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Improving Parenteral Nutrition Safety with Multi-Chamber Bag Solutions

Announcer:
You're listening to *GI Insights* on ReachMD. This episode is sponsored by Fresenius Kabi. Here's your host, Dr. Brian McDonough.

Dr. McDonough:
Welcome to *GI Insights* on ReachMD. I'm Dr. Brian McDonough, and joining me to discuss the use of multi-chamber bags as an alternative to traditional compound parenteral nutrition, or PN, is Dr. George Phillip Ayers. He's an Associate Clinical Professor at the University of Mississippi School of Pharmacy as well as the Chief of Clinical Pharmacy Services in the Department of Pharmacy at the Mississippi Baptist Medical Center in Jackson. Dr. Ayers, thanks for being here today.

Dr. Ayers:
Thank you, Dr. McDonough, for having me.

Dr. McDonough:
So, Dr. Ayers, could you start by telling us how we typically manage PN today and what limitations are associated with traditional compounded PN?

Dr. Ayers:
Sure. So I have seen a change here. I started in nutrition in the 1990s when we saw multidisciplinary teams—physicians, pharmacists, dietitians, and nurses—actually involved in the process. So we moved on from that, and now we're seeing more disciplines like a dietician or pharmacist actually ordering or prescribing the parenteral nutrition. So that's certainly a change that we've seen overall in nutrition support.

I would say in terms of parenteral nutrition and compounding, there's certainly compounding that still occurs, especially at larger hospitals, but many hospitals now are outsourcing compounded parenteral nutrition. From a financial standpoint, they find it more advantageous for them to do that. And we've also seen an increase in the use of multi-chamber bags in the United States. It really started with some of the product shortages that we saw initially, and now more people have incorporated those into their formulary and are using multi-chamber bag parenteral nutrition as part of their practice.

Dr. McDonough:
With that being said, let's turn our attention to multi-chamber bags, or MCBs, which have been drawing attention as a potentially safer alternative. According to a review published in *Nutrients* in 2024, five hospital-based studies and one home-based study reported that MCBs were well tolerated and provided adequate nutrition. Additionally, three hospital-based studies reported that MCBs had lower postoperative infections and a lower mean risk of catheter-related bloodstream infections. How do you interpret these findings, particularly for patients who are critically ill and require complex nutritional support?

Dr. Ayers:
Yeah, I think there are some key findings here. Number one: being able to meet the nutritional needs with a multi-chamber bag parenteral nutrition, I think, is huge. The other findings like reduction in infections and the catheter-related infections, in general, are also interesting as well. And so we know that that may be due in part to less manipulation of the parenteral nutrition bag. When we're compounding—we're talking about a very complex medication here—you can have up to 40 or 50 components, and so in that compounding process, you're making a lot of additions to the bag. In a multi-chamber bag, there are less additions and less manipulation of the bag, so that may be playing a role in terms of reducing the infections that we would see by using multi-chamber bags.

There are also some key things here too that are not mentioned in the study. We do know that once we do a better job in terms of tight glycemic control or glucose control, that certainly plays a role in catheter care as well. If we look at our critically ill patients in the United States, I think we can take a look at the overall acuity of these patients and their needs, and oftentimes, we might be able to meet not only nutritional needs, but the electrolyte needs of these patients that are critically ill.

So I think it's something that we all want to look into at our own institution. Does it fit your patient population? Looking at the acuity of your patients, I think, is also important when you're considering incorporating a multi-chamber bag parenteral nutrition into your formulary.

Dr. McDonough:
Now, in addition to safety, MCBs may also help improve clinical workflows, and this is seen in a different study published in the *Journal of Parenteral and Enteral Nutrition* in 2021. The study found that three-chamber MCBs reduced pharmacy staff time by 62 percent and overall cost per bag by about 37 percent compared to hospital pharmacy compounded bags. From your perspective, how do these time and cost efficiencies translate into broader operational and safety improvements?

Dr. Ayers:
In the time that we're in in healthcare, you're always looking at opportunities for cost savings. I think this article did a very nice job of covering that—not only material but labor cost as well. So if we're using these multi-chamber bags and we can incorporate those into our practice, we can potentially take those pharmacists that we're using to compound parenteral nutrition and we can redeploy those pharmacists to the patient care unit for more direct patient care responsibilities, which I think is always good and better for patient outcomes as well.

And in terms of standardization, I think it’s really important too to look at these multi-chamber bags. Anytime you standardize a process, you certainly reduce the potential for error. And this is, again, a high-risk medication by the Institute for Safe Medication Practices. So it’s a medication that can cause harm if used incorrectly. So it's very important that we do what we can to reduce the potential for errors that occur in the use of parenteral nutrition, and by using a multi-chamber bag PN, we can potentially do that.

Dr. McDonough:
For those just tuning in, you're listening to *GI Insights* on ReachMD. I'm Dr. Brian McDonough, and I'm speaking with Dr. Phil Ayers about how multi-chamber bags can help reduce parenteral nutrition risks.

