Best Practices in Neuromuscular Monitoring: A Focus On 2023 ASA Guidelines

CMEO Podcast Transcript

J. Ross Renew, MD, FASA, FASE:

Hello. On behalf of CME Outfitters, I would like to thank you for joining us for part two of this podcast series focused on improving perioperative care, entitled *Best Practices and Neuromuscular Monitoring, A Focus on 2023 ASA Guidelines.*

Today's activity is supported by an educational grant from Merck, Sharp and Dohme Corporation. I'm Dr. Ross Renew. I'm an Associate Professor of Anesthesiology at Mayo Clinic College of Medicine and Science, and the Vice Chair of Research for my Department of Anesthesiology and Perioperative Medicine at Mayo Clinic in Jacksonville, Florida.

I'm really happy to be joined today by Dr. Dru Riddle. Dr. Riddle, tell us a little bit about your practice.

Dru Riddle, PhD, DNP, CRNA, FAAN:

Thanks for having me. It's great to be here. I'm Dru Riddle. I'm a nurse anesthetist and practice in Fort Worth, Texas in the Baylor Scott and White Healthcare system. We're in a large community hospital where we take care of just about every type of patient, aside from the higher risk pediatrics. We have a tertiary care pediatric facility in town, but beyond that, it's really a … all comers that walk in the door. We're not a specialist practice so much as anybody who's needing anesthesia services.

I also have the opportunity to serve in a capacity as faculty at the Texas Christian University (TCU) School of Nurse Anesthesia here in Fort Worth where I teach both clinical and didactic anesthesia content. So, great to be here.

J. Ross Renew:

Great. Thanks for coming. Excited about our conversation. I'm excited about talking about something that I think has real world implications, can significantly impact patient care. And that is trying to implement optimal neuromuscular blockade managements.

Our learning objective today is to try to help give some information and insight in how to incorporate best practices in the utilization of quantitative train-of-four (TOF) monitoring of neuromuscular blockade, particularly in the context of new American Society of Anesthesiologists (ASA) guidelines that were released this year.

During the course of today's podcast, we may be discussing some off-label uses of medications and monitoring.

Dru, I want to start by asking you a question about some background and terminology. I know that we've had conversations before. When you look through the literature you see that we're all over the place in how we describe various terms. In a previous podcast that we opened, I asked Deb Falk to define the different ways we assess level of blockade, but I'm curious if you could give us a little overview on how you would describe the level of blockade.

Dru Riddle:

Yeah, you know, it's a great question because there is a lot of somewhat ambiguity amongst clinicians. A lot of us toss these terms around, deep and moderate and shallow and minimal, but I think it's really important that we're all on the same sheet of music in terms of what we're talking about with these blockades.

Using the ASA guidelines as sort of the basis, using the references that the team at ASA put together when they published the guidelines. Let's start, sort of, at the deepest level, or most complete neuromuscular blockade and go back to someone who's completely recovered.

So, if we think about that, we're always on that continuum, right? Patients can change where they are on this scale pretty quickly based just on a time constant, even without pharmacologic intervention. But complete blockade is a patient with a post-tetanic count of zero. What does that mean? Well, you have a nerve stimulator or a quantitative monitor. You administer a train of four, there's zero response. You administer your tetany and post-tetanic count, there is no activity at all.

There is something called deep neuromuscular blockade. And deep is considered a post-tetanic count of at least one, but a train of four account of zero. So someone who doesn't have access to quantitative monitoring, if you're using a peripheral nerve stimulator, you would see zero twitches when you hit your train of four button on your machine. But at least one count, one twitch post-tetany. Moderate neuromuscular blockade is considered a train of four count of anywhere between one and three, whether you're using quantitative monitor or your more qualitative peripheral nerve stimulator.

Now, there's a little bit of confusion around the differences between shallow or minimal. And the definitions are somewhat similar. And so, sometimes these are used interchangeably, but when we think of shallow or minimal neuromuscular blockade, that clinically looks like a count, a train of four count of four. So, you click the button train of four, you see four twitches, but you do see fade that's present. What does fade mean? Meaning that the first twitch is stronger than the last twitch. We have some degree of fade that's developing.

