Good afternoon folks. Thank you for joining us for the NoCVA HAI SSI Perioperative Glycemic Control webinar. My name is James Hayes and I'll be your facilitator during the call today. Although with us today is Laura Maynard, director of collaborative learning. Before we get started I'd like to redo some logistics. This webinar is being recorded and will be posted to the NoCVA HAI and SSI learning network project pages. So you can go there to reference. At the conclusion of this webinar you will receive a short evaluation containing four questions. We ask that you please give us your feedback those questions as we use those for this webinar. And planning for future webinars. Currently all lines are muted and in listen-only mode. During the question and answer time, you're welcome to ask your question live by raising your hand. You may click on the hand icon located in the Control Panel on the right-hand side of your screen. We'll unmute your line and you can ask your question live. Please be sure to announce yourself and the hospital you represent. We encourage your participation throughout the webinar. So if you have a question or comment like to make, please use the chat box to do that. When making your comments, please be sure to select chat, all participants so that everybody on the call can see your comment. Before we get started, I would like to test the chat feature. So please select chat, all. Let us know where you're from and who's on the call today. So we appreciate that. Want to introduce our speaker today. We are extremely pleased to have with us doctor Bradford Winters. He's an intensivist and anesthesiologist who specializes in both general surgical critical care as well as neuro critical care. His background is in basic sciences where he originally did research in microbiology, entered his doctorate degree in the area of molecular bacterial pathogenesis. He subsequently spent several years studying vascular biology as well as pulmonary diseases. He's become interested in patient safety and quality through his efforts to evaluate the effectiveness of rapid response programs and develop and implement Johns Hopkins at a response program. And also to integrate it into the hospital's overall emergency response system. He spent the last decade as a clinician in the ICU. And in the very same ICU where the congregants of unit based safety program was first developed and where the original prevent CLABSI work was done. He has a special interest in technological solutions and strategies to improve patient safety and quality and we're very happy to have Dr. Winters with us today. So at this time, we're are going to turn the presentation over to Dr. Winters.

