Pediatric Nutrition
CONTINUING EDUCATION FOR CLINICIANS

Understanding the Current Guidelines for Preparing Pediatric and Newborn Feedings in Health Facilities

✦ Transcript ✦

Editor's Note: This is a transcript of a live internet presentation on January 17, 2023. It has been lightly edited for clarity.

Caroline Steele, MS, RD, IBCLC: This is one of my favorite topics, so I hope you take some ideas back to your own facility. We're going to talk about the risks associated with human milk and formula handling in the hospital setting, particularly in the neonatal intensive care unit (NICU), but also anywhere that you're doing pediatric feedings. We're going to summarize the current standards and best practices and, finally, describe how centralized handling and barcode scanning have been shown to reduce errors.

As we go through the presentation today, I encourage you to just think of maybe 1 thing to take back. I think what keeps people from making progress sometimes is they feel like if they can't implement everything all at once that they shouldn't do anything. Really think about just taking small advice and small things back to your facility.

When we talk about infant feedings, there are 3 primary concerns: contamination, preparation accuracy, and misadministration. I'm going to go through each of those, starting with contamination.

Contamination

There are a lot of consequences of infant feeding contamination, and 1 of them is just generic feeding intolerance. I think of how many times we have babies on a feeding; they're doing fine and, all of a sudden, they have loose stools or they're spitting up, and we always blame the feeding regimen or the feeding recipe. But in hindsight, after doing this almost 30 years, I worry that maybe some of that was just good, old-fashioned foodborne illness from how we handle infant feedings. We know that gastrointestinal (GI) illness is possible when you have more than 105 colony-forming units (CFU)/mL. That's associated with GI distress and diarrhea. And certainly, at the extreme, you can end up with gastroenteritis or necrotizing enterocolitis. And if these organisms invade beyond the mucosal barrier of the gut, you can end up with sepsis or systemic disease.

When you talk about contamination, there are a lot of influencing factors. One is your preparation technique and location; good, old-fashioned hand hygiene or touch contamination; the use of sterile water and sterile ingredients; and the cleanliness of equipment, including breast pumps. Some of you may remember that a few years ago, the Centers for Disease Control and Prevention (CDC) put out an alert because a baby died in the hospital setting, and it was traced back to the fact that the mother was not properly sanitizing her breast pump parts. She was cleaning them but not sanitizing them. Refrigeration times and temperatures make a difference, as well as hang times at the bedside, particularly for continuous feedings. There's the frequency of tubing changes and, finally, a strict adherence to monitoring those expiration dates and times.

When we talk about infant feeding, I want to make 1 thing clear. A lot of times people use the terms "sterile technique" and "aseptic technique" interchangeably. We know we use sterile technique a lot in the hospital setting. That is designed to destroy all microbes and it's very common in healthcare, particularly for procedures. When we talk about feeding preparation, we're really talking about aseptic technique, which minimizes the presence of pathogenic organisms and refers to that no-touch technique and attention to detail so that you're not introducing new microbes, and you're not introducing anything that could continue growing.

That summarizes contamination.

Preparation Accuracy

Let's talk a minute about preparation accuracy. There are a lot of things to monitor when you talk about infant feeding accuracy. First of all, the accuracy of the order—making sure the provider is ordering accurately. Many of you have electronic

health records where the provider may have to choose from a drop-down list of 20 or more items. It's not unheard of to accidently click the wrong thing.

Then, even if the order's right, make sure that the correct fortifier or formula is used in the process and that the recipe is accurate to get the caloric density that you're looking for. And even if all of that is correct, did the person mixing it actually use the correct quantities of each component? And finally, do you have an accurate way of tracking everything that was used, in the event of a recall?

Misadministration

Misadministration refers to accidently giving the wrong human milk or the wrong fortifier or formula to the wrong patient, and there are a lot of consequences of that.

First of all, medical or infectious disease concerns. If you gave the wrong human milk to the wrong patient, you could expose that baby to viruses, such as hepatitis C virus or HIV. It could also result in exposure to drugs or medications taken by the mother whose milk it was. With formulas and fortifiers, you can also have medical events, such as allergic reactions, GI intolerance, or metabolic complications. Then there's regulatory scrutiny. Usually, bodily fluid exposures are reportable to the State Department of Health. They may also be viewed as a Health Insurance Portability and Accountability Act (HIPAA) breach. For example, if I give a mom a bottle to feed her baby, and she feeds her baby and then looks at that label and realizes that is not her milk, you would have to report that as a HIPAA breach if there's protected health information on the bottle label.

