•When compounding parenteral nutrition (PN) with glucose, existing stability and compatibility resources for dextrose may be used by converting glucose concentrations to dextrose equivalents.
•When evaluating stability, ensure dextrose-based measurements and concentrations are used to align with available stability references and maintain formulation safety and integrity.

Sweet Relief: How Imported Glucose Solutions Can Help Alleviate Parenteral Nutrition Component Shortages

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Introduction

Since 2010, nearly every component used in the compounding of parenteral nutrition (PN) admixtures has experienced shortages.[1]
Contributing factors include:

- Manufacturing issues
- Supply–demand imbalances
- Product discontinuations
- Limited access to raw materials
- Natural disasters[1,2]

Patients receiving PN in the home setting are particularly vulnerable to harm related to product shortages due to decreased monitoring.[4]

Temporary importation of foreign products can be authorized by the FDA to mitigate shortages—for example, importing Glucose 50% from Europe.

Limited guidance is available to support clinicians in converting and safely using these alternative glucose products.

Molecular Distinctions

The active component is chemically identical in both products.
United Pharmacopoeia (USP) monograph (Figure 1)

- DextrosStatese = the hydrated form (d-glucose monohydrate) measured as weight/volume.
- As noted in the USP: dextrose = hydrated form, weight/volume monohydrate molecule[5].

European Pharmacopoeia (Ph. Eur.) (Figure 2)

- Glucose = the anhydrous form, which excludes the water molecule from the measurement.
- As described in the Ph. Eur.: glucose = anhydrous form excluding the water molecule[6].

D-Glucose Monohydrate = Dextrose

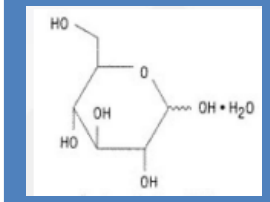


Figure 1. D-Glucose Monohydrate (Dextrose), 3.4 kcal/g

D-Glucose = Glucose

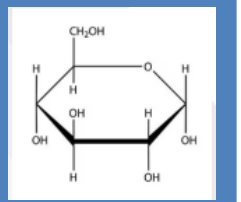


Figure 2. D-Glucose (Glucose), 3.375 kcal/kg

Steps and Considerations for Dextrose to Glucose Conversion

- Glucose has a higher osmolarity and energy content per gram than Dextrose, USP
- (Table 1). The energy content of Glucose is 3.75 kcal/g
- Glucose makes up 90.9% of the weight of d-glucose monohydrate form (Dextrose, USP). Therefore, Dextrose is equal to 3.4 kcal/g or 3.75kcal/g x 0.909
- Glucose 50% concentration would be equivalent to Dextrose 55%
- Dextrose 55% x 0.909 = Glucose 50%, with rounding error).

Table 1.

	Dextrose 50%	Glucose 50%
mOsm/L	2520	2775
kcal/L	1710	2000
Specific gravity	1.170	1.177

Stability Considerations

- Glucose and dextrose are chemically identical; therefore, their compatibility and stability profiles are expected to be the same.
- ASHP guidelines state that generically and chemically identical drugs are anticipated to demonstrate comparable stability outcomes.
- When compounding parenteral nutrition (PN) with glucose, existing stability and compatibility resources for dextrose may be used by converting glucose concentrations to dextrose equivalents.[7,9]
- When evaluating stability, ensure dextrose-based measurements and concentrations are used to align with available stability references and maintain formulation safety and integrity.

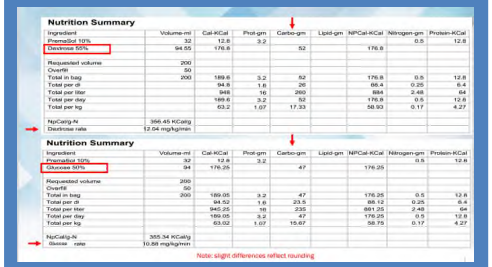
Nutrition and Ordering Considerations

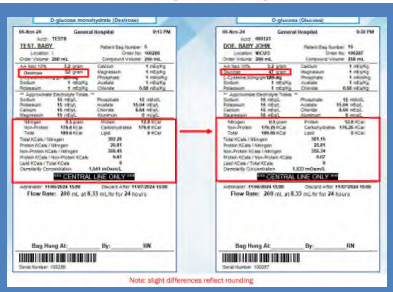
Example: Neonatal patient (3 kg), dextrose infusion rate of 12 mg/kg/min.

Step 1: Calculate the grams of Dextrose per day: 12 mg/kg/min = 51.84 grams (52 g) of dextrose/day

Step 2: Calculate the amount of calories provided by dextrose: 51.84 g/dextrose/day x 3.4 kcal/g = 176.3 kcal

Step 3: Determine the grams of glucose to provide equivalent number of calories: 176.3 kcal ÷ 3.75 kcal/g = 47.01 (47 g) grams of glucose/day





Professional Guidance:

ISMP Imported Fluid Product Checklist[10]

- The ISMP Imported Fluid Product Checklist helps identify potential safety risks and supports development of risk-mitigation strategies.
- Key considerations include concentrations, barcodes, labeling, storage requirements, calculations, and electronic ordering systems.
- Effective implementation requires clear, formalized, and widely distributed communication that remains accessible for reference throughout the use of the imported product.

ASPEN Guidance [7,9]

- Consideration should be given for alternative concentrations of intravenous dextrose products based on availability for PN compounding.
- Use of any alternative products will require modification to electronic health record systems, automated compounding devices (ACDs), and ACD-supported applications to reflect current product availability.

Discussion

- Persistent shortages of parenteral nutrition components threaten patient safety and continuity of care, particularly for patients requiring long-term therapy.
- Temporary importation of glucose solutions can help mitigate domestic dextrose supply disruptions.
- Although glucose and dextrose are chemically equivalent, differences in labeling, energy content, and osmolarity require careful conversion and clear communication to ensure accurate compounding and dosing.
- Use of established stability guidance, safety checklists, and staff education helps minimize risk during shortages.
- Collaboration among healthcare professionals, clinical organizations, and industry supports continuity of nutrition care during supply chain disruptions.
- Proactive plans to review, assess, and implement imported nutrition products support both patient safety and institutional resilience.

Recommendations

- Partner with clinical organizations
- Carefully review accompanying "Dear Health Care Provider" letter and other available documentation for conversions
- Leverage established stability guidelines
- Educate healthcare teams and patients/caregivers
- Implement robust safety checklists

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