Good afternoon, everybody. Thank you very much for that very warm welcome, Laura. I really appreciate it. So today we're going to talk a little bit about Perioperative Glycemic Control. And what I'm going to try to do in this talk is give you guys a basic background in what the literature and evidence says about performing and how we should consider performing glycemic control in the perioperative and intraoperative period but also I'd like to touch on some of what we call the adaptive pieces about how we actually implement this kind of patient safety and quality improvement initiative in the operating room.
environment. So start off, I have to tell you about my disclosures. Unlike the doctor here in this cartoon on the slide, I actually have nothing to disclose that is relevant to this topic. I don't own any stock or financial interest in any companies that have anything to do with blood glucose control. So I'm clean and free from that. And I'd like to let everybody know about our objectives a little bit. What I'd like folks to be able to take away from this presentation is the ability to discuss with other folks what the evidence and literature and national organization guidelines actually say about perioperative and intraoperative glucose control. I'd also like folks to be able to understand and describe the role that teamwork-based programs such as the comprehensive unit safety program have in achieving effective implementation of an intervention such as better perioperative glucose control. I'd like to -- folks to walk away from the talk understanding who their stakeholders are and some ideas about how to engage the different stakeholders that you may need to bring into this process if your hospital is interested in tackling this patient safety issue. I'd also like folks to be able to walk away with the ability to explain how they would implement a rigorous process of metrics to achieve the goals of better perioperative glucose control. So let's start off with a little bit of definitions. What actually is hyperglycemia? That is the problem that we are trying to tackle in better Perioperative Glycemic Control. Well, in normal people, blood glucose sugar is normally maintained in a very, very tight range. Somewhere between 72 to 126 milligrams per deciliter. In fact, when you look at the literature and we'll talk about this in a little bit as we go forward a lot of people talk about something called tight glucose control. Or strict glucose control. For the most part, when you look in the literature and you look at guidelines, when people start using those terms, this is what they're talking about. They're talking about actually trying to maintain low -- normal blood glucose under abnormal conditions. So if you look back at a lot of the papers over the last decade or so, when they say they engaged in stricter or tight glucose control, their target -- trying to target a range somewhere 70 to 126 plus or minus a little bit. Now, most laboratories define a normal blood glucose range somewhere on the lower end of about 60, 65, up to somewhere around 115, 120. It may very a little bit depending on your hospital's lab but generally a reflection of what is considered to be normal in normal people under normal conditions. Now as our cartoon here shows, control of blood sugar and where a lot of medications that are available out on the market interact involves a lot of both peripheral and central mechanisms across many, many different organ systems. And the problem of Perioperative Glycemic Control, even though there's been a lot of papers published lately and a lot a lot of reviews of the last decade's worth of research in this area, the problem itself and the controversies that then and continue to swirl around it actually date back to the 1990s. In fact, Van Haeverbeek published a nice article in 1999 starting to really address this issue, which has been simmering in the background back through the 1990s in the perioperative literature. Now of course, everybody is familiar with the Surgical Care Improvement Project or the so called SCIP. Glucose control is one of the central SCIP measures although they put -- focus primarily on cardiac patients. Perioperative piece of this SCIP measure and process does tend to focus on infection involving things like hair removal, and antibiotic administration, timely administration of antibiotics and re-dosing, removal of urinary catheters when they are not needed, maintenance of normal 30 and finally what we're here to talk about today is glycemic control. Interestingly if you look at some of the actual measures within the SCIP measures, one of the goals for cardiac patience is to achieve you glycemia for this to -- first two postoperative days. That creates a nice target for folks to work with but as you can imagine, that snapshot in time, potentially misses large areas where patients may not have good glycemic control. While this -- SCIP measures have value, we are actually now trying to seek a better holistic more continuous approach to better glycemic control...
behind just these points snapshots in time. As you can imagine obviously glycemic control becomes a much more complex issue than simply targeting what's in the SCIP measures would suggest. So what is the relationship of the glycemic response to surgery? Well, patients undergoing surgery commonly exhibit a hyperglycemic response secondary to the stress response. Now, 15, 20,000 years ago when humans were mostly living in caves and we were out there battling the normal elements of nature, having a robust stress response, helped keep us alive and help our species survive. When we saw something like a saber tiger, come at us, the ability to wrap up our catecholamines and drive up our blood glucose, we had plenty of energy for our muscles to be able to react and engage in that so-called fight or flight response with obviously a normal adaptive mechanism that helped us survive. Of course nowadays, humans lived in a very, very different environment. We are not being attacked by sabertooth tigers normally. We live a much more safe life most of the time. And so now some of these innate stress responses that we've developed evolutionarily become maladapted for us. However, because it's part of our normal evolution, it's often viewed as a normal response. In fact, anesthesiologists in the operating room have viewed this hyperglycemic response along with the rest of the manifestations of the stress response in fact be quote-unquote normal. But in fact it's actually a failure of glucose regulation. And given the controlled environment that we live in now, and under controlled medical care, it actually becomes maladaptive and can harm patients. In fact, many people believe it's occurrence is a possible harbinger of diabetes in that it could be a predictor of stress test. A person who exhibits exaggerated time ago -- hyperglycemic response to surgical stimulus in fact is more likely down the road, to become diabetic. And some people view it as a prediabetes. If you exhibit an exaggerated response in the perioperative period, what is the risk that you are eventually going to become diabetic? People have been looking at that and trying to track patients figure out whether in fact an exaggerated sponsor the perioperative period can be predictive. Other people have argued that in fact what we are often seeing is undiagnosed diabetes. A patient may not get -- often doesn't have their blood sugar tested very often until now. They come in for surgery and all of a sudden they are being watched by the medical system, getting blood glucose measured more frequently and because they are either on the way to developing diabetes or already may have diabetes but are undiagnosed, we see it. Because we're measuring blood sugar and all of a sudden we see this exaggerated intraoperative and perioperative response. In fact up to 20% of patients with perioperative hyperglycemia actually have no diagnosis of diabetes at all, which is why some people think it may be a prediabetic state. In some studies up to 50% of surgical patients actually have some form of diabetes but have never been diagnosed at the time of surgery and the time of surgery becomes the diagnosis of the disease. So a lot of people are trying to tease out exactly what is exaggerated or strong glycemic response, actually -- how much of it is a harbinger for things in the future and how good is it for uncovering or unmasking diabetes that we haven't caught through other means or medical system? So additionally, nondiabetic and nondiabetics and diabetics may also respond very differently to the consequences of this response. So another layer that adds onto it is the fact that the nine diabetic, the true nondiabetics who may have an exaggerated hyperglycemic response versus a diabetic may in fact have very different consequences. The mechanisms driving the response while they often share some similarities to type two diabetes, are in fact different. They involve a variety of counter regulatory hormones including things like cortisol, growth hormone, and especially of concern in the operating room because of stress response, catechols like noradrenaline and adrenaline. Ultimately from our point of view as clinicians, the stress response in surgery leads to three major problems. Whatever the hormonal milieu is. It leads to the
breakdown of glycogen by the liver to drive up blood sugar. It needs to deliver
generating glucose from gluconeogenesis amino acids, also further driving up the blood
sugar and a state of insulin resistance with the body did not respond normally to the
insulin that is already produced or available to the tissues. All of these ultimately lead to
this hyperglycemic response. Interestingly though, if you look in nondiabetics particularly
those having had abdominal surgery there’s some interesting studies that show two very
interesting factors. One of which we would probably expect. Putting people on postop
glucose infusions is bad. It drives up their blood glucose. And makes hyperglycemic
response much, much worse. But even more interesting is that you actually give people
a small pre-op glucose load, just before they undergo surgery, it has been shown to
actually improve the control of blood glucose in the intraoperative and perioperative
period. It actually seems to smooth out the process. Additionally we know from studies
that there are other things that exacerbate the insulin resistance problem. Those include
things like hypothermia in the operating room, very large blood loss surgeries, prolonged
pre-op fasting, prolonged immobilization in the perioperative period and perhaps even
certain anesthetics. One study looked at ISIL flooring use and found that it seemed to
correlate with increased insulin resistance. -- I do -- isoflurane. All this might not mean
too much for us if it wasn't for the fact it obviously have consequences. If it didn't have