That brings you to the economic concerns. Now, HIPAA fines can be $25,000 or more per incident, so you certainly want to take that very seriously. Also, if a baby gets the wrong mother's milk, you have to do blood workup. You have to draw blood on that baby, that baby's mom (in case a virus came from his or her own mom), and the mother whose milk it was. That blood workup can be $500 or more. And then certainly, if there was medical complication related to the exposure, there would be the cost of treating that as well.

And while all this is true, probably the biggest real risk—because the risk of getting sick from the wrong breast milk is low—is loss of family satisfaction and loss of confidence. Parents think this milk was labeled clearly, how could you have possibly given it to the wrong baby? And that may make them lose confidence in the medical care that they're receiving. They start to wonder, well what other errors are happening that I don't know about?

We definitely want to minimize misadministration. We don't want an adverse event, and we don't want our families to lose confidence in us.

Regulations and Guidelines

Keep those things in mind: contamination, accuracy and misadministration. Those are really the areas that we're tying into. I want to now go through the different regulations and guidelines.

People usually want to know what the Joint Commission says about this, and they actually do have several things that address feeding preparation. Provision of Care (PC.02.02.03) basically says that the hospital is responsible for the safe and accurate provision of food and nutrition products and ensuring that everything's prepared using proper sanitation, location, temperature, light, moisture, ventilation, and security. In other words, any food you're preparing that includes human milk, donor milk, or infant formulas, must be prepared keeping all of these things in mind. The National Patient Safety Goal (NPSG.01.01.01) says you must use 2 patient identifiers for human milk administration. Environment of Care (EC.01.01.01.11) says you have to have a method of responding to produce notices and recalls. And finally, under Infection Control (IC.01.05.01), it says that all hospital components and functions must be integrated into your infection control activities. You can see all of this ties in to how you're handling human milk and formula.

Best Practices: Overview

There are a lot of best practice resources out there. I'm partial to the top one, the book from the Academy of Nutrition and Dietetics, which I had the privilege of working on. I do not get any money from this book, so I am not promoting it from that

standpoint, but it is an excellent resource, and I highly encourage you to look through that if you're looking for guidelines. There is also an excellent resource from the Human Milk Banking Association of North America. American Society for Parenteral and Enteral Nutrition (ASPEN) has several articles out, as does National Association of Neonatal Nurses (NANN). There's a Human Milk in Feeding Premature Infants Consensus Statement that we're going to talk about in a minute here.

All of these references really talk about how to implement this in your facility. The Consensus Statement was put out in 2015. Interestingly, they had 11 authors from all over the world, and they wanted to talk about all things human milk and donor milk for preterm infants. And the section on centralized handling of human milk says that all NICUs should use centralized preparation in a dedicated space; consider specially trained, dedicated staff, if possible; and use technology of some sort, including barcode scanning, to reduce the risk of errors.

When you're looking at best practices, if your hospital participates in the *US News & World Report* Best Hospitals survey, you might notice that in the neonatology section, they specifically ask whether your hospital offers a dedicated area within the facility, but away from the bedside, for human milk and formula preparation. In order for you to answer yes to this, it has to be a prep room that uses aseptic technique, with restricted access, and with no other activity occurring in the room. It also asks about other risk reduction programs, such as barcode scanning for correct identification and using dedicated technicians. Other organizations are really looking at what are best practices for handling.

Best practices have these areas in common. They talk about location and layout—a place that is physically separate from direct patient care areas used solely for the purpose of human milk and formula prep and that supports aseptic technique. They all talk about specially trained staff and, ideally, if you have the bandwidth, dedicated staff. They talk about using special temperature control measures—in other words knowing that things are stored at the proper temperatures at all times—and having infection control programs to make sure that you're not introducing anything at the time of preparation or feeding. They talk about proper accuracy during preparation, unit dosing, ensuring proper labeling, and using barcode scanning to reduce the risk of human error.

Best Practices: Location

Let's start with location, which, again, should be away from patient care areas. The location must support aseptic technique and conform to all other standards of handling. I always think of it this way: there's no other unit in our hospital where the employee that changes diapers or places intravenous catheters would also be responsible for preparing meals. And yet, in our NICU population, we often put that burden on the bedside nurse. And if we were in-person, I would ask people who do not have a centralized prep area where they think the most common location for preparing feedings is. It is almost always next to the diaper scale because often that is the counter next to the sink. But if I was preparing you a sandwich, and I washed my hands and then laid out everything on the counter next to the diaper scale, you probably wouldn't want to eat that sandwich. And yet, that's often where we are preparing human milk or formula for our most fragile babies. Keep in mind, when you're preparing feedings, this is food prep, and it should follow all of the US Food & Drug Administration (FDA) guidelines that are in the FDA Food Code.

