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Parenteral Nutrition Practice Series

HOSPITAL/PHYSICIAN DEMOGRAPHICS

ATLANTA MEDICAL CENTER
ATLANTA, GEORGIA

- 460-bed acute care facility
- 12-15 TPNs per day
- Areas of Medical Excellence include advanced surgery, cardiology, oncology, neurology, women's health, orthopedics, and trauma
- Member, Tenet Health System

Case Study[1]:

Converting from Outsourced Parenteral Nutrition to a Multi-Chamber Bag: Convenience and Cost Savings With CLINIMIX Sulfite-Free (Amino Acid in Dextrose) Injections and CLINIMIX E Sulfite-Free (Amino Acid With Electrolytes in Dextrose With Calcium) Injections

"This is a product definitely worth looking at. It doesn't matter what type of institution you have, whether it's big or small, whether it's in a rural or urban area, CLINIMIX and CLINIMIX E Injections definitely have an important role."

-Teresa Pounds, PharmD

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OBJECTIVE/SYNOPSIS

Atlanta Medical Center wanted to evaluate their process to improve their operational efficiencies and to better serve their parenteral nutrition (PN) patient population. Areas for improvement identified included:

- Amount of waste due to the inability to quickly adjust a TPN order
- Use of Multi-Chamber Bag PN to allow more ownership and control

BACKGROUND

Dr. Teresa Pounds is the Clinical Pharmacy Manager at Atlanta Medical Center where Dr. Israel Orija is an attending physician and endocrinologist. Together, Dr. Pounds and Dr. Orija have observed both the operational and economic benefits of CLINIMIX Sulfite-Free (Amino Acid in Dextrose) Injections and CLINIMIX E Sulfite-Free (Amino Acid With Electrolytes in Dextrose With Calcium) Injections.

Atlanta Medical Center formerly outsourced PN through CAPS for 2 years, typically administering 12-15 PN orders per day. Although their outsourcing system seemed satisfactory, they felt that significant improvements could be realized by bringing the majority of PN orders back into their hospital through the implementation of multi-chamber bag PN.

IMPLEMENTING CLINIMIX AND CLINIMIX E INJECTIONS

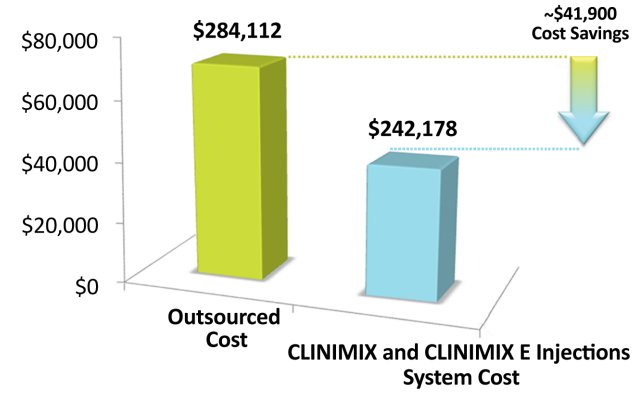
Simplified Management of Changing Nutritional Needs

Meeting patients' changing nutritional needs is important to Dr. Pounds. With compounded PN solutions, electrolytes and other substrates may need to be manipulated and adjusted over time. CLINIMIX E Injections offer:

- Formulations appropriate for a variety of patient types
- A baseline electrolyte profile

Dr. Pounds adds multi vitamins and trace elements to the CLINIMIX Injections bags as needed, but manages any adjustment to electrolytes outside of the CLINIMIX and CLINIMIX E Injections bag with riders and firmly believes this is the best protocol to address the needs of the patient.

Figure 1.
Total Annual System Cost 1-Year Projection*



* Total Annual System Cost includes acquisition, supplies, labor, and waste.

Cost savings is information provided by the customer. Baxter has not verified this information and makes no guarantee of cost savings.

"It's really very exciting; the amount of electrolytes in CLINIMIX E Injections is able to metabolically maintain the majority of patients. However, if additional electrolytes are required, I feel using riders allows me to give the patient what they need, right when they need it. Administration of electrolyte riders provides a quicker audit of patients' real lab values and electrolyte requirements."

-Teresa Pounds, PharmD and Israel B. Orija, MD

Cost Savings Without Compromise

Financial concerns are important to hospitals, clinicians, and patients. CLINIMIX and CLINIMIX E Injections help institutions realize cost savings. Atlanta Medical Center compared the annual cost of outsourcing their formulas with CLINIMIX Injections and projected a significant cost savings (**Figure 1**).