consequences I don't think we'd be worried about whether people's blood sugars go up
or down but we don't have consequences. There are certain biological consequence of
such as impaired leukocyte function, increased inflammatory markers, and
predisposition to infection. This little cartoon on the slide shows the effect that
hyperglycemia has on the ability of white blood cells to grab onto in endothelial cells and
move in and out of the blood vessel in order to respond to infection. When you have
elevated glucose, this process becomes suppressed. And white blood cells can't do the
job they’re supposed to do. In addition to these biological markers, we do know they are
outcome problems. Surgical competitions are increased in the face of hyperglycemia
particularly surgical site infections. There's increased resource utilization. There’s
increased length of stay particularly in the ICU. That is critically ill surgical patients.
There’s increased need for organ support such as ventilator days, the need to support
someone's lung ventilation. Even concerning concerning may increase mortality and that
is not only occurs in diabetics where people have traditionally thought it would be a
problem but in nondiabetics as well. So there’s an underlying caveat that goes with
everything I've just said. Much of this data regarding glucose control -- we’re going to
tease this apart a little bit in this webinar is actually derived from cardiac surgical patients
as well as ICU patients in general. In fact, one of the big studies that really lit the fire
under this area was back in 2001 when Vanderburg and her group in Europe published
their famous article on tight glucose control. Again, focusing on keeping people's blood
sugar normal in otherwise abnormal circumstances. Now, that was at ICU level study.
And some of the patients were perioperative but not all of them. So trying to extrapolate
this to the general surgical population throughout our operating rooms, throughout the
kinds of patients that the operating room takes care of is a bit of a stretch at times
because again a lot of the data actually comes from ICU patients and again from the
subset of cardiac surgical patients. Extrapolating it to all surgical patients has become a
common quest by many hospitals because of the potential connection to surgical site
infections which of course everybody is trying to reduce. And the data that suggest that
having hyperglycemia may worsen the risk for surgical site infection has driven a lot of
the focus on this. But can we actually apply these strategies to all surgical patients?
Well, if we look at some of the data on general surgical patients, there was a 2010
systematic review that looked at 94 studies. They were nondiabetic patients. The
patients that weren't traditionally thought to be a big problem in terms of Lucas
management. What they found is that blood glucose rose significantly with induction of anesthesia and alone. That was before the surgeon even begin the surgery. And persisted in up to 40% of patients well into the surgery, about six hours. They also found in certain subset that abdominal surgery patients did have this rise although glucose levels off after time. And whether it was an open or laparoscopic -- laparoscopic surgery didn't seem to make much of a difference. As we know from other literature cardiac patients have the highest and most sustained glucose values but interestingly, so did neurosurgical patients. Some people have argued that neurosurgical patients are driven by the fact that many of many of them get steroids but even neurosurgical patients who don't get steroids also seem to have this problem. So in this study, of nondiabetic patients, clearly the glycemic response being out-of-control was a very, very common problem and persisted for long periods of time intra. But interestingly they also found that patients who get different anesthetics such as epidural anesthesia often had attenuated glycemic responses. Remember I said there was one study that looked at ISIL flooring and suggested increased insulin resistance. -- isoflurane. Like an epidural, you might actually be able to attenuate some of those responses. Dr. Subrahmanyan and his colleagues found that using continuous insulin infusions in vascular patients was able to significantly reduce postoperative cardiovascular events. Dr. Lipschitz and Gropper looked at a low of studies to see reducing these competitions. What they found is that glucose should, based on their review, be kept below about 140 to 150 milligrams per deciliter. And what they found in their evidence review is that tighter glycemic controls of didn't really improve the situation. This actually parallels what was subsequently found after that original Van deBerghe study came out in 2001. For those who might remember that study, they targeted again exquisite tight glucose control maintaining normal glycemia in a large number of ICU patients. They found dramatic improvements in a variety of outcomes. Interestingly, they also had almost no episodes of hypoglycemia which is one of the major concerns that people have about tight glucose control. That paper created a huge buzz, lots of ICUs around the country started doing tight glucose control and a lot of them started publishing their data. What they found was that nobody could reproduce the results of her study as well as the other studies that came afterwards. The hypothesized -- hypothesized it may not actually be the bloke who -- the glucose value per se that we target in any environment whether it intra-op, in the ICU or out on the four, perioperative lee, but rather the provision of extra insulin to overcome the insulin resistance. Whether your blood sugar is 80 or 140, having that extra insulin might be the real key to preventing complications. Again, nobody's been able to 100% let -- nail this down. It's a pretty hard thing to do but it's a very interesting thought considering what has transpired in the literature over the last 10 years. So the Cochrane review, for those who aren't familiar, the Cochrane collaboration is a very robust folks -- group of folks into a lot of of very rigorous systematic reviews to answer clinical questions. And they are very, very well-respected. And they in 2009 published a review of blood glucose control and surgical site infections. They compared strict or tight glucose -- control regimen to what they defined as conventional regimen, keeping blood sugars sugar is below 200-milligram per deciliter. They found, as we said that beginning,
being in the ICU although many of the patients were in fact postoperative, it was also contacted by small size trials, inconsistent definitions and some other problems. And their conclusion that given these methodologies, and the data that was present in these papers, that there was not sufficient data to support a strict or tight glucose control approach in these patients. And again they looked mostly at ICU but a lot of them were surgical. This was followed up by a second Cochrane review looking specifically at diabetes patients undergoing surgery and comparing again the same strict tight glucose control regimen to a conventional regimen where we would just keep the blood sugar below 200 milligrams per deciliter. Like the study they did on the surgical site infection, they found in diabetic patients that there was no difference with tight glucose control over conventional control. Trying to approach a more normalized glucose under these circumstances, somewhere in the 80 to 120 range, really had no benefit. And they did a post hoc analysis of their data and also found that tight glucose control had a higher incidence of hypoglycemic events in the perioperative intraoperative period. Very much mimicking what all the ICU studies found when they tried to replicate Dr. Van deBerghe’s work. So overall, in the ICU, with surgical patients and with surgical patients in the operating room, tight glucose control, normalized blood glucose doesn't seem to have a benefit and carries a potential risk of more hypoglycemic events. So where does all this leave us at this point? If we want to control blood sugar, and we think it's a good idea because we've got a lots a lot of circumstantial evidence suggesting that out of control blood sugar is bad, given the data that we have, what do we do? Doesn't seem that tight glucose control is what we should be doing because it doesn't seem to help and it carries a big risk. We know that elevated blood sugar is probably bad. So how do we determine how we're going to attack glycemic control in the surgical patient? How are we going to go about doing it? Well, this is where we come to some of the adaptive pieces. We're going to talk a little bit about some of the targets and things we're going to actually do as the technical pieces in this. I'd like to present the adaptive piece at this point and then we will we've all those other pieces into it. If you want to attack this problem in operating rooms, if you believe this could be a problem in your operating rooms, you need to start making the change locally. Needs to be driven by frontline staff, not a top-down approach. No offense to any executives on the phone call or listening into the webinar, but while executive leadership needs to be involved in the process, frontline providers need to be the drivers of change. Surgeons, nurses, anesthesiologists, et cetera need to be the people that develop these interventions and implement these interventions because they are the ones who know what's going to work and what the barriers are at the local level. Teamwork strategies are clearly needed to do both the technical work which we'll talk about a little bit in a few minutes and a lot of the adaptive work to be successful. Of course you will here at Hopkins, we developed our comprehensive unit safety program model which of course we know and love but there are other models out there that worked very, very well. Many folks on the phone call may be familiar with team steps -- TEAMSTEPPs. It was originally developed by the military, used very heavily across the military and the VA system as well as nonmilitary and him -- non-VA hospitals. Very effective teamwork strategy. Whichever one you like your institution, TEAMSTEPPs or even other ones, these of the things you need to leverage at the local level to make these kind of changes. Of course you have to start off by building your team. This comes back to, who are your stakeholders going to be? Surgeons, clearly need to be involved. This is their patients. It's their complications they have to deal with. Your anesthesiologists, I believe the state of North Carolina also has and anesthesia assistance. AA. These of the providers that have commenced the glucose. These are the ones who are partners with the surgeons in the intraoperative period. You get these people as part of stakeholders in the process. Of course because
