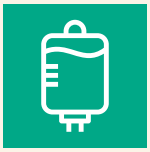
PRACTICE TOOL

The Institute for Safe Medication Practices (ISMP)/ American Society for Parenteral and Enteral Nutrition (ASPEN) Multi-Chamber Bag Parenteral Nutrition Consensus Statements



Parenteral nutrition (PN) is a complex life-sustaining therapy for patients who cannot intake adequate oral or enteral nutrition. A PN formulation is one of the most complex medications prescribed to patients and is considered a high-alert medication that is susceptible to errors that can result in patient harm.[1]

A pharmacy can compound PN specifically for a patient (i.e., custom-compounded PN), or it can be delivered using standardized, commercially available multi-chamber bag parenteral nutrition (MCB-PN). While MCB-PN is PN and subject to PN-specific guidance and recommendations,[2,3] there are unique safety considerations to MCB-PN that must also be considered.

Recently, ASPEN and ISMP conducted a stakeholder meeting to reach consensus on 18 statements involving MCB-PN general use, ordering/order review, preparation and labeling, administration, documentation, monitoring, and transition of care. These consensus statements were published by ISMP[4], and ASPEN will publish a paper that further details the methods and rationale for each statement in the *Journal of Parenteral and Enteral Nutrition.*

Consensus Statements on MCB-PN

General:

1. **What is the appropriate terminology to use when referring to standardized, commercially available parenteral nutrition products from a manufacturer?** When referring to standardized, commercially available parenteral nutrition products from a manufacturer, “commercial multi-chamber bag parenteral nutrition” is the specific terminology that should be used. Avoid the term “premixed,” as this term implies that the product is ready for administration and may lead to errors, including failure to activate the bag and/or add prescribed additives prior to administration.

2. **Based on the current MCB-PN products available in the US market, what populations are appropriate to receive MCB-PN?** Adult and older pediatric patients with an appropriate indication for whom MCB-PN can meet their targeted nutrition needs may be considered appropriate to receive MCB-PN products at the discretion of the practitioner. The use of MCB-PN is not recommended for the following populations: patients who require long-term PN for whom MCB-PN cannot meet their targeted nutrition needs; preterm and term neonates; pediatric patients who require conditionally essential amino acids in PN; patients with inborn errors of metabolism; patients with highly individualized fluid, electrolyte and/or macronutrient requirements; and patients with hypersensitivity to any component of the MCB-PN product. Special considerations may be made during times of PN component shortages, emergency crises, and at the discretion of the practitioner (e.g., travel, initiating therapy).

3. **How can the selection of MCB-PN products offered by institutions promote the safe and appropriate use of MCB-PN?** Facilities and institutions that provide MCB-PN products to patients should evaluate the nutrient requirements of their patient population and offer MCB-PN products that best meet those needs. Additionally, the use of MCB-PN should be considered in the context of the needs of all patients requiring PN, and a systematic program to provide a variety of forms of PN, if appropriate, should be developed. Consideration should be given to contingency plans during times of PN component shortages.

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4. **How can practitioners use what is currently known about the potential benefits and risks of MCB-PN versus compounded PN to support their decision between these two types of PN?** Practitioners should apply scientific literature and error data to evaluate the potential benefits and risks of the use of MCB-PN versus compounded PN in the context of the patient and the environment. When evaluating compounded PN versus MCB-PN, it is important to assess whether the organization uses an automated compounding device to reduce the risk of compounding errors and has an interface with the electronic health record (EHR) to reduce the risk of transcription errors.

5. **How should MCB-PN-related errors be reported?** Document errors and close calls (i.e., near misses) that occur during the MCB-PN-use process (e.g., ordering, order review and verification, preparation, labeling, dispensing, administration, monitoring, documentation) through the organization's reporting system for analysis and to ISMP for shared learning.

6. **Is additional training necessary for practitioners involved in any step of the PN use process at an institution or facility that provides MCB-PN?** Provide initial and annual training and competency assessments for any practitioners who work at a facility or institution that provides MCB-PN and are involved in any step of the PN-use process.