And where quantitative monitoring comes in now is we begin to see a difference in that first to last twitch. And a quantitative monitor can give us a ratio, of a … an assessment of the amplitude or the strength of one twitch compared to the first twitch, compared to the last twitch. And so we see a train of four ratio when we have shallow neuromuscular blockade of less than 0.4. Minimal neuromuscular blockade is a train of four ratio of 0.4 to 0.9.

And then, finally, I think maybe most importantly in this whole, "How are we defining things?" conversation is around acceptable recovery. And, it's interesting to note that with qualitative monitoring, we really can't determine this. It does require quantitative monitoring to see a train of four ratio of at least 90%, or 0.9. You know, we in clinical practice, if we're not using quantitative monitoring, we do the best we can with our, with our peripheral nerve stimulator. You know, we know that certainly clinical assessment alone is not adequate there.

So, I know there's a lot of information and a long answer to a really short question, but hopefully that gets us all at least on the same sheet of music as we move forward, because we will probably be using these terms somewhat interchangeably in practice and we need to be clear on where we are on all of this.

J. Ross Renew:

Yep, absolutely. I mean, I view that answer and your discussion there as really the foundation of our future conversation, and not just during this podcast, but it's important as a technique to communicate important clinical information as we're taking care of our patients. So, I think about when we transfer care to the intensive care unit (ICU) in a patient who may be still intubated and being able to give them a consistent reliable definition of their current level of neuromuscular blockade, I think it's going to be really important, particularly in a patient that is maybe just had undergone surgery and they're going to try to extubate and wake up sooner. I think it's important when we transfer care to our colleagues too, you know, if someone's coming into our room to give us a break, or, you know, transitioning off a case and completely transitioning care. It's nice to be able to use clear nomenclature that we can all agree upon, so there's no ambiguity in what's really important clinical information and has the potential, you know, as an anesthesia providers. We have the opportunity to screw this up pretty easily. And so, making sure that we're at least using the same verbiage is critical too.

I think that there's been a lot of issues with coming to terms with these terminology because one of it is researchers have used various terms. When you go through their methods sections, you'll see it's kind of all over the place. But our definition of recovery even changed. I can recall looking at papers from 10, 20 years ago when they talked about a TOF ratio of 0.7 as being adequate recovery. And, you know, most recently, our definition for adequate recovery is a train of four ratio greater than 0.9 at the hand or the thumb measuring the response of adductor pollicis.

You know, there's good literature that patients in that 0.7 to 0.9, while you might think it's kind of academic and does that really matter, there's evidence that there's still oropharyngeal dysfunction and our patients are at risk of having aspiration events when they're that, at those shallow or minimal levels of blockade that you mentioned. And so, I think it's really important that we're consistent with that and, kind of have some context into how these terminology came about.

So, the big exciting information this year coming out, and ... from the ASA on publishing guidelines on neuromuscular blockade management, you know, I'll ask for your thoughts, Dru, on this, but I'll say that for me, it's been a long time coming. I've been waiting for it and I've heard whispers of it, but it's neat to finally see it come out. What's your take on these guidelines that were published?

Dru Riddle:

Yeah, I agree with you. You know, the whispers have been out there for quite some time that these guidelines were coming and the group was working on them. You know, anesthesia care is synonymous with neuromuscular blockade. Not every single patient, of course, is ... requires neuromuscular blockade, but probably more than any other discipline within the healthcare space, this is in our wheelhouse. This is our expertise in not just managing patient's neuromuscular blockade, but maybe equally, at least equally, if not more importantly, ensuring appropriate recovery from neuromuscular blockade.

Look, we are chemically paralyzing people. And we have a responsibility not just to manage that intraoperatively really well, but ensure that we are appropriately antagonizing or reversing that chemical paralysis when it's appropriate for the ... for the care of our patients.

So, my gut react... Or my initial, kind of reaction to this was, "Finally." And also, I feel like these guidelines are some of the stronger recommendations related to management of neuromuscular blockade. It is a high risk, incredibly dangerous endeavor because we are chemically paralyzing folks.