So, Dr. Ayers, now that we've reviewed some data on the safety and logistics of MCBs, let's talk about guidelines. The American Society for Parenteral and Enteral Nutrition, or ASPEN, 2024 multi-chamber bag practice tool notes that MCBs can be safer, less expensive, and useful in shortages. And the European Society for Clinical Nutrition and Metabolism, or ESPEN, says that ready-to-use, prepared, and adapted commercial MCBs are an effective option for home parenteral nutrition. With all of that in mind, how are these guidelines shaping clinical practice? And how widely are they being adopted?

Dr. Ayers:
I think anytime you look at adding a new product to the formulary, you want to look at guideline-directed therapy. So it's always nice to have organizations like ASPEN and ESPEN there to hang your hat on, if you will. In the U.S., we've seen an increase in the use of multi-chamber bags, and especially in some of our smaller institutions where it's cost prohibitive for them to compound or even to outsource, I think they're certainly a viable option. And I think those guidelines would also support that as well.

From a home standpoint, it's interesting that we're starting to see a little bit of an uptick in the home environment as well. They're very helpful for those home patients on PN who are traveling; the use of multi-chamber bags can really be a lifesaver because trying to travel with some of these products can be very difficult. So having that where they can activate the bag themselves during travel is very important. And we're also seeing that we can oftentimes meet the needs on a daily basis for some of these home patients by utilizing multi-chamber bags.

And it's interesting that you mentioned ESPEN because the Europeans do have more formulations than we have in multi-chamber bags, at least at this point. And hopefully down the road, we're going to see some more options in the U.S.

Dr. McDonough:
And if we continue talking about clinical implementation, ASPEN's practice tool also notes that institutions should develop policies and procedures regarding MCBs as well as conduct extensive educational training on their use. With that being said, what safety considerations should we keep in mind when it comes to MCBs? And how can we best educate staff, patients, and caregivers on proper applications?

Dr. Ayers:

I think one of the key takeaways is realizing that this is parenteral nutrition. Even though it's a standardized, commercially available product, we still need to treat it as we would compound parenteral nutrition. It's really important. It's still a high-risk medication whether there's multi-chamber or whether we compound it. So it's very important to have those policies and procedures in place. And these should be activated using aseptic techniques. So in other words, in the pharmacy, it should be USP 797 compliant. Any additives to these products should be done under aseptic conditions as well.

And in terms of administration, I think it's very important that anybody involved in this process—pharmacists, physicians, or nurses—understands that these products need to be activated by pharmacy, and then all the administrative policies and procedures should be in place as well.

Sometimes patients may not receive the entire bag because these come in various volumes, and so to meet their needs, you may not give that entire volume. So it's very important that policies and procedures state that "this bag not hang over 24 hours," so be sure that everyone understands that.

Also be sure that all the appropriate additives are being added to the MCB PN—for instance, multivitamins and trace elements. If we're using a two-chamber bag with just amino acids and dextrose, we need to be sure we're also giving these patients intravenous lipid emulsions or they can develop essential fatty acid deficiency. So being sure all those things are in place is really important.

Filtering is also something else that should be part of your policy and procedure. And for nurses and even caregivers and patients administering this, they need to understand that these products should be filtered as well.

Dr. McDonough:
Before we wrap up our program, Dr. Ayers, I'd like to ask you one more question, what strategies or recommendations would you offer to help clinicians and institutions effectively transition from customized compounding to MCB systems?

Dr. Ayers:
Yeah, that's a question I get asked quite often. So I make the recommendation that you look at your patient population, the acuity of your patient, and you look at what formulations that we have available in the U.S. to see if they will they meet that patient population—not only their nutritional, protein, and caloric needs, but also their electrolyte needs as well.

So one thing I recommend to a lot of clinicians is they do a medication use evaluation and see exactly what their patients are getting currently, if they're doing compounding PN, the average amount of protein and calories, and what the electrolytes look like to see if the formulations fit. And oftentimes, you will find that it really is the case and that they will fit your patients, and so you may be able to incorporate it. Some people have chosen to do a hybrid where they're using multi-chamber bag PN for a number of their patients and maybe still customizing for patients where a multi-chamber bag PN does not meet the appropriate needs.

So, again, I think looking at it on an individual basis in your facility or in your institution and looking at a medication use evaluation and the current needs of your patients would be a wise way to approach the potential use of multi-chamber bag parenteral nutrition in your institution.

Dr. McDonough:
That's a great comment for us to think on as we come to the end of today's program. I want to thank my guest, Dr. George Phillip Ayers, for joining me to discuss how we can improve parenteral nutrition safety with multi-chamber bag solutions. Dr. Ayers, it was great having you on the program.

Dr. Ayers:
Thank you, Dr. McDonough. It was great to be with you as well. I appreciate your time.

Announcer:
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