7. **What should be changed at the manufacturer level to improve MCB-PN safety?** Manufacturers should consider providing a broader variety of MCB-PN formulations to meet the needs of more diverse patient populations. Consider completing a human factors engineering analysis for new MCB-PN formulations prior to introduction to the market (e.g., ensure product packaging and labeling are well-differentiated for different formulations, include a scannable barcode, confirm ease of use and activation).

Ordering/Order Review:

8. **What EHR functionality is required for safe ordering of MCB-PN?** EHR functionality should include clinical decision support (e.g., dose range checking, compatibility, drug-drug interaction checking, duplicate therapy alerts, maximum concentrations for central versus peripheral line administration, maximum osmolarity) to guide practitioners. Evaluate available clinical decision support (in the EHR and automated compounding device) and ensure there are soft warnings and hard stops to alert practitioners when approaching or exceeding limits (e.g., single dose, daily dose, infusion rate, maximum solubility of calcium and phosphate, osmolarity) or omission of an essential component (e.g., ordering a non-electrolyte containing MCB-PN product without the addition of electrolytes). Regularly review alert overrides to determine appropriateness and to improve the safety of MCB-PN practices.

9. **What specific actions should be taken when ordering, reviewing, and verifying an order for MCB-PN (beyond that of compounded PN)?** Build standardized order templates for prescribing MCB-PN. Based on the patient's energy and protein goals, select a product from the organization's formulary that is appropriate for the patient with the least amount of waste. Calculate the volume needed to meet the patient's daily fluid and nutrient requirements, which may be less than the full bag volume. Use tools and resources to determine the exact amounts of amino acids, dextrose, lipid injectable emulsion (ILE) (if added), electrolytes, and additives the patient will receive based on the prescribed volume. To prevent selection errors, consider including the brand name with the generic name when differentiating between MCB-PN products. Clearly indicate the volume to be infused, the rate, and the duration of the infusion in the order. If the entire MCB-PN bag is not infused, clearly indicate that the remaining solution should be discarded. Clearly indicate whether amounts of prescribed additives include amounts already contained in the commercial MCB-PN product. A pharmacist must verify the MCB-PN order for compatibility, stability, and to ensure the correct amounts are being administered based on the volume.

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Storage, Preparation, and Labeling:

10 **Where can the inactivated MCB-PN product safely be stored?** Store inactivated MCB-PN products separately in the pharmacy, away from similar-looking bags, and according to the prescribing information. Avoid storing MCB-PN in patient care areas (e.g., automated dispensing cabinets). In the home setting, store MCB-PN according to the prescribing information.

11 **What are the critical steps in preparing MCB-PN for administration?** MCB-PN bags require activation to mix the chambers and the addition of prescribed additives to prepare for administration. The pharmacy should activate MCB-PN bags and add any prescribed additives in a sterile environment before dispensing the activated PN to patient care units in inpatient settings. An intravenous workflow management system (IVWMS) with barcode scanning should be used to verify the vials and syringes that contain all manually prepared additives before they are injected into the MCB-PN admixture. Additionally, using gravimetric analysis in the IVWMS may help detect dosing errors before reaching the patient. A pharmacist should review the final MCB-PN bag with additives prior to dispensing. In the home setting, MCB-PN should be prepared according to the manufacturer's instructions. If prescribed additives are required to be added at home, they should be incorporated using aseptic technique (e.g., Aseptic Non Touch Technique [ANTT]®).

12 **What nutrient components are safe to add to MCB-PN?** Practitioners should choose the MCB-PN product that requires the least amount of manipulation to meet the patient's nutrient requirements. Components added to MCB-PN, including additional macronutrients and micronutrients, must have established stability and compatibility data that support their safety. Develop a policy about safeguarding the addition of nutrients to MCB-PN products based on their stability and compatibility data and make this policy readily available.

