Safe PN Practices: Closing the Gaps

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To assure the safe use of parenteral nutrition (PN), the American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.) provides guidance on best practices in the prescribing, reviewing, compounding, and administering of PN therapy and has also been sponsoring PN Safety Webinars to further distribute this important information to nutrition support clinicians. In addition to the Clinical Guidelines work group, A.S.P.E.N. formed a PN Safety Task Force to provide the 2 guidance documents on PN safety. Despite these efforts, A.S.P.E.N. acknowledges that gaps in practice remain regarding the safe use of PN. The A.S.P.E.N. PN Task Force continues to concentrate on solutions to these practice gaps.

The chair of the PN Task Force, Phil Ayers, PharmD, University of Mississippi School of Pharmacy, Jackson, Mississippi, USA, addressed gaps in the latest A.S.P.E.N. Parenteral Nutrition Safety Consensus Recommendations [Ayers P et al. *JPEN J Parenter Enteral Nutr*. 2014]. A gap of note includes the use of multichambered commercial PN products. While such products can be viable alternatives to manually compounded PN products when compliance with USP Chapter <797> and other accepted guidelines of sterility is not feasible, Dr Ayers emphasized that even these standardized commercial PN products require best practices. He further stated that there is a need for health care organizations to have policies and procedures that address the use of these multichambered, commercial PN products on formularies. Another gap regards competency assessment for nutrition support personnel. Dr Ayers highlighted 4 specific areas where guidance is needed: prescribing, order review/verification, compounding, and administration. He said that the task force made a number of recommendations for how the competency of nutrition support clinicians should be assessed. Among these were suggestions that the organization should determine the qualifications required, that all staff members should be assessed, and that the assessments should be maintained and continually improved. The assessment should address the person's level of knowledge and their skills, quality of behavior, and judgment.

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As a high-alert medication, PN requires safeguards to minimize the risk of error at every step in the PN-use process. However, a lack of standardization for prescribing, order review, preparation, and administration of PN stands at odds with minimization of error. Practice gaps in the A.S.P.E.N. PN Clinical Guidelines were addressed by Joseph Boullata, PharmD, University of Pennsylvania, Philadelphia, Pennsylvania, USA [Boullata J et al. *JPEN J Parenter Enteral Nutr.* 2014]. The first A.S.P.E.N. guidelines for safe PN practice from 1998 were revised in 2004. Taking a new approach to guideline development a decade later, A.S.P.E.N. based its 2014 document on practical questions that could be answered with available data, provided extensive evidence tables, and graded evidence to determine clinical guideline statements with rationales. The remaining questions were addressed by the task force's expert consensus, resulting in a set of recommendations with accompanying rationales. Despite the existence of guidance documents, practice gaps continue to exist. Many gaps are related to current practices (eg, pharmacist review of the PN order), but others exist because of limited or evolving data (eg, novel IV fat emulsions). Examples of practices that still lag behind clinical guidelines and areas in which data may influence clinical guidelines were discussed. Dr Boullata encouraged the audience to review and follow the painstakingly crafted recommendations, stating that A.S.P.E.N. guidelines can be used locally to address practice gaps, to reduce PN-related medication errors, and to better support a culture of safety.

The session's last speaker, Gordon S. Sacks, PharmD, Auburn University, Auburn, Alabama, USA, expanded on the implementation of safe PN practices, describing safety gaps in the prescribing of PN. Common factors of PN prescribing errors include knowledge and/or performance deficits on the part of the prescriber, patient characteristics (including age and renal function), calculation of PN dosage, and specialized dosage formulation or prescriber nomenclature [Seres D et al. *JPEN J Parenter Enteral Nutr.* 2006]. Reasons for PN order clarification comprised orders that were illegible, were missing an essential nutrient, or contained

incompatible additives. Dr Sacks compared results from 2 surveys of safe practice, the first conducted in 2003 (n = 651) [Seres D et al. *JPEN J Parenter Enteral Nutr.* 2006] and another in 2011 (n = 893) [Boullata JI et al. *JPEN J Parenter Enteral Nutr*. 2013]. High and nearly equivalent percentages of use of a standardized form were seen (88% and 90%, respectively), but the amount of electrolytes ordered per day or per kilogram body weight per day dropped from 39% in 2008 to a range of 11% to 35% in 2011.

A review of PN-related errors within the medication process revealed that approximately 40% of errors involved transcription, about 35% concerned errors in administration, and another 24% involved PN preparation [Sacks GS et al. *Pharmacotherapy*. 2009]. Only about 1% of errors were derived from the actual process of prescribing. Dr Sacks described the potential of computerized provider order entry (CPOE) and clinical decision support systems for reducing such errors. A meta-analysis of 12 studies showed that use of CPOE systems led to a reduction in overall medication errors in nearly all of the studies, with CPOE associated with a two-thirds reduction in prescribing errors in adult patients (OR, 0.34; 95% CI, 0.22 to 0.52) [Shamliyan TC et al. *Health Serv Res*. 2008]. Further, a randomized controlled trial of CPOE at a pediatric hospital demonstrated avoidance of 775 prescribing errors for every 1000 orders [Fontan JE et al. *Pharm World Sci*. 2013]. Results of a systematic review of data from surveys from the American Hospital Association and the American Society of Health-System Pharmacists indicated that use of CPOE was associated with a nearly 50% reduction in the likelihood of errors [Radley DC et al. *J Am Med Inform Assoc*. 2013]. CPOE was estimated to have resulted in a 12.5% reduction in medication errors, representing the averting of >17 million medication errors in the United States in a single year. Despite these successes, the 2013 Survey of Safe PN Practices revealed that only 33% of respondents had used CPOE for PN, with >80% requiring transcription in their prescribing process. Only 7% had access to an electronic interface [Boullata JI et al. *JPEN J Parenter Enteral Nutr*. 2013].

Dr Sacks concluded that errors still exist, even if one is not actively looking out for them. It is important to focus on them, as some of these errors can lead to serious adverse events. A standardized PN process can help to eliminate compounding and order entry errors, and a system for prompt reporting of errors without penalty should be implemented. Dr Sacks urged compliance with the Safe PN Practices guidelines, stating that it is the responsibility of prescribers, pharmacists, nurses, dietitians, and other members of the nutrition support team to recognize and report all PN-related errors.