And, you know, you look at clinical practice guidelines, whether it's in anesthesia or, you know, perioperative risk assessment, etc., quite frankly, sometimes guidelines are sort of, "Well, this is lovely information to know, but it doesn't really directly impact my practice." And I would say, these guidelines are the contrary to that. They directly impact what I do and the way I approach my care. And I would assert that we all should really take a look at them. If you haven't, if you haven't read them yet, they're freely available. Go out, read them. Understand the implications because the science is fairly robust that underpin these recommendations. And unlike some other guidelines, these, these have the opportunity to significantly change outcomes in a positive way for our patients.

J. Ross Renew:

Yeah, I completely agree with you. We need to own this as a specialty, like you said, that the management of these drugs, these are our drugs. They'll trickle in other circumstances, but primarily these are anesthesia drugs. You know, the difference between a poison and a drug is really just the level of competence of the provider administering the drug. These drugs were originally discovered as, you know, the curare in the rainforest, the poison tip darts that the locals used, and certainly an understanding of the potency and complications associated with it. Dr. Beecher's landmark original study showing the increased complications when using curare in the perioperative period, it's been something that's flagged the importance of having good neuromuscular blockade management. Unfortunately, we still seem to be struggling with it as a specialty.

I also like to think about these ASA guidelines in the context of other societal guidelines. You know, the ESAIC, the European Society of Anesthesia and Intensive Care came out with their guidelines the summer preceding this one. They're analogous to these ASA guidelines also. Most major societies that have put out guidelines say, "Hey, you need to be using a quantitative monitoring. You need to use a quantitative monitor." Sugammadex is the only option if you're trying to reverse deep or moderate levels of blockade. And, I think the ... I didn't see any surprises in the guidelines when they were published and I commend the ASA for their efforts.

I've had conversations with a number of the authors on that, and it was neat to get some insight into the work and how serious they took this matter. The level of evidence is strong. I think all the level of evidence is strong except for one of the guidelines and that's the role for neostigmine at reversing minimal levels of blockade. So ...

Dru Riddle:

Yep.

J.Ross Renew:

They did their due diligence. There's robust literature. So, what, what do you ....

Dru Riddle:

One of my other worlds is I have the opportunity to co-chair the Cochrane Network here in the U.S., and so … part of guideline development and understanding strength of evidence in that process is something that I feel really... really, both comfortable discussing and confident in. And I would agree with you, Ross. I think the group did a really good job from... This is a little technical, but from the methodology of how the recommendations even came to be, which I think for me then as a clinician, someone who hopefully is going to use these in my clinical practice, I have … I have confidence in what the recommendations are and how they might apply, you know, kind of across the spectrum of patients undergoing anesthesia. This is not a, "Oh, there's only a small subset of super high-risk patients," or, "Only in this subset of surgical types of patients," but rather this is anyone who receives neuromuscular blockade, regardless of pathophysiology risk, practice setting even. So, I think they … I agree with you. They did a really nice job with them.

J. Ross Renew:

Did you find any surprises or things that you thought they may have left that were not addressed? Something they might've omitted or left out?

Dru Riddle:

No, other than... there is … there is, perhaps a little bit less of a recognition that quantitative monitoring may not be as ubiquitous across non-academic medical centers across the U.S. than, than perhaps is realized. And, we look at monitoring and operating rooms over my 20 something years in anesthesia and I dare say the operating room (OR), the day I went in for my first anesthetic looks very different than it does today. And I think we'll see, you know, massive rollout of quantitative monitoring, but there's a lot of really large, fairly complex health systems that don't have quantitative monitoring available. And so, I think the authors did a nice job, but perhaps could have called out a little bit better in the absence of quantitative monitoring, sort of, here's … here's where we think you need to be, rather than just perhaps relying on, at least in the bullet point forms, you know, here are, here's the train of four ratio. Because we know the data are really clear. We can't determine a train of four ratio without the assistance of some sort of, you know, real complex technology. Well, not super complex technology, but without the technology to do so.

The other piece that in my mind I think, I would say that it surprised me, but in a good way, is that really sugammadex vs. neostigmine, they were very front and center about the efficacy of both of those drugs. And perhaps, you know, we often see clinical practice guidelines that speak to either classes of drugs, or speak in general terms about the management but not really calling out in particular, you know, individual drugs. And in this case, you know, the data underpins exactly what they said, which is there's probably little if any use of neostigmine perhaps except when we are trying to reverse minimal neuromuscular blockade, or obviously we can't use sugammadex like with cisatracurium or atracurium, so ...

