Pharmaceutical Aspects of Artificial Nutrition (Review)

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Abstract

Artificial nutrition, including enteral (EN) and parenteral (PN) nutrition, is indicated whenever adequate oral nutrition fails to sufficiently supply the necessary nutrients to the body. It is a convenient, efficacious, safe, and well-tolerated form of clinical nutrition in the hospital and home setting. EN is administered via nasogastric tube or ostomies while PN usually requires a central venous access for administration, straight into the blood stream. The infused nutrients can then be taken up directly by the different organs. PN is targeted as a single daily portion formulated as an oil-in-water emulsion providing the necessary substrates for the catabolic and anabolic metabolism including macro- and micronutrients and fluids. PN has a complex pharmaceutical composition - all-in-one admixture - and its compounding or ready-to-use preparation. The use of PN is more challenging and more expensive compare to the use of EN, commercially available as ready-to-use formulations. EN and concomitant medication is highly challenging. Upon incorrect handling and administration, PN is associated with potentially severe or even fatal complications, mostly relating to the central venous access (e.g., catheter-related sepsis) or to a metabolic intolerance (e.g., hyperglycemia, refeeding syndrome) because of inappropriate administration. A correct order of admixing, correct dosing, and administration of the artificial nutrition is crucial for safety and efficacy; clinical and biochemical monitoring of the patient and treatment regimen adaption are necessary. The high number of reactive solutes allow only limited stability of a ready-to-use PN admixture. The potential for numerous incompatibilities and interactions renders PN admixtures generally unsuitable as drug vehicle. Laboratory compatibility and stability testing and pharmaceutical expertise are a prerequisite to define the PN composition including nutrients or even drugs admixed to define the appropriate and individualized nutrition and medication regimen. The aim of this narrative review is to present the actual state-of-the-art to deliver best quality artificial nutrition with special regard on pharmaceutical aspects such as instabilities, incompatibilities, and concomitant co-medication.

Keywords:

parenteral nutrition; enteral nutrition; artificial nutrition; all-in-one parenteral admixture; compatibility; stability; pharmaceutical expertise; drug admixing; drug administration

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