this involves glucose control, you need to people like Dido but ecologists -- they have huge amounts of knowledge about blood glucose management. When you get these groups together as prescribers, the power that you can get out of developing an appropriate approach to managing this problem can be really great. Of course you have to have your pre-op nurses and intraoperative nurses involved because even though we tend to focus on intraoperative management of blood glucose, there's the pre-op piece as I mentioned before, there's some data showing giving people glucose pre-op can make it easier to manage their intra-op and postoperative glucose so you need to have those folks on board. Need to have your intra-op nurses involved because they're going to need to help the anesthesiologists. Following up in the PACU or ICU is crucial and of course because insulin is a drug, you need to have your pharmacist involved. Anybody else you can think about the local level that's going to be necessary within your institution to make this successful. Think broadly and widely about who your stakeholders are going to be and of course as I said before the executive is an essential person to have on your CUSP or TEAMSTEPPs team. You want that person to be pretty high level, Vice President level or higher. The reason why that's important is they are the person who's going to be or liaison to administration. They're going to the person to make the argument to get the resources, whether it is time, money, equipment or whatever it takes to be successful in your project. They're also going to ask you to be accountable. But again, you need that connection to shall we say, the C suite to demonstrate that what you're doing is going to improve patient care and have benefit for the institution. So you want that executive on the team. Keep in mind that executive doesn't have to have any knowledge of medicine. It can be somebody who is a finance person. The fact that they act at the executive level for your frontline SCIP or TEAMSTEPPs team is where the benefit is. Then once you've got your team build, you need to identify a defect. We already have our defective because that's why we're talking about this. We got that covered. We want glucose control. But I didn't identifying a defect actually goes a little bit deeper. And you can blow that up to say not only did we have to identify defects, but we have to identify barriers which in and of themselves may be sub defects within the process. So keep that in mind. Even though we know we have a defect here, we have glycemic control problems in our operating rooms, keep in mind you may need to dig a little deeper into other defects that underlie that effect. Once you've identified your defect, you need to know your baseline. Metrics matter. One of the things that has played quality improvement and assurance over the years is people undergo or undertake Quality Improvement Project's without knowing what their baseline data is. Then with when people come around and say did you make things better? The answer winds up being, I think we made things better and people say, what's the data to show you may get better? And people don't usually -- don't have something that's robust. We owe it to our providers who are going to make the extra effort to do these things, to see quality metrics that they are making improvements, our executive folks want to know the investment in improving this quality and safety has paid off. That's where the accountability comes in. And our patients and the public want to know that things are getting better. If you know your baseline, you can make a direct comparison and know whether you are making improvement. If you're not making improvements, you can come back around and say, why aren't we making improvements? But if you are making improvements, you now have evidence to say so. Some people even think something is a defect when it's not a defect. Adding a baseline may help you define exactly how bad your problem is or even if you do or don't have a problem at all. Because folks are on this webinar, they presumably think or know they have a problem. And that's great. But you still need to have your baseline data because you need to have that foundation. In addition to getting your baseline data, you need to have a plan for getting that data on an
ongoing basis. That data plan is going to have to be manageable. Data collection is the death knell of so many improvement projects. People try to take on too much data collection, they don't have a good plan in place and it falls apart. There's some really important principles that can help you make your data collection and therefore your project manageable, sustainable and successful. Starting off, you don't need data on every single patient. You can audit. The power of the audit is that it gives you a statistical sample of your population. If it's done in a sufficiently random pattern, it should reflect your overall population. This makes it much more manageable and sustainable. If you're trying to collect data on everything every slow everything a patient that rolls through your operating room, that is just not sustainable. Everybody knows you can't do that. At least you can't do it for very long. So develop a scheduled audit process. This is something we are really big in the national SSI project. We encourage people, sample. Doesn't have to be a huge sample. You can look at the first 30 patients that come out of your operating room each week. Or maybe pick five to 10 patients from each day's surgery schedule at a random sampling. Whatever fits into your workflow. And that workflow is going to be determined by how big your hospital is and what your throughput is in your operating rooms. If you have only a handful of operating rooms, you're not going to have that many patients. If you've got ORs that are running a couple hundred patients a day, you are a huge hospital, then you want to sample more. Define who is going to do it. In fact, try to create a group of people that can do it. You want to have a bullpen. Everybody has probably experienced over their careers, they put into place a process, they make one person responsible for that process or only a couple people responsible. One of those folks leads, moves onto another position, takes another job, and all of a sudden there's a whole. A gap. Data is not collected or something is not implement it or is not done. It begins to pile up. All of a sudden it takes too long to train somebody to do it. Things fall apart. Next thing you know, you have inertia and nobody can get the project up again and go in again. Like baseball, you won't -- you want to be able to pull the starting pitcher and throw someone from your bullpen. If somebody in your CUSP team responsible for something like data collection has to go on leaves or takes another job, you want somebody who can literally stepped right in there and keep the process smooth. Getting derailed is really difficult to get back on track. Built an audit to come back to some data and focus in a few moments. Define your denominator. It should be all the patients are exposed to your intervention. But you want to define who those folks are going to be to start with. Decide are you going to look at outcomes versus process measures or both? Outcomes are great, particularly when outcomes are fairly common. Like SSI and colorectal patients. But somehow -- some outcomes like wrong side of surgery thankfully are very, very rare. Under those circumstances, process measures may need to suffice and stand in for them because it could take you decades of data collection to determine you've improved or not improved a rare outcome. Often it's good to collect both. I would argue in terms of glycemic control besides looking at the outcomes of length of stay, SSI, or even how often do we not meet the market on glucose control we decided to define it for operating rooms, also look at how often do the interventions that we put into place to make those outcome improvements actually get those done. That can give you an even more robust idea of how you're doing and where to tackle problems and barriers if you aren't reaching the outcomes that you want to reach. Start developing your intervention bundle. That's the next step. I would argue start small. Start with a pilot program. Work out the kinks in a smaller group of patients. If you already are a small hospital like a critical access hospital, you may decide to start across all surgery types because you don't have that large a surgical caseload. But if you're a big hospital and only can -- only you can make that determination is a couple suggestions. Choose a surgical and that's manageable. Consider things like does it have
a core cohesive group of surgeons that you can get to all agree upon the process? Consider a surgical line or surgical group of patients that has the highest rate of competitions if your institution. Maybe a group that has a high SSI rate, maybe orthopedic arthroplasty cases. Since this is going to be or low hanging fruit, this is where you're going to make an impact that you can measure. When you do your audit and get your baseline, consider looking at a group of folks who perhaps performed most poorly in that audit, whether they have good or bad outcomes. You can work out your processes in this group to try to achieve better glycemic control and then expand it to other groups. Take into account all those things. If you try to bite of something too big to start with it's really hard to swallow as we all know. And it's going to make it harder for you to be successful. So let's talk about the key core point which we've alluded to back at the beginning when we talked about the data in the literature. What is going to be your core intervention/metric? What are you going to target for glucose? How are you and your CUSP 14 tech -- TEAMSTEPPs team going to define what is appropriate glycemic control in your operating room so you can know when you're not meeting that target? It's a little bit hard to determine as I think everybody has gleaned from the beginning of the talk when we talked about the baseline data in general surgical patients. That's partly because a lot of the data is out of ICU and restricted to cardiac surgical patients. There's not a lot of studies in general surgical patients. We know that the original hoopla over tight glucose control -- that is normalize blood sugar, has been very much liberalized in the ICUs. And is getting liberalized everywhere else because it just doesn't seem to have a big benefit and it has high risk. Different randomized control trials that we can look at unfortunately -- people use different targets all over the place as you probably recognized in the first few papers I talked about. All different kinds of targets. The bottom line is we do know that intensive or strict or tight glucose protocols