It's also important not just to have a dedicated space, but also to consider how that space is designed—and it does not have to be big. I've seen prep rooms in something as small as a closet, but it has to have a good layout. The Facilities Guidelines Institute (FGI) puts out recommendations for hospital design, and most hospitals use these. If you've done any sort of remodel in inpatient or outpatient units, the FGI is usually where hospitals go. They've been recommending a dedicated prep room for feeding since 2010. In 2014, they really talked about the flow, which has to go from clean to dirty, so you're not recontaminating clean space. When you think about layout, again, you want to separate clean and dirty.

You don't necessarily have to have an anteroom. Best practices talk about having an anteroom where you can wash your hands and put on a bonnet and put on gowns and things like that, but in this example, there's a little peninsula counter, which is the line between the dirty and clean spaces. You come in, and you can wash your hands and get prepared in the area where the

dishwasher and the garbage can are, but as soon as you cross that peninsula, you are in the clean space that is dedicated for feeding preparation. Sometimes it's just thinking a little outside the box to make what you have work for you.

For temperature control, make sure that you're always using laboratory- or pharmacy-grade refrigerators or freezers because you want them to have good temperature maintenance. There are single- and double-door potions. I will say, one time in my career, I bought a double-door, and I regretted it because if there was ever an issue with it, then you were losing twice the space and had to relocate all of that milk. So, personally, I recommend single-door. You want to have a continuous temperature monitoring system that can watch that around the clock. You want to make sure that your refrigerators and freezers are on your backup generator power and have after-hours correction plans. If you have a prep room that isn't open 24/7, what happens if it loses power overnight, and who is responsible for taking action?

You also want good storage in the prep room. Bins that are long and narrow can optimize the space in your freezer. They go all the way to the back, but you'll never have to reach over 1 patient's bin to get into another patient's bin. That reduces the risk of grabbing the wrong thing or putting it in the wrong bin. Bins that are about the height of a 2-oz bottle can prevent bottles from toppling into the wrong bin. Some hospitals opt to use covered bins as well. And then, when you're thinking about your prep room, you do have to think about heat and noise. So, refrigerators and freezers generate heat, and they can be kind of noisy, so you have to think about how your space is—who's going to be working in there, if they're going to be in there all day, and how do you minimize that. Maybe you put 1 fridge and freezer in the prep room and then you have your overflow in a storage room around the corner or something so that it's not so loud or not so hot in your preparation area.

Best Practices: Infection Control

For infection control, these are the things that most consider best practices:

- Using gowns, gloves, and hair coverings
- Making sure you have a hands-free sink
- Using a dishwasher and a drying rack if you have nondisposable items that you're using
- Making sure that you're monitoring your fridge and freezer temperatures
- Having food-safe sanitizers available—and I say that because a lot of hospitals are using sanitizing wipes that are not considered food grade, so I encourage you to work with your infection prevention department to look for food-safe sanitizers
- Enclosed drawers—for example, storing in clear plastic drawers that you can open with 1 finger—if people get bins that have lids, no one ever puts the lid back on the bin because, when you're preparing a lot of feedings, it's just 1 more step to do, so having drawers where you can keep dust or contaminants or debris out (but that are easy for the person preparing to open) can really make that compliance a lot better
- And having a foot-controlled, covered trash can.

Another thing on infection control, which seems easy, is the whole handwashing and sanitizing part. One thing that I've seen a lot of is that, when they get done preparing the feeding, which is step 5, that a lot of times people then grab a sanitizing wipe with their dirty glove and go back and sanitize the area. So, make sure that everybody's aware that you remove the dirty glove, then sanitize, then wash your hands, then start that preparation over. Even consider having something like this posted in a prep area, whether you have technicians or whether you have nursing staff or others preparing your feeds for you.

Best Practices: Accuracy

Moving on to accuracy and looking at your orders and calculations: make sure that you have some guardrails in. I've worked at a facility where we put an alert in if a physician chose a formula that wasn't appropriate for the age of the patient—things like that to help the staff. Also, tech training can give them the tools to look for things that don't seem right so that they don't blindly follow an order that doesn't make sense. For example, if a volume seems excessively high—it's really easy to accidentally put in an extra zero when you're typing in the electronic health record.

Looking at calculations, any time you can automate your processes—whether that is a simple spreadsheet that calculates for you or if you have a scanning system that does your recipes for you—if you can reduce the risk of human error, that's going to be a benefit for patient safety. But you also want to have manual processes because we know sometimes computer systems can go down, and your people preparing need to know how to do this in the event of an outage.

You want to make sure you're getting accurate measurements. So, for powders, you should really be doing gram scale measurements. Research has found that household measurements, such as cups, teaspoons, or can scoops can vary anywhere from 25% to 40%. It's not always that the receptacle is off; it's the person measuring it. Sometimes people pack it way down or sometimes there's an air pocket in there, so gram scales are really your best bet. And then, make sure that you're validating your gram scales on a regular basis with known weights.