"At Atlanta Medical Center, we compared our standard procedure to CLINIMIX and CLINIMIX E Injections and found that they were more cost-effective for us," reports Dr. Pounds. "There is a high degree of waste associated with compounded products. If a patient's situation changes and they no longer need all of the prepared compounded solution, that solution is wasted. However, with CLINIMIX and CLINIMIX E Injections, there is more control. These premixed PN bags can be activated when the patient is ready."

Indications

CLINIMIX and CLINIMIX E Injections are indicated as a caloric component in a parenteral nutrition regimen and as the protein (nitrogen) source for offsetting nitrogen loss or for treatment of negative nitrogen balance in patients where:

- The alimentary tract cannot or should not be used,
- Gastrointestinal absorption of protein is impaired, or
- Metabolic requirements for protein are substantially increased, as with extensive burns.

Important Risk Information

- CLINIMIX and CLINIMIX E Injections are contraindicated in patients having intracranial or intraspinal hemorrhage, in patients who are severely dehydrated, in patients hypersensitive to one or more amino acids, and in patients with severe liver disease or hepatic coma. Solutions containing corn-derived dextrose may be contraindicated in patients with known allergy to corn or corn products.

Please see detailed Important Risk Information on page 4 and accompanying full Prescribing Information

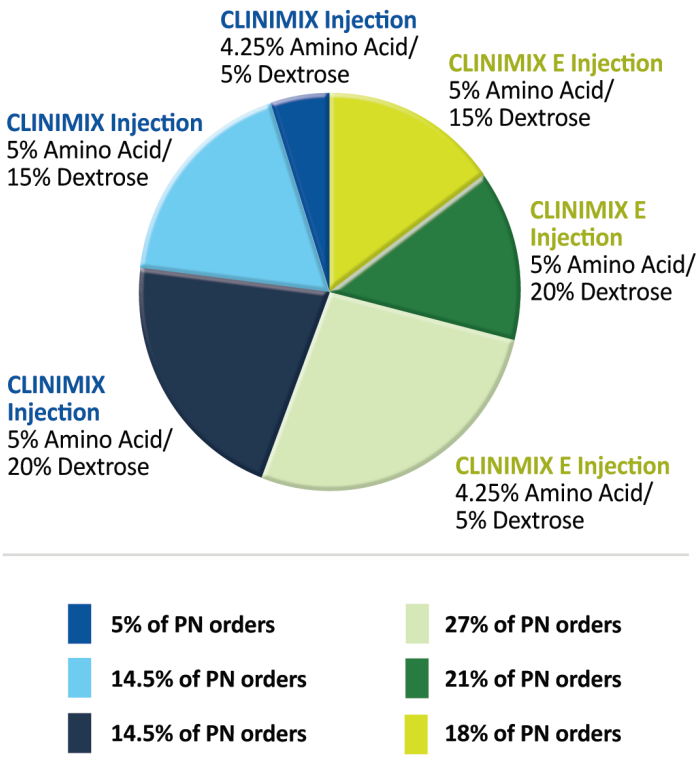
RESULTS

The Majority of Patients' Nutritional Needs Could Be Met With CLINIMIX and CLINIMIX E Injections

A review of Atlanta Medical Center's TPN orders demonstrated that 74% of daily amino acid, dextrose, and fluid requirements could be met with a variety of CLINIMIX and CLINIMIX E Injections formulas. An annualized view of the various formulas purchased is shown in **Figure 2**.

Dr. Pounds stated, "This is a product definitely worth looking at. It doesn't matter what type of institution you have, whether it's big or small, whether it's in a rural or urban area, CLINIMIX and CLINIMIX E Injections definitely have an important role."

Figure 2.
CLINIMIX and CLINIMIX E Injections Formulas and PN Orders (1L and 2L Volumes)



Multi-Chamber Bag PN May Help Reduce Risk of Medication Errors and Contamination During Preparation

Compounding complex PN solutions is a detailed process that must take into account numerous variables. Many safety guidelines today recommend the use of medications that are in the most ready-to-administer forms available from the manufacturer. Of the CLINIMIX and CLINIMIX E Injections used at Atlanta Medical Center, over 65% is 2 liter CLINIMIX E Injections (with electrolytes) and the majority of the remainder is CLINIMIX Injections. If additional electrolytes are needed, they are delivered via riders or piggyback. The use of these forms of medications may help reduce the potential for touch contamination and medication errors that may occur during the compounding process.