carry significant risks so we're going to avoid them. We're not going to shoot for 80 to 110 in intraoperative period. It just has no evidence to support that it's going to work. Insulin therapy we know, has greater benefit than some nondiabetic patients and we also know that diabetic patients may be less susceptible to consequences of high blood glucose until they reach extreme levels. So again we need to temper what we might think is appropriate. So again, intensive therapy at 80 to 110 is best supported for cardiac surgery patients. Even that is getting liberalized to some degree. We know that the ICU approach has been very, very liberalized. But the debate continues. In fact a recent study of 73 diabetic and 370 nondiabetic cardiac surgical patients actually found that intraoperative glucose control actually had no benefit. So the waters unfortunately have been muddied. People to that study to suggest in maybe two things. Either it doesn't matter or intraoperative glucose control needs to be married to perioperative glucose control and given it a lot of the stuff I talked about earlier on in the talk we know there's a lot of pieces that have to be tagged onto the intraoperative piece both pre-op and postop for example, giving some glucose ahead of time and avoiding postoperative glucose infusions adds to the benefit overall of good glycemic control. So all that aside, all that uncertainty, all that data in the literature, how can we pull that together? I'm going to make a couple recommendations for you guys to work from because I know that's probably what you'd like to hear. And we have to start somewhere. Because unfortunately we don't want to throw our hands and say the literature is all over the place. We walk away this -- walk away and come back another day. Clearly it something you probably need to do now. How are we going to do it? Well, I'm going to take my cue from a 2013 -- last year systematic review. Examined the outcomes in three groups of diabetic patients. Undergoing surgery. Where they grouped the studies that they looked at into what they called strict control which is not the same as the original strict control where they said somewhere between 100 and 150. It overlaps a little bit with the original studies. A
moderate group with they said somewhere between 151 and 200, remember the
Cochrane studies used 200 as their cut off. Then greater than 200 which they called
liberal control which I would argue isn't really control at all. And neither did the Cochrane
group. What they found in this systematic review looking at all the studies they could
find, that moderate glycemic control targets, when achieved, had reduced postop
mortality and stroke compared to the liberal control. They did find some other outcomes
such as atrial fibrillation and SSI didn't seem to be impacted by that -- by this but we do
not -- postop mortality and stroke where improved. Those were two pretty hard
outcomes. There's a found going to that strict target, 100 to 150 added nothing on top of
moderate control. And so for an answer to take a stab at what we should target I'm going
to rely on this systematic review. And tell you guys with some guidance based on that as
well as some other guidelines from other groups and the Cochrane reviews, I'm going
to stick my neck out and say that a good glucose target range, which has been
recommended in the literature now, not just me sticking my neck out. It has been
proposed by several other authors -- that avoiding blood glucose but will -- above 180
should be your target. Exactly where the target should be below that is unclear. So you
are free to choose a target below that. But based on the aggregation of all the data and
the literature, probably the safest and best thing to do is say we are going to target to
keep blood sugar below 180. We're not going to target any lower. Make sure we have in
place an algorithm and process to avoid hypoglycemia. We'll come back to that in a few
moments. We are going to of I'd wide fluctuations in blood glucose which I understand
maybe easier said than done but you want to try to avoid that. We're going to focus on
using IV insulin intra-op, not so cute insulin. Intraoperatively, subacute insulin is
unpredictable -- sub-cue. Because sub-cue insulin, you're not going to have predictable
absorption and are not going to be able to get good us -- we're going to wind up with
white situation. Putting the patient on IV insulin with 30 to 60 minute monitoring is the
recommendation for keeping blood glucose control away from wide fluctuations, keeping
it below that 180 target and staying away from hypoglycemia. When you measure your
blood glucose every 60 minutes, avoid capillary sampling. That is avoid doing lancets at
the tip of the finger or on the forearm. You should use venous or arterial sampling.
Obviously everybody now operating them, -- has an IV. Make sure it's a good IV so you
good accurate blood samples off of it. Capillary sampling in the perioperative and
intraoperative period like subcu insulin has unreliable results. You're going to get and
reliable glucose values. Stick with actually direct blood samples. Restrict post op glucose
infusions. We know the data and literature suggest they worsen the problem. Minimize
the drivers of insulin resistance. This comes back to the other things folks have been
trying to do to reboot -- reduce SSI. Try to reduce hypothermia. Try to keep your EBL
down. I know that's easier said than done. Provided a small amount of oral
carbohydrates two hours prior to surgery. We now know that MPO rules over the years
have gotten much more liberal, the idea of being strict MPO for eight hours pre-op is a
thing of the past. The data suggest that 50 to 100 grams of oral carbohydrates in the
form of a clear liquid, something like apple juice, two hours prior to surgery is not going
to worsen the risk of aspiration problems. And will help improve your intraoperative and
postoperative glucose control. Reduce your variability. Make a glucose control algorithm.
Don't let it just be up to providers to do whatever they think at the heat of the moment.
Create an algorithm or adapt one. Work with your endocrinologist tour to develop
something that's going to work in the intraoperative environment. Make it accessible. Put
it on your electronic anesthesia record. Put on your computer. If you guys don't have a
computerized anesthesia record in the operating room, create some other way to make
sure it accessible for people to reference it and use it. Develop resilient approaches to its
implementation, compute algorithms force functions that help people to remember to use
it. Be expansive. Include pre-op insulin and non-insulin medication management. Okay? Pre-op, hydrate and some of the of the things I've already talked about. Rank order of improvement strategies. Force functions, constraints, automation and computerization are the strong things. As you develop interventions and implementation strategies for this kind of intervention, try to stay away from things that are down at the bottom of this list. Education is really important but it's a week intervention. Telling people just do a better job is not going to work. You need to help people do their job better by focusing on things at the top of the list. And it's not just about the glucose level. Okay? We already said that. A little bit about thinking outside the box. I'm going to throw something out there that is new and different. I'm going to tag on to this where folks can think about. It obviously may be a very debatable subject for you at the local level. But there is data in literature now that shows that impact of poor pre-op blood glucose control may be significant. There was a large national inpatient database study looking at hip and knee arthroplasty's by orthopedics. They found a statistically increased risk of several complications including SSI and stroke in diabetic patients, all types of diabetic patients, when they showed up with poorly controlled pre-op glucose. Additionally there was a single Center neurosurgical study that found very, very similar results. Even mild pre-op hyperglycemia. Predicted postop complications and ICU and hospital length of stay. It has been suggested and I know several hospitals around the country who've been participating in the national SSI project who he in fact have taken this approach where they are actually measuring hemoglobin A1c levels pre-op. And using it as a predictor of bad outcomes and rescheduling elective surgeries until those levels come under control. That may be controversial. It's not based on a lot of data but some folks have locally felt that this is an important approach to improving outcome in their surgical patients. So put out there because it's a little bit outside the box. It's a little bit of emerging evidence. Maybe over the next couple of years this will get solidified to the point where it actually becomes some things -- something that is recommended but I wanted to throw it out to you guys so you had at least heard about it. Reporting. Big part of quality improvement. Develop a plan to report back to all of your operating room staff. Different providers may need to different venues. Anesthesiologist may need something different than your nurses or surgeons. Trillion dollars try to tune in to what's important to those individuals. User outcome and process measures, make it public, make it transparent. Show people how they're doing. People love to hear about success. It makes them feel empowered to do even more and be even more successful. So in summary, glycemic control in surgical patience is a team approach. Need to engage your stakeholders, get into their heads a little bit, understand what they're thinking, and what their needs and interests are. Exact target ranges are not defined, 180 milligrams per deciliter is the upper limit. It should be the target and is probably the best widely used goal and has the best data to support it even though the data is a little bit nebulious. Consider all the factors that affect blood glucose. Consider all those approaches you need to consider in your perioperative glycemic management per call. Develop quality metrics at the local level. Make sure you have a baseline. Develop an algorithm to reduce variability for managing out of range glucose. Audit your practice. Don't drown drown yourself in too much data collection. Determine what you need to know what you want to know. Report back to your staff how well you are doing. Come back around, reinforce, regroup, whether you're doing well or not doing well, to try to improve the process. First time around, it doesn't always yield high-level results. You've got to be resilient. You've got to persevere. And our references, and I'd like to open the line -- I guess we've only got about 10 minutes left. I talked a little bit too long. I apologize. I'd like to leave it open for questions.