J. Ross Renew:

You mentioned the evidence for the different antagonists. And I would alert our audience to an article that I'm sure you're familiar with, with comparing adverse events associated with sugammadex and neostigmine. I know that that was heavily cited in the guidelines as well when they were developing … developing them. And so they really did look at, you know, a vast array of literature that's been mounting and something that folks interested in this topic have been sharing and kind of shouting from the rooftops for years, "Hey, we can do better with this." This isn't just my opinion. This is an evidence-based approach to handling this.

I want to touch on one of the things that you mentioned with one of the shortcomings of the guideline. That is the applicability to the provider in a practice that doesn't have access to objective and quantitative monitoring. And I think that, you're touching, … you touched on something that was probably the biggest barrier, the biggest deterrent for getting guidelines of this manner approved and through.

I know that the ASA does not represent just academic anesthesiologists. It represents folks in rural settings. It represents anesthesia providers throughout the country in a variety of environments. And some of the conversations I've had with the authors of this point to this as being the biggest concern, is not alienating and leaving behind the providers that don't have access to quantitative monitoring. And so they weighed that vs., "Well, we have to do the best thing for the patient." And I know that lots of conversations were had about this. And the biggest concern being that, you know, if we have guidelines now for the anesthesia clinician who does not have access to monitoring, are we exposing them to medical-legal concerns in the face of new guidelines?

And ultimately, you know, that … the driving force for developing these guidelines according to the committee and what they wanted to get done is, "Look, we have the evidence. It's apparent. Quantitative monitoring is the only consistent way to determine adequate recovery, so we're going to go for it." I commend them for going for it with these guidelines where they say anytime you're giving a neuromuscular blocking agent, you need to. And hopefully this is one of the motivators for folks in our audience and people interested in neuromuscular blockade to explore some of these guidelines.

I know that you shouldn't feel alone. If you're listening to this right now and think, "Oh gosh, we just have one peripheral nervous stimulator in my practice. Now I've got to learn something new." You're not alone in that thought. I talk to people across the country. And implementing, introducing these guidelines is something that many folks are having to undertake and incorporate, and a challenge that everyone's trying to address as they try to get up to speed with some of these guidelines. It's something that's going to be interesting to see. It really speaks into implementation science now as well. We start thinking about what are factors to it that impact human behavior and learning new techniques?

What kind of barriers do you think you guys might see in your group as you try to implement monitoring or practices that you're familiar with?

Dru Riddle:

Well, yeah, you bring up a great point. I'm in a large ... large community hospital and we don't have quantitative monitoring. And so, to me, while I see that as, you know, maybe something in my practice we need to change, I see the guidelines as the evidence to go to the facility and say this is something that's critically important. We now have really clear data. Although it's been mounting, now we have the definitive statement in application of this, you know, across, across the places where anesthesia's delivered in our facility. And so, I do applaud, I agree with you, I applaud the boldness of the group to make the call because we can't hide, we can't hide the evidence or bury the evidence. If the evidence is there, we need to bring it forward and make the guidelines appropriate to the evidence. And then, those of us that are fighting the fight of, "Well gosh, how do we implement this?" Well, the guidelines help us to make that argument for our facilities.

You know, the other aspect of this really has to do with... you know, guidelines are great. You can hang them on a wall, you can put them up in the, you know, in the break room and everybody can take a look at them, but changing provider practice, especially when provider practice may be deeply rooted in a culture of safety. You know, let's, let's be real, anesthesia is incredibly safe. It's safer today than it was, you know, a couple decades ago. Not to imply that it was unsafe a couple decades ago.

And so, I think sometimes providers want to see really substantial changes and not perhaps incremental changes when a new guideline is brought out. I think we need to recognize we're doing a decent job at neuromuscular monitoring likely, you know, here in 2023. We probably can always do a bit better. And these guidelines, as I see the implementation, really allow me to go from good to great, or better to best in my practice.

