

Utilization of an Electronic Home Parenteral Nutrition Order Form and Admixture Assessment

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Introduction

Providing parenteral nutrition (PN) in the home can present different challenges than providing it in the hospital or in a long-term care facility. Stability and solubility must be evaluated in a different manner as a healthcare provider is not available to visually inspect each solution immediately prior to infusion. Safety of the infusion is also a concern as there are limitations in patient monitoring. To ensure the provision of a safe and stable PN solution for use in the home, an electronic PN order form with an integrated assessment guide was introduced. The form was designed to enable the clinician to evaluate the PN formula order using accepted literature guidelines for extended stability and safe administration.

Methods

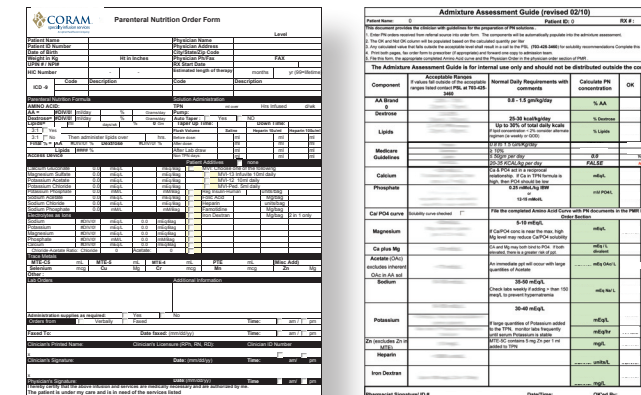
An electronic PN order form with an integrated electrolyte, micronutrient and macronutrient stability assessment guide was developed. The electronic form allowed entry of the PN formula into a standardized physician order form while automatically calculating the components on a per liter basis to allow easy comparison to acceptable guidelines. Out of range values were flagged on the form to be evaluated and adjusted before TPN compounding. All clinicians were provided with access to this electronic form and education was provided regarding the use of the form. Guidelines were based on published stability data and clinical practices. Any variable listed on the assessment guide that was determined to be out of limits was reviewed on a case by case basis for potential solution instability and safety concerns. Recommendations for altering the formula were offered via telephone by a team of experienced clinical pharmacists.

Assessments were reviewed by the clinical team to identify areas of concern and to explore alternative options to meet patient needs. Education was also provided to clinicians to better understand the key areas of concern related to stability and to determine the potential therapy options to improve patient safety. Various therapeutic scenarios were reviewed to assure clear communication with the ordering physician about recommended formula changes.

Clinician Education

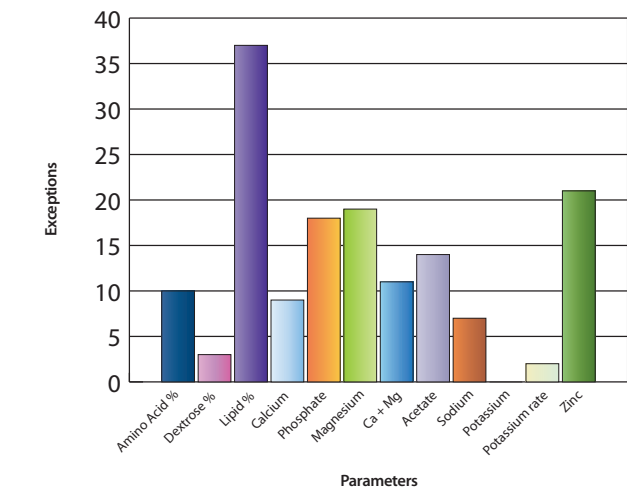
- Assessment of patient specific needs
- Stability impact of components
- Proper use of Solubility Curves
- Guidelines for using Dual-Chamber Bags
- Alternatives for meeting nutritional needs

Parenteral Nutrition Order Form



Component	Normal Daily Requirements with PN	Caution: PN concentrations	OK	Not OK
AA Blend	0.8-1.2 g/kg/day	0.8AA		
Dextrose	10-20% w/v	10-20%		
Lipids	1-2 g/kg/day	1-2 g/kg/day		
Medications	As ordered	As ordered		
Electrolytes	As ordered	As ordered		
Phosphate	As ordered	As ordered		
Ca/PDR Curve	As ordered	As ordered		
Magnesium	As ordered	As ordered		
Ca + Mg	As ordered	As ordered		
Acetate	As ordered	As ordered		
Sodium	As ordered	As ordered		
Potassium	As ordered	As ordered		
Zinc	As ordered	As ordered		

Admixture Exceptions



Results

Based on a review of a sample of the early calls received, the most common stability concerns were related to the final lipid concentration of the solution, the amount of sodium, acetate, calcium and magnesium combined per liter and calcium-phosphate solubility. Alterations in the formulation were recommended such as use of dual chamber bags, alternate day lipid infusions, providing higher amounts of alternating electrolytes or the use of hydration bags to provide sufficient electrolytes in extreme cases. Safety concerns identified regarding the total amount of a nutrient provided or the rate of potassium were reviewed on a patient specific case by case basis. Staff clinicians also had a team available to them of experienced Corporate clinicians to review

assessment findings, discuss therapeutic options, approve formulation stability and discuss formula recommendations with the ordering physician. Over time, it was found that clinicians were using the form proactively to identify and address potential safety concerns, thus minimizing multiple calls to the ordering physicians. PN dispenses were reviewed and found to be within desired guidelines. Even the best tools are not 100 percent sensitive to identify all potential safety issues, which is why they are aids to the assessment process that does not replace clinician experience and judgement. In addition to extensive training, staff clinicians utilize their Corporate resources to assist in review to assure patient safety.

Conclusion

Providing a stable PN solution in the home offers some unique challenges to the clinician. With proper evaluation of the data and using clinical resources, many complications Safety concerns are challenging to evaluate as clinical patient parameters vary greatly. Utilizing a standardized tool greatly improves patient safety when combined with clinician review and assessment.