If you're doing liquids, you want to make sure you have something with good graduations. So, a 2-oz bottle usually has very good graduations, along with graduated cylinders and syringes. Oftentimes, the markings on 8-oz bottles or some of the bigger bottles aren't really accurate. While you may use them for storage or for dispensing feedings, that's not your best bet for measuring your liquids. You want to be as accurate as possible.

You also want to have a method of tracking in the event of a recall. Manufacturers must put out a recall if there is an issue with their product. That is part of FDA regulation, and in the last couple of years, there have been many recalls. But you also need to know if you have fed a patient something that's been recalled or sent home formula with someone and then it turned out that that was recalled. That can be a paper log, documentation in an electronic health record, or a scanning system. In a real-life example from 2019 (before all the recent recalls), there had been a recall on a product, and we were using a scanning system at my facility that captured every lot number of every product we used in the hospital or sent home. After the recall, we ran a report, and it turns out, this recall was in August, and the patient who had received it had received it back in March of that year, and they had already been discharged. We followed up, and there was no adverse event. But about 3 weeks after the recall, someone from the FDA field office in our area came into our department unannounced and asked for us to show them how we had managed that recall. So, I really do want to make sure people have a way of knowing what products went to what patients.

I mentioned unit dosing was considered a best practice, and the reason is it reduces your risk of contamination. Think about it this way: if I make 12- or 24-hours' worth of feedings in my dedicated, aseptic space, with unit dosing, I draw it up in syringes or I pour it into bottles and then dispense that. The nurse at the bedside grabs the syringe or the bottle and proceeds to feed it, so you're not doing any manipulation of that feeding at the bedside. However, if I do 12- or 24-hours' worth in a big jug and then the nurse takes that to the bedside to draw into a syringe or to pour into bottles, then you're doing that management away from your aseptic space. That does increase your risk of contamination.

Unit dosing also reduces your risk of misadministration. If I'm prepping it and labeling all feeds at the same time, and I'm verifying it is the correct patient, then I'm lowering that risk. If I'm putting it in a jug and a nurse is drawing it up and then relabeling that, there's a risk that the wrong patient label could go onto the syringe or bottle at that time.

The other thing is, if you're thawing large amounts of human milk, sometimes the milk gets a little warm and this way, it cools to room then to refrigerator temperature much more quickly in individual doses than it would in a larger container.

Best practices for proper labeling should include patient name and medical record number or identification; contents and caloric density; volume and frequency or rate; route of administration; expiration date/time; "For enteral use only"; and "Keep refrigerated until used." I have seen, throughout my 30-year career, people will draw breast milk or something into a syringe and then slap a patient label on it. But you really need to include what is in that bottle or syringe. All of those details should be on the label.

When you're verifying identification of human milk, you want to make sure you're doing either a 2-person double-check or barcode scanning at each of these times:

- When combining bottles—so if I'm fortifying milk and I need to combine 2 bottles together, I need to be making sure that I'm not accidentally mixing up 2 patients at that time.
- Any time I'm relabeling—if I have my jug of prepared feeds and I'm drawing in a syringe and I'm putting a label on that, someone should be verifying that I am labeling it correctly, or I should be using scanning at that step.
- When I take that feed to bedside to feed—someone should be verifying with me either against the patient's armband visually or through barcode scanning.
- And finally, at discharge.

As I mentioned earlier, human milk must be double-checked, based on Joint Commission guidelines.

Now, when you talk about formulas and fortifiers, a lot of times people skip this step, but it really is important to confirm that you're adding the right formula or fortifier at the time of preparation or, if you're formula-feeding, at the time of feeding. And so that can also be done through a 2-person verification or through barcode scanning.

I'm all about using technology instead of human labor, which risks human error. The goal of using technology is really to reduce errors and improve efficiency. With scanning, you can eliminate that second person for verification. If you can get a system where it'll automate your recipe calculations, then you reduce the risk of a mathematical error. If you get a system where you can scan the products as well as mom's milk, then you can confirm proper product. You want to make sure, if at all possible, you can automate your labeling so that you're not manually doing that. Again, risk of human error. Same with automating your expiration dates and times. Finally, if you can automate your inventory and your tracking of lot numbers, then in the event of a recall, you have a much simpler way of figuring out who received what products.

Evidence Supporting Best Practices

What are some of the published outcomes out there? In this first study, the data were collected between 2000 and 2004, so it's a bit of an older study. It was looking at contamination of infant feedings, and this was a study I did at the facility I worked at during that time. We were building a new NICU where we were building a feeding prep room. Now, we had a lot of human milk in our facility, but this was the early 2000s, so if mom didn't have enough milk, we were using formula as the backup. In this study, we actually studied formula because we knew we couldn't control how mom pumped, how she cleaned her breast pump, or how she transported the milk or stored it at home. So, what we wanted to do was just look at the difference of contamination of things we could control.