And so. I would encourage our listeners. If you're in that situation, "I don't have access to quantitative monitoring. Maybe I, maybe I have sugammadex, but I just have one or two vials sitting in the, in the, you know, in the pharmacy area only if I get into a really bad trouble, but routine use of this drug is either not allowed in my facility because of, you know, formulary concerns or access, etc.," that you begin to use these guidelines to educate other decision makers to help you come into what will become best practice as opposed to just good or okay-enough practice.

J. Ross Renew:

Yeah. I think that's going to be the obstacle. You know, we are certainly practicing in an era of trying to be fiscally responsible and making good economic choices for our institutions as we try to, you know, improve patient safety, but not at great expense. The bottom line is, you know, we're trying to practice as cost-effective as possible without compromise and patient safety. I've heard this conversation before about buying new equipment has some upfront cost, for sure. When you start comparing different monitoring modalities, some of these devices have disposables that can add some cost as well. But it's, it's ... you can't, it's tough to put a price on unexpected outcomes related to residual weakness. There are certainly some models that are out there, some publications that have demonstrated the cost of an unexpected ICU stay, the cost of an unanticipated aspiration pneumonia that perhaps prolongs a hospital length of stay. And so, there've been some efforts to try to quantify the impact, the financial impact of inappropriate neuromuscular blockade management. Using these, this information I think can help you when you go to your ... your pharmac ... your hospital committees, your administrative committees that would ultimately have the say in obtaining these devices.

But the other thing that you touched on that I think could really have an impact on empowering you to have this conversation say, "Hey, we want to get quantitative monitoring," is I think you can have a more targeted approach use, appropriate administration of one of the most expensive drugs on our anesthesia cart. And that is sugammadex. Depending on your hospital contract, around $100 for a 200 milligram vial. We ... my practice, which we have unrestricted sugammadex use and objective quantitative monitoring, we use the monitoring to confirm that our sugammadex is at an appropriate effect. There's an emerging idea that you can titrate sugammadex and really can only do that with a quantitative monitoring. So. it may have sugammadex-sparing effects by giving more appropriate precise dosing of sugammadex. I would use that when I'm having that conversation with my decision makers about buying new equipment as well.

Dru Riddle:

Yeah, I agree. I also think there's... This whole idea of, "Why do I even need these guidelines to begin with? I'll just deeply paralyze everyone. I've got this great drug, it can reverse patients from, you know, this whole continuum of blockade." I would, I would call out to folks that are doing that, that that's not best practice. Quite frankly, it's probably a little bit lazy. And we need to, we need to ... our patients deserve better.

And so, appropriate use, and planning appropriate use of neuromuscular blocking agents is equally as important to appropriate use and planning for antagonism of those neuromuscular blocking agents. And, you know, we're well positioned to be in the place to drive that. From a pharmaco-economic perspective, you're exactly right. The upfront cost of the monitor may far be offset by the either sugammadex sparing, or appropriate use of the neuromuscular blocking agents to begin with.

I also would point out to some folks, you actually may have quantitative monitoring capabilities that work in your... Whatever your monitoring system you have. You just don't have the last piece of the cable, or it's even there and coiled up in the... You know the bottom drawer of the anesthesia machine that no one opens? Because it's full of spare parts and nobody knows what they are. There actually may be some quantitative monitoring that was purchased as part of your monitoring system and it just, sort of never got rolled out. Actually, that's happened in a couple facilities I've had an opportunity to work with, that no one knew they actually had the monitors and they were already incorporated.

As silly as it sounds, go open that bottom drawer. Ask someone from biomed, "Hey, is this just a switch we need to flip?" Because it could, could actually be there for you and you just, you just don't know because no one's ever, you know, no one's ever used it.

J. Ross Renew:

Yeah, great point. Great suggestion. There's ... I kind of group these monitors into two categories. There's like the standalone handheld one that you can carry with you everywhere. Take it to post-anesthesia care unit (PACU), take it to ICU. You'll need to get some cords to integrate into your electronic medical record. Most of them have that, but then there's the modular one, which is what you're talking about Dru, that you can click in. That's, we, we have both the standalone and the modular one that we'll click in. And when it's integrated like this, I see greater utilization of it because it doesn't take up space on an IV pole. It really just becomes part of our anesthesia machine,and it's just integrated a lot more seamlessly in that setting as well. I would look at what kind of specific

anesthesia machine you have and your workstation and start with that manufacturer and see if they have monitoring available for that. That's a great place to start. Like you had mentioned, maybe you've got one laying around. That'd be cool.