Thank you so much. And we have had one question come in through the Q&A box.
I see that.

Yes. Saying that they have buy-in and have decided on targets that have process issues. And that their patients go to acute acute-care floors soon after surgery, where they currently don't manage insulin drips. Are there other options?

Okay. Great. You certainly probably don't want to fill up your ICUs just because you need to put people on insulin drips. I know many, many hospitals, genital warts do not handle insulin drips. The insulin drip management is probably most important -- screening from the literature earnings in trough period. Obviously if you're patient is going to ICU after other surgery, it can be a seamless transition with the insulin drip. Since your floors can't manage it and that's a very, very common problem, certainly floors can't do 60 minute blood glucose for the most part. You are going to have to bite the bullet at that point and say we're going to use an insulin drip in trough. We're going to get blood glucose under good control as we can. Intra-op. And maybe you can do it in the PACU if your PACU can manage an insulin drip but then you have to develop a plan for transitioning to the floor where they can't do that. So the insulin infusion unfortunately just because of nursing protocols and resource issues, is probably going to have going to have to be limited to the intra-op, possibly the PACU if your PACU can manage it and that's why you need to have them as a stakeholder, certainly your ICU but you have to develop a transition phase to try to maintain as good of glucose control as you can postoperatively. If you can avoid postop glucose infusions, and if you can get a protocol in place where you get a little bit of carbohydrate load at the beginning, you may find that it's not as big a problem once you move to a subcu regimen out on the floor. Certainly patient to go to the floor are going to be a stable for the most part hopefully. So hopefully their subcu insulin absorption isn't going to be quite as unpredictable as you obviously might have in an active ICU patient whose unstable. It's an unfortunate roadblock that I think everybody has. And I can't do and insulin drip on my hospital wards here. It's pretty ubiquitous problem overall across the country. It's not a barrier we're likely to be able to change except trying to approach it differently and make it work as best you can.

