Development of a standardized pediatric parenteral nutrition for the first days of life of a term or preterm newborn

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Abstract

Objectives: Parenteral nutrition (PN) can be composed of about 50 different ingredients, whereof the majority are amino acids (AA). Therefore, PN represents a complex and high-risk fabrication. Medication errors (ME) are often related to PN and may include prescription, transcription, preparation, and administration errors. As the treatment with PN is indispensable for a good cerebral and neurologic development as well as a postnatal weight gain conforming to the intrauterine growth, ME can result in growth retardation, developmental disturbances, and infections.

With the aim of reducing ME potentially having an impact on vulnerable patients as well as the improvement of the security and quality of the nutritional treatment of newborn term or preterm infants, a standardized pediatric PN for the first days of life had to be implemented.

Methods: A working group composed of pharmacists, clinicians, neonatologists, and industrials developed a PN solution conforming to the needs of the two implicated neonatal services. A standardized and experiential solution, as well as the ESPGHAN guidelines of 2018 haven been chosen as references. The feasibility of an industrial production of double-chamber bags has been evaluated and implemented.

Results: A standardized pediatric PN for the first days of life of a newborn infant has been developed. The solution has been formulated for a peripheral venous administration with an osmolarity under 900 mOsm/L to allow a wider range of application. The production of double-chamber bags has been chosen to increase the stability and raise the shelf-life. The first compartment contains an AA admixture and the second compartment is composed of glucose and electrolytes (sodium, calcium, and organic phosphate). This production is initially realized by the service of pharmacy and afterwards by the industrial partner. The standardized bag has been implemented successfully on the neonatal ward in March 2019. Since then, almost 1800 standardized bags have been used (appr. 90 bags/month), resulting in a reduction of on-ward PN preparations of nearly 80%.

Conclusions: The development of a standardized pediatric PN bag in collaboration with pharmacists, clinicians, neonatologists, and industrials results in the possibility of a 24/7 availability on the neonatal ward of a high-quality product allowing a secured administration as well as a reduction of ME. This decreases considerably the number of individual PN bags to be prepared by nurses on the neonatal ward or in urgency situations.

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