Dru Riddle:

Yeah, yeah, sometimes you do. There was a facility that had both, had a couple of the freestanding portable ones and some that were modular and just didn't know that they, didn't know they had them. No one had really looked and asked. Yeah, so interesting.

J. Ross Renew:

I know when I came on staff I found and had to dust off three TOF watches …

Dru Riddle:

Oh, wow.

J. Ross Renew:

… in our group, which are not currently manufactured anymore. But when you go and look at the literature, the TOF watch is talked about all the time, it was one of the most studied acceleromyography-based objective monitoring.

Dru Riddle:

Yep.

J. Ross Renew:

So, Dru, we've talked a lot about some of the important literature that's out there and these ASA guidelines, but I want to try to pick your brain about important clinical scenarios that you may have encountered in your practice in which neuromuscular blockade management played a key role in enhancing patient safety. Do you have an anecdote or anything like that?

Dru Riddle:

Yeah, actually not that long ago we had a patient who was undergoing a laparoscopic, was having some colorectal surgery, laparoscopic procedure. And it was a procedure where the surgeon was, sort of on the fence as to whether this patient should stay overnight or actually was a decent candidate to be discharged later in the day. Because of some family situations, this patient was really, really interested in trying to get home the day of surgery. And so, we, we talked about it on the front end, of course didn't give any guarantees to the patient, but we did everything we could to try to maximize his opportunity to be discharged that day.

Surgery went well. I will say that appropriate neuromuscular management intraoperatively, talking with the surgeon, understanding what his needs and desires were, facilitated what I think was a really successful surgery. The patient was deeply blocked intraoperatively, to facilitate surgical exposure and laparoscopic techniques. And then, at the end, we made clear decisions around antagonism of that block and the timing of the antagonism of that block. The patient was appropriately antagonized, was extubated, was sent to the recovery room, ultimately was able to participate fully in the enhanced recovery after surgery (ERAS) requirements of PO (by mouth) intake and early ambulation, pain control, etc., and ended up being discharged.

It's important that all of our patients are appropriately reversed from their neuromuscular, you know, blockade, but in particular, this patient who was going to be going home in a non-monitored situation with non-healthcare provider family members, this patient is a high-risk kind of an individual. Abdominal surgery, you know, we know that this patient has the risk of, you know, aspiration and laryngeal and pharyngeal weakness that could lead to all kinds of, kind of bad fulminant sequelae. I think it's important also though to recognize that sometimes these patients just have a little bit of extra blockade, a little bit of residual that maybe is not clinically in your face apparent, but boy does it slow down the process in the recovery room. Maybe they're just not oxygenating quite as well as you'd like. They're not able to fully participate in their recovery, whether it's the pulmonary toileting or in the case of ERAS, early ambulation, etc.

And so, when you think about those pharmaco-economic models, you know, how long does it, how long does an extra 20, 30, 45 minutes in the PACU cost? Not just physical time with the patient, but, sort of from the throughput perspective? I also want to point out, you know I said earlier we don't have quantitative monitoring in our facility. And so, this patient laparoscopically, the position was with the arms tucked. And, I think it's important to call out that, you know, best practice tells us we would be not using the face, not using the eye, the orbicularis oculi or the eye muscles in order to monitor our patients. We were using, because we didn't have access to the arms during the case. But it's important in your, if you're in that situation, at the end of the case, the drapes come off, the arms get untucked and come out and you've got to move that neuromuscular monitor to the arm because we know those eye muscles overestimate recovery. And so we really need to be clear that we are monitoring appropriately given the limitations of the monitors we have. Just kind of a caveat to put in there, that we really do need to think about monitoring on the arm if we can. If you can't because it's not accessible, moving that, moving that monitor.

J. Ross Renew:

Yeah, I couldn't agree with you more about, you know, getting the monitor, getting the peripheral nerve stimulator from the face to the hand. We know that recovery at the face occurs well before recovery at the hand. We've set the threshold at recovery at the hand as it's one of the last muscles to recover, that way we can feel certain that if the hand's recovered the rest of the body and the muscles that we care about has recovered as well. And so, that step's real important. There's great literature that checking the level of blockade at the face overestimates the degree of recovery.

