Transcript Details
This is a transcript of an educational program. Details about the program and additional media formats for the program are accessible by visiting: https://reachmd.com/programs/focus-on-pharmacy/maintaining-glycemic-control-in-the-icu-setting/2770/

ReachMD
www.reachmd.com
info@reachmd.com
(866) 423-7849

Maintaining Glycemic Control in the ICU Setting

MAINTAINING GLYCEMIC CONTROL IN THE ICU SETTING

Hyperglycemia in the critically ill. How can we best get patient's blood sugars under control. You are listening to ReachMD, The Channel for Medical Professionals. Welcome to Focus on Pharmacy. I am Dr. Charles Turck, PharmD, your host, and with me today is Dr. Brian Smith, PharmD, Director of Education in Clinical Services in the pharmacy department at UMASS Memorial Medical Center and Chair of UMASS' glycemic control task force. Dr. Smith is also a board certified pharmacotherapy specialist and an assistant professor at the University of Massachusetts Graduate School of Nursing in Worchester.

DR. CHARLES TURCK:

Dr. Smith, welcome to the program.

DR. BRIAN SMITH:

Thank you for having me.

DR. CHARLES TURCK:

Now, Dr. Smith, I would like to start off by asking, would you describe your clinical role at your institution, what is that you do?

DR. BRIAN SMITH:

In addition to my other responsibilities, I am (1) a clinical specialist in the Neurosurgical Trauma Intensive Care Unit, so I perform daily patient care rounds with the ICU team and make a host of recommendations related to pharmacotherapy. In addition, especially relevant to this topic, I helped the hospital's initiative to ensure tight glycemic control in our critically ill adult patient.

DR. CHARLES TURCK:

What do you see as may be the three or four largest global medication related challenges facing clinicians in the ICU?

© 2023 ReachMD

DR. BRIAN SMITH:

Some of the things that we really tried to focus on are those medication challenges that have been to shown to really improve outcomes and so I think glycemic control is one of those things that is really a challenge to achieve. It's easy to say let's control someone's glucose but in critically ill patients, that can be a big challenge. I think other things from a medication standpoint are sedation management, trying to incorporate things like daily wake ups to minimize time on ventilators and get people moving through the health system more safely and with less complication. I think another big challenge is infection control and not only infection control, but also treating a lot of these emerging resistant pathogens, so I think that's another really big challenge on how to minimize antibiotics, but also to make sure that you are adequately treating those patients that actually do have infection.

DR. CHARLES TURCK:

Could you briefly talk about the importance of glycemic control in the ICU setting, why exactly is that it is so important.

DR. BRIAN SMITH:

Well, starting actually back to the 50s and 60s, there has been data to suggest that hyperglycemia is associated with poor patient outcomes and there have been numerous trials to demonstrate that relationship and then throughout the 80s, there had been various studies looking at glucose insulin and potassium solutions with the thought that insulin in of itself might have some therapeutic properties that were protective, but then people started looking at the other side of the equation and that may be it's the control of the glucose that's the key issue and really in 2001 with the first Van den Berghe trial in surgical ICU population, where they demonstrated a significant mortality benefit from tight glucose control versus those who did not have and since then there has been a second Van den Berghe trial and some other studies in this area, but that's kind of what kicked it all off the fact that it seems to improve mortality and have significant morbidity benefits as well.

DR. CHARLES TURCK:

As Chair of UMASS' glycemic control task force, at your institution, you played a large role in the effort to get critically ill patients blood sugars within an acceptable range. Since taking the reins on an initiative, what do you feel like you have learned along the way that may be you didn’t know before, are there any perils that you could share?

DR. BRIAN SMITH:

Yeah, well, I think the biggest thing and it may not be a big surprise to folks, but it's really a giant team effort. The fact that we have very strong support from our Chair of our Critical Care Committee, Dr. Richard Irwin, and administrator Willis Chandler, they've really given me the authority and the support to really involve all disciplines in this project, so pharmacists helped to play a large role, our attendings, our intensivists play a large role; the house staff, NPs; we are getting input from nutrition; we've had stuff from people from the lab getting involved. Nurses play a massive role and some of the things that we really didn’t consider going into it that I think people should consider is things like you have enough glucometers if your are going to be increasing the number of fingersticks you are doing, is the lab prepared to handle the volume of increased values if things are going to be sent to the lab, do you have the support system to better monitoring to track you on performing. So I think having a really good team, getting everyone on board and then being able to anticipate some of these other unexpected things as well.