We looked at formulas when our nurses were preparing them in the NICU at bedside, which was really a little cart in the corner, and then when we opened our prep room with our dedicated technicians. Basically, bedside prep was 24 times more likely to show contamination than preparation in our feeding prep room. And with bedside prep with powdered formulas, which are not sterile to start with, almost 44% had microbial growth. When we switched to centralized prep, that dropped to 4%. What that told me was, yes, powdered formulas are not sterile to start with, but where and how you're prepping them made a huge difference with regard to microbial growth.

Even sterile liquids, when they were handled at the bedside, such as drawing up sterile formula from a little bottle into a syringe, had more contamination with bedside prep. Sometimes you end up touching the outside of the syringe or setting the syringe down on the counter, and then it gets dipped into the sterile formula. It's easy to see how even sterile formulas could be contaminated at bedside. When we switched to centralized prep, that dropped to zero. So, it really did tell us having a dedicated space made a big difference.

In this study at Nationwide Children's, they did a 6-year analysis of human milk errors in their NICU. They implemented a barcode scanning system, but then they still had pretty high numbers of incorrect scans. So, they went back and looked at their processes and did additional interventions. They added scanning hardware and label printers at each bedside. They centralized their human milk handling, and they hired dedicated technicians. And when they looked at their near-misses or wrong scans per 1,000 bottles, the wrong milk to wrong baby per 1,000 bottles dropped from 8.3 down to 3. So, that's a pretty significant reduction. Expired milk per 1,000 bottles dropped from 84 down to about 9 and, finally,

preparation errors (using the wrong fortifier or the wrong product) dropped from about 4.8 down to 2.2. Pretty dramatic changes tied to having that centralized prep and those dedicated technicians.

In a 7-year study done at a facility I worked at, we looked at human milk and formula errors. This was a big NICU: 105 beds, more than 10,000 human milk feedings monthly, and annual human milk handled by the prep room between 120,000 and 143,000 oz—and that's just mom's own milk, not donor milk. I give you those details because the more milk you handle, the more likely you are to make errors. In the hospital, centralized handling with dedicated staff was implemented first. Then about a year later, barcode scanning of human milk and donor milk was introduced. Then, about 4½ years later, scanning of formulas and fortifiers in the prep room was added. So, we tracked data for wrong milk to wrong patient; expired human milk or donor milk; and wrong formula, fortifier, or ingredients at the time of preparation.

What we found is that, prior to doing any interventions (eg, before the prep room or technicians), there were 3 errors in the 2½ years before this was implemented. So, we thought, well 3 errors isn't very much. And then we implemented our prep room and we had no incidents. There were no reports of any baby getting the wrong human milk. But, when we added barcode scanning, in the 7 years, there were over 1,200 wrong scans, so we knew that there were probably more errors than we thought. We just didn't have a way to detect them. You know, if I gave the wrong milk to the wrong patient, I might never know I did that. But that averages 175 a year or almost once every other day. So, we really felt like, by implementing our scanning system and our centralized processes, that we were reducing that risk.

In the same study, we looked at expired human milk. Prior to doing anything, we had never had any reports of expired human milk being used. Once we implemented our prep room with our dedicated staff, we still had no incidents reported. But, once we started scanning, over 2,100 times in the 7 years, there was expired milk scanned. We know that expired milk is more likely to result in contamination, so we felt like, by introducing scanning, we reduced that risk of that reaching the patient. This was an average of about 300 times a year, almost once daily. We really felt like this improved safety.

Finally, we had 2½ years' worth of data for wrong ingredients used in preparation where we had never had a report of a patient getting the wrong fortifier or formula. When we started our prep room, we still didn't have any reports of that. But in 2½ years, 480 times at the time of preparation, the wrong product was grabbed off the shelf. Again, just a safety measure to prevent us from giving the wrong product to the wrong patient.

We also did a time study, and we found that we saved 1,400 prep room staff hours and about 1,000 nurse hours per year. This was time saved by not having to find a second person for 2-person verification. It was time savings by not having to manually calculate all the recipes and time savings in charting by not having to chart everything about the feeding because it automatically imported from the scan.

Considerations for Implementation

When you want to get started, how do you implement these best practices? You reviewed the literature; you know what you want to do—but how do you get there? You want to assemble the correct people, get the right key stakeholders there, form a feeding team, and really make sure you're getting some executive champions who can help take this forward.