"CLINIMIX and CLINIMIX E Injections require fewer preparation steps than compounded products, minimizing the likelihood of mistakes and contamination."

-Teresa Pounds, PharmD and Israel B. Orija, MD

SUMMARY

The transition from outsourced compounded PN to the use of multi-chamber bag PN was a successful practice change for Atlanta Medical Center and embraced by both pharmacists and physicians. They have been using CLINIMIX and CLINIMIX E Injections for approximately 2 years now, and believe the benefits have been significant.

- **Increased control of their PN process**
- **Improved response times for providing PN**
- **Reduced waste of costly PN products**
- **Overall system cost savings**

Important Risk Information

- **It is essential that a carefully prepared protocol based on current medical practices be followed, preferably by an experienced team. Frequent clinical evaluation and laboratory determinations are necessary for proper monitoring during administration.**
- CLINIMIX and CLINIMIX E Injections **must be** admixed prior to infusion.

IMPORTANT RISK INFORMATION

- **It is essential that a carefully prepared protocol based on current medical practices be followed, preferably by an experienced team. Frequent clinical evaluation and laboratory determinations are necessary for proper monitoring during administration.**
- CLINIMIX and CLINIMIX E Injections are contraindicated in patients having intracranial or intraspinal hemorrhage, in patients who are severely dehydrated, in patients hypersensitive to one or more amino acids, and in patients with severe liver disease or hepatic coma. Solutions containing corn-derived dextrose may be contraindicated in patients with known allergy to corn or corn products.
- Because of the potential for life-threatening events, caution should be taken to ensure that precipitates have not formed in any parenteral nutrient admixture.
- Use with caution when administering to patients with anuria or renal insufficiency, pulmonary insufficiency, or heart disease. The intravenous administration of these solutions can cause fluid and/or solute overloading, resulting in dilution of serum electrolyte concentrations, overhydration, congested states, or pulmonary edema.
- Metabolic complications have been reported, such as acid-base, electrolyte, and blood glucose imbalances, elevated liver enzymes, and osmotic diuresis and dehydration.
- Other adverse reactions that may occur include febrile response, infection at the site of injection, extravasation, and hypervolemia. The infusion of hypertonic nutrient injections into a peripheral vein may result in vein irritation, vein damage, and thrombosis.
- This product contains aluminum that may be toxic with prolonged parenteral administration if kidney function is impaired.
- CLINIMIX and CLINIMIX E Injections **must be** admixed prior to infusion.

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CONTRIBUTORS

Teresa Pounds, PharmD, BCNSP

Clinical Pharmacy Manager

Has been a practicing pharmacist for more than 15 years and the Manager of Clinical Pharmacy Services and Program Director of the Pharmacy Practice Residency Program at Atlanta Medical Center in Atlanta, Georgia for the past 7 years. Dr. Pounds is an adjunct professor at the Mercer College of Pharmacy and Health Sciences Center in Atlanta, Georgia. She received her PharmD from the Mercer College of Pharmacy and Health Sciences Center and completed her Postdoctoral Pharmacy Residency at Georgia Baptist Hospital. Dr. Pounds is a past president of the American Society of Parenteral and Enteral Nutrition, Georgia (GASPEN) and has been a board liaison to the Association of Black Healthcare Professionals (ABHP) Council on Educational Affairs. In addition, she was a member of the American Society of Hospital Pharmacists (ASHP) educational council for 2 years. Dr. Pounds presents both locally and nationally on the topic of parenteral and enteral nutrition.

Israel B. Orija, MD, MRCP, FACP, FACE

Endocrinologist, Attending Physician

Is currently an attending physician at the Atlanta Medical Center in Atlanta, Georgia and an assistant professor of medicine with the Medical College of Georgia, Augusta, Georgia. He attended the College of Medicine of the University of Lagos and did his internal medicine residency and endocrine fellowship at the Cleveland Clinic Foundation, Cleveland, Ohio. Dr. Orija has contributed to the field of endocrinology with publications and presentations at local and national meetings. His main interests in endocrinology include diabetes and obesity, as well as thyroid, adrenal, pituitary, and reproductive endocrinology.

CLINIMIX
sulfite-free (Amino Acid in Dextrose) Injections

CLINIMIX E
sulfite-free (Amino Acid with Electrolytes in Dextrose with Calcium) Injections

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References

[1]Baxter Healthcare Corporation, data on file

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