Michael, I'd encourage you if you have a follow-up question, to feel free to type it on in or raise your hand if you called in over the phone. And we can unmute your line if you have follow-up comments or questions. Others if you have questions, you can put them in the chat box or in the question and answer box. While we're looking for other questions to come in, I have one because it's one that's been raised by so many of our hospital teams that have been in our safe surgery project. And that is, what approach have you used to getting the surgeons onboard? I know you mentioned how important it is to have them as a part of the team. But how do you approach them and how do you engage them to really participate in this kind of improvement work?

Great question. I could tell you -- I'm not a surgeon but I can tell you working as a surgical intensivist and obviously just being a physician, physicians are very driven by data. Nurses I think are also very driven by data but I think physicians tend to be even more driven by data. I think nurses tend to be -- while they are data-driven tend to also be much more influenced by stories. I'm not sure doctors -- while they do appreciate hearing a good story about good patient outcomes, they like to know, what's the data to say that this works? I would argue, bring the data to them. Again, look at the references. You guys will have access to the slide set I understand. Going look at some of those slide sets and pull some of the data out to engage your surgeons and your
anesthesiologist. In actuality, your surgeons are one group Jeff to get on board to say we’re going to try to improve glycemic management in in trough period, if the anesthesiologist who are going to be doing the physical work. That is measuring the glucose, getting the insulin drips going if necessary, managing it. Both groups are going to need data. The physicians want to know that the data is -- supports the effort that they are going to make. It's just the way we think. To be honest, we are not easily swayed by things other than data. Take some of these papers, pull some of the data out, get your baseline data. Maybe before you actually try to engage your surgeons, do that audit. Find out how well or how badly you are doing and that way you have some information to take them and say, look, the data and literature suggest we probably should be doing a better job here. And look at our actual data. We're not anywhere near these targets. Whatever percentage of the time it is. That makes surgeons and anesthesiologists and clinicians to finish -- physicians eyes pop open. When you show them that we’re not doing well, that gets their attention. That is the thing I would say is probably the most important way to grab them as stakeholders.