© 2023 ReachMD

DR. CHARLES TURCK:

Presumably education is also a key piece. Education of all those players, how big is a challenge is that?

DR. BRIAN SMITH:

It's a huge challenge and what we've really learned and I think this is probably another key thing to keep in mind is that it doesn't begin or end, it's continuous and so what a lot of data on educational show is that you do an initiative, you educate, you have very good adherence or compliance and then that fades over time, so initial education is important, but you need to do it on a continuous and ongoing basis. We basically do ongoing rounds on a quarterly basis where we have the entire team; physicians, pharmacists, nurses from our critical care operations committee going to every ICU, meeting with the bedside providers, meeting with the nurses, getting feedback and continually educating, but at the same time getting that good feedback and redesigning our protocol, so we probably make modifications to our protocol at least yearly based upon this feedback, so the education is ongoing, but also getting the feedback from the individuals actually using it to improve the protocol.

DR. CHARLES TURCK:

Switching gears for just a moment, how does one adjust an insulin drip, what sort of factors do we need to take into account?

DR. BRIAN SMITH:

I would say the best way to adjust it is very carefully. There are a whole host of factors to consider when making adjustments to insulin and I think one of the biggest key driving force is the monitoring of blood glucose. So checking glucose and then reacting to that number, making a change in the insulin infusion and then rechecking again. Intravenous insulin acts differently than subcutaneous and so on and the fact that you don't have that delayed subcutaneous absorption effect, so the half life of IV insulin is probably you know 5 minutes or so, so after making a change to a drip rate, you would anticipate seeing the maximal effects of that, probably within 20 minutes, so there is the insulin component to it, but also some patient specific factors such as underlying disease states, degree of critical illness, nutritional intake, intravenous sources of dextrose, cortical steroids, there really are a whole host of factors that all come together that will make the insulin requirements go higher, go lower, but it really comes down to very good monitoring and continuous adjustment to meet the patient's needs.

DR. CHARLES TURCK:

You mentioned some differences between IV and subcutaneous insulin, what do you do at your institution or what do you take into account when you transition in patients from an insulin drip to subcutaneous insulin?

DR. BRIAN SMITH:

Well, I think there are a number of factors to consider when switching from intravenous insulin to subcutaneous, one is what is their recent usage pattern of the intravenous insulin infusion. We typically don't like to see a lot of fluctuation prior to the change, we would like to see that it's relatively stable within a unit per hour or so for the last six hours, and then we take that requirement and calculate a total daily requirement and then divide that between a long-acting insulin and the short acting insulin. At the same time, we consider what their nutritional intake is, are they on continuous tube feeds versus eating three meals a day, also taking into consideration the

© 2023 ReachMD

changes that we can anticipate within starting steroids, stopping steroids or changing of steroid doses, so there are a number of factors that you need to carefully balance into that transition, but if you can try to control for those factors, then it's just a matter of doing a little bit of calculations.

DR. CHARLES TURCK:

For those of you who are just tuning in, you are listening to Focus on Pharmacy. I am Dr. Charles Turck, and I am speaking with Dr. Brian Smith, from UMASS Memorial Medical Center. We've been discussing practical aspects of glycemic control in the intensive care setting.

Dr. Smith, you talked about transitioning patients from IV to subcutaneous insulin. You've said that one factor that might make you more wary about transitioning someone is fairly wide fluctuations in insulin requirements. Should the patient stay longer in an ICU because they are on an insulin drip or because their insulin requirements are fluctuating?