It's a good idea to do a failure mode and effects analysis (FMEA). If you've never done one, your quality team can definitely help you. You want to review every step of the process because your goal is to identify the potential failure points, and then, you give them a score (a risk priority number [RPN]). If you take severity on a scale of 1 to 10, likely occurrence on a scale of 1 to 10, and detection on a scale of 1 to 10, then multiply those together, that'll give you your RPN. And it'll help you figure out what is most important and where you need to focus your efforts.

Then you want to take it to implementation. Once you've figured out where your pain points are, how can we fix this? It's good to start with unedited brainstorming. Really try not to say that we can't do that or we've tried to do that before because the more brainstorming you can do, the more creative ideas will come out. Then you want to choose the most appropriate

solutions and determine next steps. As I mentioned earlier, you might be just doing 1 step. All we're going to do is find a dedicated space, and it's an old closet, and we're going to convert it, and the nurses are going to use that because that's all we can do at this time. But you want to make sure that you're systematic in your approach. Then figuring out, do you need to buy equipment? Do you need permission from any regulatory bodies? Do you need to train people or update your policies? Does this impact other departments that maybe you hadn't thought about?

As you go through the steps, you want to identify owners for different parts of the project and then make sure you have goals and outcomes, like how are you going to know if this is a success, and how are you going to measure that throughout the project? You want to start a project plan: evaluate the workflow; outline the steps; and come up with a timeline. Again, assign responsibilities and track your progress.

Key Takeaways

My final thoughts here, because I really do want to give some time for questions. These are recommendations for the hospital milk room from Lippincott's *Essentials of Pediatrics* for Nurses from 1936. This book has an entire chapter on the hospital milk room, and it talks about a location—basically aseptic (although they don't use those words)—where infant feedings can be prepared in a satisfactory manner. It's a separate room with no other function. They talk about clean technique. They talk about how staff working in the prep room should not be doing any patient care, so there's not risk of cross-contamination. They talk about using scales for weighing powders and precise recipes. I mean, it all sounds very familiar, and this is in 1936. We're almost 90 years later and we're still having these conversations.

Some key takeaways here. We know that regulatory standards reference the proper handling of food and nutrition products for all patients. As I mentioned, Joint Commission has quite a few. Many of the state departments of health have their own guidelines, but when you think about this, we don't always think of human milk and formula under that realm of food. But it really is, and we need to make sure we are handling it with the same reverence that we would for food and that process.

Centralized handling and barcode scanning are considered best practices. Numerous professional and quality organizations have talked about how this reduces the risk of contamination, errors, and misadministration, and it can improve efficiency. Research has shown improved outcomes and time savings with centralized handling and barcode scanning, and family and staff satisfaction have been tied to such processes. If you can have dedicated staff, it allows your nursing staff to spend more time at the bedside and focus on that, and it gives the family the idea that you value their human milk so much that you have a dedicated place to do that. I used to explain to my families, it's kind of like having a pharmacy for your milk. We are watching every drop of it, and we are really making sure that we're handling it in the most appropriate manner.

As you go through this process, what I really encourage you to do is review the guidelines, a lot of the things we've talked about today. Then, bring your team together to discuss current challenges. What would be those things that maybe you could change in your facility? And come up with a plan, even if it's just one change or maybe if it's a phased approach, thinking about what you could do to implement that. Then looking at technology, is that just a spreadsheet that you could use to help with calculations or tracking lot numbers? Or is it a more integrated system, some sort of system that will do this for you? Look at how you can use technology to reduce that risk of human error.

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Audience Questions

Editor's Note: This is a transcript of live audience questions with the educator's responses from the presentation on January 17, 2023. It has been lightly edited for clarity.

✧ What are your thoughts on using sanitization steam bags in the hospital setting, and do these bags need to be put in microwaves separate from where food is heated?

Yes, I believe that sanitizing bags are excellent. I've worked in facilities where our policies and procedures said that we would use those for certain things. We had moms use them for their breast pump parts. We used them for some of the specialty bottles that maybe our occupational therapy and speech therapy team were using.

We did implement separate microwaves for those so that we weren't using them where food was.

✧ Are there any differences in recommendations for milk and formula handling between NICU and non-NICU departments? If so, what are those differences?

In general, I say you should use the same processes throughout your hospital, and the reason I say that is most of the guidelines we're talking about, this very strict handling, is because you want to minimize risk for immunocompromised patients. We know our NICU patients, particularly our preemies, are immunocompromised, but I always go back to the fact that if an infant is in the hospital setting, they are ill and are probably somewhat immunocompromised. So, I would say that standardized procedures, should be consistent throughout your hospital.

✧ In the image of the prep room that you showed, what is the machine on the counter between where the employee scrubs in and the clean area where preparation occurs?