13 **What components are essential to add to MCB-PN?** Different MCB-PN products contain different nutrients, and practitioners should be aware of the specific nutrients included in the MCB-PN products available at their institution or facility. Unless there is a patient-specific contraindication or rationale to avoid specific nutrients, practitioners should aim to meet all nutrient requirements for patients receiving both short- and long-term PN. Injectable multivitamins and trace elements are essential to add to MCB-PN bags, as they are never included in the MCB-PN products currently available in the US market. Electrolytes are essential to add to non-electrolyte-containing MCB-PN products, and ILEs are essential to provide to patients receiving non-ILE-containing MCB-PN (via addition to the MCB-PN product or separate infusion), unless there is a patient-specific contraindication or rationale to avoid them.

14 **How should the labeling of MCB-PN differ from the labeling of compounded PN?** Pharmacy should add a label to the MCB-PN product, which includes the brand and generic name of the MCB-PN product, total volume of the bag, the rate of administration, the volume to be infused, the amount of each component to be infused (including additives), and the beyond-use date of the final admixture. The label should clearly indicate if excess volume is to be discarded. Once the bag is activated, the manufacturer's expiration date on the MCB-PN is no longer valid, whether additives are added or not. Practitioners may consider covering the manufacturer's barcode and expiration date on the MCB-PN bag, to prompt scanning the barcode on the pharmacy label (with the beyond-use date) and not the manufacturer's barcode on the bag.

Administration:

15 **What specific actions should be taken to improve the safety of MCB-PN administration?** Optimize the use of technology and safe workflows for MCB-PN administration, including safeguards to ensure that the bag is activated and that the prescribed volume is infused over the appropriate timeframe (i.e., not to exceed 24 hours).

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Documentation, Monitoring, and Transition of Care:

16 **How can practitioners support patients to receive appropriate amounts of prescribed additives when the full bag of MCB-PN is not infused?** Practitioners should consider the complexities of ensuring that patients receive appropriate amounts of prescribed additives when the full bag of MCB-PN is not infused and should consider whether compounded PN may better meet nutrient needs. In situations where the full bag of MCB-PN is not infused, practitioners should choose the MCB-PN product that results in the least amount of waste and that requires the least amount of manipulation. If incomplete amounts of prescribed additives are provided due to patients not receiving the full MCB-PN bag, patients should be monitored for nutrient deficiencies and medication complications, as applicable, and additional supplementation of vitamins, trace elements, electrolytes, and other additives may be considered.

17 **What specific actions should be taken to safely transition patients on MCB-PN across care settings?** To safely transition patients across care settings, practitioners should review the PN order prior to the care setting transition to verify that the products ordered are available and the order is clear, feasible, safe, and meets the patient's needs. Practitioners may transition patients between types of PN (i.e., MCB-PN and compounded PN) during their care setting transition to support availability, feasibility, and safety. Patients who receive MCB-PN in the home setting and/or their caregivers should receive MCB-PN-specific education related to safe storage, preparation, administration, and monitoring.

18 **What specific actions should be taken when switching between compounded PN and MCB-PN?** When switching between compounded PN and MCB-PN, practitioners should be aware of the distinct product components, safety concerns, and practice recommendations for each and take appropriate action to ensure safe and adequate nutrient delivery to the patient.

Error Reporting

To report any errors related to MCB-PN or any PN, go to ECRI ISMP Medication Error Reporting System link:

https://home.ecri.org/pages/ecri-ismp-error-reporting-system

References

1. Institute for Safe Medication Practices (ISMP). ISMP List of High-Alert Medications in Acute Care Settings. ISMP; 2024.
2. Ayers P, Adams S, Boullata J, et al. A.S.P.E.N. parenteral nutrition safety consensus recommendations. *JPEN J Parenter Enteral Nutr.* 2014;38(3):296-333.
3. Boullata JI, Gilbert K, Sacks G, et al. A.S.P.E.N. clinical guidelines: parenteral nutrition ordering, order review, compounding, labeling, and dispensing. *JPEN J Parenter Enteral Nutr.* 2014;38(3):334-77.
4. The Institute for Safe Medication Practices (ISMP)/The American Society for Parenteral and Enteral Nutrition (ASPEN) Multi-Chamber Bag Parenteral Nutrition Consensus Statements. ISMP 2025. https://home.ecri.org/blogs/ismp-tools/multi-chamber-bag-parenteral-nutrition-consensus-statements

This practice tool is supported by FRESENIUS KABI

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