Excellent. Thank you so much. And I'm looking to see if others have questions. If anyone who has called in over the phone has an additional question or comment, feel free to raise your hand and we'll be glad to unmute your line. Also wanted to mention I know that Jan from the Virginia healthcare and hospital association is on the phone line. JAN, if you have comments or questions we'd be glad to unmute your line if you'd like to speak.

Yes. Thank you, Laura. Can you hear me?

Yes, we can.

Great. First of all, Dr. Winters, thank you so much. Listening in, I found the content of the program to be very informative. You just did a great job explaining not only the why but the Howell. And understandable and practical and systematic manner. I just really want to thank you.

You're welcome.

I hope our participants found it very useful. I sure did.

Again, my e-mail address is on the slide set. And folks if they want to come back and get it, I can tell you, it is bwinters@jhmi.edu. If folks are looking to glean algorithms or actual approaches, I did not throw up any slides showing exactly what our glucose protocols are because I know when you throw slides up like that, people's eyes glaze over because they are trying to read it and figure out exactly what it says. What we have tools and stuff that we've done to manage our glycemic issues. And we're happy to share those.

Thank you so very much. Really appreciate that. I know we will appreciate having some of the examples to share with the group. So thank you to all the attendees today as well. I do want to remind you that we will -- there will be a brief evaluation that will come to you shortly after the webinar. We encourage you to fill that out. That helps us with our planning. I definitely want to thank Dr. Winters. We really appreciate this presentation. Very helpful and right on target with what our folks have been asking for and needing. We very much appreciate hearing from you.
You're very welcome.

Excellent.

This is Jan. I just want to remind everybody that the Partnership for Patients campaign and the work of the HENs is drawing to a close. And so I think this is a great closing send off program we have particularly for our HAI and our surgical group. To wish everybody a very happy and blessed holiday season.

Thank you, Jan, so much. I echo those comments and also would say that even though the Hospital Engagement Network itself is drawing to an end, if any of you have questions or concerns or ongoing thoughts about healthcare acquired infections, about this webinar or any of our others, feel free to get in touch with myself or Janet. Our contact information is on that slide. So thank you, all very much. At this time we'll conclude the webinar.

Have a great day, everybody.

Thank you.

Nice job, everyone. Thank you.

[event concluded]

Actions