Those are what are known as bead baths. Bead baths originally started as a piece of laboratory equipment where labs could warm specimens that they had to warm before doing whatever testing they were doing. But hospitals started using them for thawing milk. The bead baths are filled; they stay plugged in, and it's a very hot temperature (about 80° C), and there's little metal BB-looking beads in there. There's no water, it's just these metal beads, and then you stick the frozen bottles down in the beads, and it causes them to thaw. What we liked about them, unlike the commercial warmers, is the commercial warmers only hold a few bottles and so, if you're thawing like a hundred bottles at a time, you just literally don't have enough space or electrical outlets to have all those individual warmers. So, we use bead baths.

We actually published a study in the *Journal of the Academy of Nutrition and Dietetics* a couple of years ago to make sure using a bead bath to thaw milk was a safe process. We looked at the bead bath to make sure that it did not overheat the milk and that there wasn't an issue with contamination of the beads. We found that it was a safe and adequate substitute for using either a water bath or a commercial warmer.

I'm also going to point out 1 of my favorite features of this prep room, and that is the shelf that has formulas that go from ceiling to floor on the back wall. That shelf is only the depth of 1 can of formula because when you're restocking, you want to do first in, first out. But invariably, people get busy, and they put new formula in the front, and you end up with expired things behind there. By having this shelf only the depth of a can of formula, it not only takes up very minimal space, but everything is face forward so there's not that risk of formula expiring because it gets shoved to the back of the shelf.

✧ Would you recommend any certification program or training for the milk technicians?

There are a wide variety of educational levels for techs out there. Some hospitals require them to be registered dietetic technicians. Some hospitals just require a high school diploma or GED. But there are training programs out there. In the Academy of Nutrition and Dietetics book that I mentioned, there is a continuing education program with it where there's some testing. It's not a certification, but there is testing for that. There's an online certification program through Ohio State University and Columbus State Community College. I've worked with hospitals where they have their technicians do the lactation education counselor certification. Not that it teaches

you the handling so much, but I think it gives you a good reverence for moms' milk and how difficult it is for moms to collect that. So it allows them to really understand the importance of what they're doing.

✧ What type of water (eg, sterile water for irrigation) should be used during formula preparation? And what temperature should that water be?

You want to use sterile water in the hospital setting. I know, with all the shortages, that has been a huge challenge, and so most hospitals, in working with their infection prevention and others, find that sterile water for irrigation is acceptable. I have used sterile water for irrigation in the past when we haven't had sterile water from our formula manufacturers. Some use sterile water that they would've had for their pharmacy. So, all of those are appropriate. And then, I recommend chilling your sterile water. I've always kept unopened sterile water containers and unopened liquid concentrate of formula, which you're going to add to water, in the refrigerator. That way, they're already cold at the time of preparation. If you use room temperature ingredients, it takes several hours before that's down to refrigerator temperature. If you use chilled ingredients, it is already at the appropriate temperature and that reduced your risk of microbial growth.

✧ In your studies, what was the source of data for wrong patient? Was this from healthcare provider or nurse event reporting, and what methods do you find most effective in tracking this data?

Prior to having any scanning system, reports of wrong milk or any of those would all have gone through a safety reporting or incident reporting system. What I find at many hospitals is, if they're not scanning, the only way they know these errors is through self-reporting, whether the nurse or a technician or whoever noticed it. As you know, not just for this area, we all really want to encourage self-reporting errors because that's how we find how to make things better. But with scanning, it allowed both our hospital and Nationwide Children's (and other hospitals that are doing scanning) to track all their near-misses. Now, every near-miss wouldn't have necessarily reached a patient. If you were doing a 2-person double-check, you might have caught it at that time as well, but what most hospitals have found is that the number of near-misses far exceeds the reports from when they were manually self-reporting, and so it leads them to suspect that there's probably more errors than they knew about.

✧ Has anything changed since the third edition of the Academy of Nutrition and Dietetics blue book was published?

There aren't many new things out there. If you were familiar with the second edition to the third edition, the third edition's more than twice as long. There were about 20 authors on that; we really came together to say we need a lot more guidance in a lot of areas, but I know of nothing major that has come out or changed that would in any way change those guidelines.

✧ There are so many improvements my hospital could make based on your presentation. What is a tip or best practice for getting shareholders to understand the importance of some of these updates so that we can have the funding, education, physical space, etc?

I was in the same boat, so almost 20 years ago, at my previous facility. We were building this NICU, and they had not designed a prep room as part of it. Even more than 20 years ago, there was a little bit of literature, but not a ton. So, I think 1 of the things that's helpful now is that there are quite a few publications out there. Because I know when I was first trying to get this going around the year 2000, I didn't have any data I could pull to show my administrators that this is a real problem, which is partly why we did that contamination study. One of the executives gave up her office so that we could build our prep room, and I looked her in the eye and I said, "I guarantee you this'll be better." Then I thought, "Gosh, I hope this *is* better because I just guaranteed this." We did our contamination study because I really felt like we would show that, but there just wasn't research out there. The good news now is that I think your best bet is starting to pull some of those research articles and show them what real facilities have seen before and after, and how they have caught a lot of these errors.