DR. BRIAN SMITH:

I think it's something to consider, but it's difficult to say that automatically a patient should be required to remain in the ICU because of insulin requirements because many hospitals do have a lot of patient care flow needs and if there is a patient that has much more severe level of critical illness that needs a bed in the ICU, sometimes you do need to be flexible in terms of who you move out and you have to pick the patients who are less critically ill, but if possible, we usually like to see that a patient is little bit more stable on intravenous insulin before switching to subcutaneous. The concern would be as if that they are having fluctuations and your insulin drip is temporarily up high and you convert based upon that high number, you may overshoot when you convert to a subcutaneous regimen. If you needed to send a patient out of the ICU and there were still some fluctuations in their intravenous infusion, depending upon the institution, some institutions would allow within certain limitations insulin infusions on acute care floors or if you needed to convert to a subcutaneous regimen, I would consider being a little bit more conservative in that, so you have to balance the risk of causing hypoglycemia. At the same time, we don’t like to see patients blood glucoses going wildly out of control by simply just shutting off the insulin infusion and shipping them out and they hit the floor and their blood glucoses go into the 300 and 400 level. That's not good for patient care as well.

DR. CHARLES TURCK:

Your institution has developed a glycemic control protocol and embedded within it is a dosing algorithm and you had spoken about some of the challenges in the beginning at least of education in ruling out the protocol, what are some of the current challenges you have faced now that the protocol has been around for a little while.

DR. BRIAN SMITH:

The current thing that we are focusing on now is (1) we have noticed that there is a group of patients within the ICU, particularly in our cardiothoracic surgery population who get extubated pretty quickly, continue to require elevated amounts of insulin intravenously but resume a p.o. diet, and the p.o. diet presents a particular challenge because essentially you are giving three carbohydrate boluses throughout the day. It's very difficult to titrate an infusion up and down to mimic those boluses of carbohydrate with an oral diet like 3 meals a day and so what we are doing now is incorporating an additional piece to our algorithm to give a proportionately sized subcutaneous dose of rapid acting insulin in correlating to the size of the meal that the patient is going to eat. That way we are not chasing blood glucoses due to mealtime spikes with a drip, but we can mimic those mealtime curves of the carbohydrate load, the glucose increases with the subcutaneous rapid acting insulin and we piloted that in a number of patients and found that to be much more successful than trying to titrate a drip. The other piece we are finding some difficulties with is getting clinicians familiar with how to

© 2023 ReachMD

calculate subcutaneous requirements from the IV drip rate, that is the whole transition algorithm, and so we've actually come up with some standardized algorithms based upon common drip rates that we are adding to the backside of our protocol, so anytime someone who wants to try to convert someone to a subcutaneous regimen, it would provide them kind of a bunch of precalculated options to minimize the chance for error.

DR. CHARLES TURCK:

You mentioned the difficulties of taking into account antral nutrition specifically meals rather than tube feeds, and I realized that your updated protocol may be in the works, but do you have any recommendations for the listeners as far as taking a look at the patient's insulin infusion and using that to calculate what their insulin requirement might be for mealtime boluses and nutrition.

DR. BRIAN SMITH:

Yeah, right now we've been working closely with our dietary department and we are going to try to implement a form of carbohydrate counting and we are still negotiating a little bit, but we are thinking for patients who eat the equivalent of one carbohydrate which will be about 15 g of carbs so that would account for one so 15 or less, we are going to give a subcutaneous bolus at one time the current infusion rate, if they eat around two carbohydrates or about 30 g, then we are going about two times the current infusion rate and if they eat more than two carbohydrate, so we are talking about 30-45 g or more of carbohydrate in the meal then we are going to go with four times the current infusion rate. Just to give a quick example, if the patient were to be on an insulin infusion at 2 units per hour and then ate a full meal, which let's say contained 4 carbs, we would multiply the 2 units per hour x 4 because they ate a full meal with multiple carbs in it. That would give us a dose of about 8 units of rapid acting insulin, so we would continue the drip rate at 2 units an hour. Once they finished their full meal, we would give them 8 units of rapid acting insulin subcutaneously x1 and then continue to follow glucoses in the adjust as needed.

DR. CHARLES TURCK:

Dr. Brian Smith has been our guest in our discussion of the importance of glycemic control in the ICU setting. Brian, thank you so much for joining us.

DR. BRIAN SMITH:

Thank you for having me.

I am Dr. Charles Turck and you've been listening to Focus on Pharmacy, on ReachMD, The Channel for Medical Professionals. To comment or listen to our full library of pod casts, visit us at www.reachmd.com, register with the promo code radio and receive six months free streaming for your home or office. Thanks you for listening.

© 2023 ReachMD