# Evaluation of a knowledge based system for parenteral nutrition composition for newborn infants – clinical results

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**Abstract.** *Background:* Knowledge based systems are only rarely used in the clinical routine. VIE-PNN [1,2], an interactive knowledge based system for parenteral nutrition composition for newborn infants, has been integrated in the local network of our patient data management system and used at the bedside since more than two years at two neonatal intensive care units.

*Objective:* To evaluate the performance and acceptance of a routinely used knowledge based system.

*Methodology:* Based on a few input data and the expert defined prescription rules, VIE-PNN calculates and displays suggestions for the components of parenteral nutrition solutions (PNS). The daily supply of electrolytes, amino acids, fat, additives (vitamins, trace elements, carnitine), bypass medication and glucose is calculated and displayed according to the rules contained in the knowledge base. These suggestions may interactively be changed by the prescribing physicians if considered necessary. For patients with partial enteral nutrition, the PNS components are reduced according to the ratio of parenteral/enteral fluid supply. We prospectively analyzed 50 PNS calculated in parallel by VIE-PNN and by a hand held calculator (C), retrospectively analyzed 5539 PNS stored in the system's database and evaluated a questionnaire asking physicians about their experience with VIE-PNN.

*Results:* The mean time needed for calculating a PNS was 2.4 (VIE-PNN) vs. 7.1 minutes (C) corresponding to daily time savings of about 3/4 hour for 10 PNS calculations. Expert review detected errors or omissions in 22% (VIE-PNN) vs. 56% (C) of the PNS prescriptions. All errors in the VIE-PNN based PNS were related to interactively changed values. Analyzing the 5539 stored PNS, 1/4 of 16 parameters were interactively changed by the prescribing physician. The questionnaires showed a good overall acceptance of VIE-PNN. Time savings and improvement of precision were rated as equally important benefits.

*Conclusion*: VIE-PNN was well accepted by the users, reduced the time needed for prescribing PNS and improved the precision of the prescriptions. Moreover, for a clinical evaluation period of about two years there were no disadvantages or systematic problems associated with the routine use of our knowledge-based system.

*References*: **1** Horn W., Popow C., Miksch S., Seyfang A.: Quicker, More Accurate Nutrition Plans for Newborn Infants, *IEEE Intelligent Systems*, 13(1):65-69, 1998. **2** Miksch S., Dobner M., Horn W., Popow C.: VIE-PNN: An Expert System for Parenteral Nutrition of Neonates, Ninth IEEE Conference on Artificial Intelligence for Applications (CAIA-93), Orlando, Florida, March 1-5, pp. 285-91, 1993.