Then, start slow, maybe just dedicating a space or doing some sort of automation of your processes. Go stepwise.

Look for some grants. I know that there are a lot of patient safety grants out there that I have personally applied for and

gotten at some facilities that I've worked at where we could use those grants to implement some of these processes.

Success begets success. At my most recent facility, we got a grant to get started, and then we started publishing some of our outcomes, and that made our administrators aware of all the great work we were doing. Then, it was easier the next time to come back and say, we'd like to expand this program because they already knew that we had been successful. We had also applied and won a couple of different patient safety awards and, again, if you can shine the light on your facility and show what a great job you're doing, then it's a lot easier to go back and ask for funding after that.

✧ Of the 2 different mixing methods when preparing formula— either adding water first then powder, or adding powder then water to the desired volume, mixing and rechecking the volume—which method do you recommend?

Both methods are acceptable and accurate as long as your recipes are correct. So, if you add, if you do water and add powder and you were to take that same recipe and do powder to water, you're not going to, let me try to explain that, I didn't explain that well. Powder takes up space, powder displaces water. So, if you're doing the powder and then add water recipes, you just want to make sure that you're accounting for that displacement and that you're getting the final caloric density that you want. What I will tell you is, with the exception of metabolics, in my experience, most hospitals calculate their recipes where they calculate, this is the water, this is the powder, and my new total volume would be then greater than the original water. I have noticed a lot of times for metabolic recipes, they will add powders and then add water to a final desired volume. So again, both can be accurate but your recipes are going to differ and so you want to make sure that you're doing it the same all the time. Hospitals I've worked at did metabolics, powder, then added water. Everybody else calculated water and then added powder.

✧ Is it safe to prepare human milk with fortifier or additive and then freeze it?

All the research out there says that you should not freeze a prepared feeding. So, once the additive's been added—and I know it always breaks my heart if we've prepared feeds and then a patient goes NPO—really the recommendations are you shouldn't freeze that. You shouldn't freeze prepared formula. And a lot of times, especially like if you're using donor milk or even mom's milk that was frozen, once you've thawed it, you cannot refreeze it either. So, unfortunately, you want to look at ways to minimize that. Some hospitals do that by only preparing 12-hours' worth instead of 24-hours' worth or making sure staff are being diligent (eg, if they think a baby's starting to look sick and they think they're going to NPO, alert preparation technicians to hold off).

✧ What is the best way to minimize wasting mother's milk?

The best way is to have very accurate recipes to make sure that you have a way to know how much milk you need so that you only thaw what you need so that you're not wasting that.

I worked at a hospital that, as a nurse-driven project, we eliminated all priming volumes for breast milk, and they just used a small amount of air or water to push the last of the milk through the tubing so that the milk reached the patient because they really felt strongly that they didn't want to waste any of that milk on priming.

Again, make sure that whoever's preparing it really has the proper reverence for breast milk so that they're not just thawing or throwing things away. Minimize container changes—that's where your unit dosing sometimes helps prevent having a lot of milk sticking to the side of a source container or things like that.

✧ Is there a best practice for adding probiotics to individual feedings in the milk lab?

For probiotics—and we do address this a little bit in the Academy of Nutrition and Dietetics' *Infant and Pediatric Feedings* book—you want to make sure that you are not running the risk of cross-contamination. Even though probiotics are healthy bacteria, you still do not want them to end up where you didn't intend them to be. So, making sure that you are using proper handling techniques. Nowadays, there are liquid- and powdered-based probiotics. Some hospitals are having those dosed out in the pharmacy and then just distributing that as a medication versus having it in the prep room. We, as the Academy, considered it not appropriate for a technician to be

adding in probiotics because, in the hospital setting, it's considered a medication.

I will add—I know that this has been more than 20 years ago—but there were research studies out there where they found central lines cross-contaminated from probiotics from other patients where they didn't have private rooms for their NICU. So, definitely make sure that you're not somehow doing that.

To complete this course and claim credit, click here, or go to: https://pnce.org/Feedings-Health-Facilities

Abbreviations

ASPEN	American Society for Parenteral and Enteral Nutrition	**FMEA**	failure mode and effects analysis
CDC	Centers for Disease Control and Prevention	**GI**	gastrointestinal
CFU	colony forming units	**NANN**	National Association of Neonatal Nurses
FDA	US Food & Drug Administration	**NICU**	neonatal intensive care unit
FGI	Facilities Guidelines Institute	**RPN**	risk priority number

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This activity is supported by an educational grant from **Mead Johnson Nutrition.**