And I commend you on taking those steps and having a great patient outcome on... You know, despite maybe having one arm tied behind your back without having quantitative monitoring available, you're doing the best with the situation that you have currently.

And I think about an earlier comment that you made about, you know, anesthesia has gotten … is very safe. And we are trying to make incremental small patient safety enhancements that may not be, you know, overtly obvious to you each time when we start thinking about leaving patients with residual weakness, the ASA 1 (American Society of Anesthesiologists classification 1) patient, you know, the 22 year old ASA one, if you left them with a low degree of residual weakness, it is very unlikely that they're going to go on to have a complication. Not every patient that has residual weakness goes on to have a complication. That's probably been one of the drivers for the anesthesia community being slow to adopt some of the best practices because so many times, you know, we follow our patients while they're in PACU, maybe post-op day one if they're in the ICU, but a lot of times we don't have this long term follow-up. And so, some of these complications that are associated with neuromuscular blockade, not only don't happen to every single patient, but they can take several days for a pneumonia to pop up from it, unfortunately.

And so, when I start thinking about specific clinical scenarios that I want to really emphasize optimal neuromuscular blockade management, I think of the opposite end of that ASA 1 20-something-year-old patient and think about the elderly patient who does not have a lot of physiologic reserve, who, you know, a little bit of hypoxia could be the difference in them getting discharged or getting admitted, or heading to a regular monitored floor room, or heading to the ICU. And so certainly the elderly is a patient population that warrants particular, particular care.

I do a lot of thoracic cases as well, and so the pulmonary cripple, a patient with, you know, tenuous chronic obstructive pulmonary disease (COPD) who comes in on home oxygen, who will not do well with a little bit of hypoxia or hypercarbia from being residual weak. I want to make sure that the things that I can control, the level of blockade, restoring neuromuscular function, is something that I've definitely taken care of and adequately addressed because we really can't tolerate... That patient really can't tolerate having anything not in their favor, particularly something that I can control like neuromuscular blockade.

And then the other group I think about a lot is the obese patient.

Dru Riddle:

Yeah.

J. Ross Renew:

You know, there's a lot of literature about, you know, should we be using real world body weight, like actual body weight, or ideal body weight, ideal body weight with some scalar component? You add a little bit to try to correct for what the different … a different weight could be. And, my take on how to dose, you know, reversal agent, or neuromuscular blocking agents in that obese patient is, I feel so much more comfortable when I have a monitor to try to help guide and steer me to, in an appropriate direction. I would feel comfortable using, deviating from manufacturer recommendations and perhaps using a smaller dose, a dose smaller than total body weight for a reversal agent if I had an objective monitor that was working well for me during that time and I could give it and then measure the response before extubating that patient.

Again, these patients often have central sleep apnea and a little bit of pharyngeal dysfunction, a little bit of upper airway obstruction. Obstruction could be the difference between them getting discharged or getting admitted, or even at the most extreme end, having to get re-intubated in the recovery room from respiratory distress. And so, I'm always vigilant about those, that group of patients.

CME programs always include SMART goals to help you translate information into action. SMART stands for specific, measurable, attainable, relevant, and timely. Our SMART goals for this program are, we hope that you can implement strategies from the 2023 ASA practice guidelines for monitoring and antagonism of neuromuscular blockade. We also hope that we've demonstrated the utility in using quantitative monitoring in place of qualitative monitoring with a peripheral nerve stimulator, or a clinical assessment which utilizes physical exam techniques as optimal strategies to hopefully avoid residual neuromuscular blockade and their associated complications.

This podcast is part of a three-part series. In episode one, we talk about improving patient outcomes with quantitative train of four monitoring. In episode three, we talk about best practices in the pharmacologic reversal of neuromuscular blockade.

All these podcasts are available, plus a wide variety of other educational activities and resources, online at CME Outfitters Virtual Education Hub. To receive continuing education credit for this activity, participants must complete the post-test and evaluation online.

I want to thank Dr. Dru Riddle for his outstanding discussion and expertise on this topic today. I appreciate you sharing your clinical insight with us as well and some of your impressions on the 2023 ASA Guidelines, and I want to thank our listeners for being here today as well.

