

Commentary

AIO admixtures have to be labelled for the individual patient. Labels shall indicate the patient's name, the composition (dose) of the individual components according to standards, the date of manufacturing and expiring, instructions for handling like storage, admixes to be made, infusion rate, as well as avoidance of medication errors [160, 162, 163]. Specific pharmaceutical support within the NST is required and efficacious [164].

6.2.3. Delivering

- 51) **For customized AIO admixtures, the cold chain should be guaranteed during transport and at the patient's home.**(R46, grade B, strong consensus 100%)

Commentary

Pharmaceutical safeguards must be applied for PN delivery, storage and administration at home throughout the patient's therapy. For customized AIO PN admixtures, the cold chain has to be guaranteed [157].

6.3. HPN admixture time and rate of infusion

- 52) **The hanging time for an HPN-admixture should be no longer than 24 h**(R47, grade GPP, strong consensus 100%)

Commentary

The generally accepted maximum hanging time for a ready-to-use admixture are 24 h. The giving set has to be changed upon each new PN dosing [11,157,161,162].

- 53) **At the end of cyclic PN administration, the infusion rate can be reduced to avoid rebound hypoglycemia (e.g. half of the infusion rate over the last half an hour).**(R48, grade GPP, strong consensus 93.8%)

Commentary

At the end of a (cyclic) PN-infusion, the infusion rate has to be reduced to tamper insulin need and to avoid rebound hypoglycemia. Glucose administration determines the maximum rate of PN infusion rate: (max. 5–7 mg glucose/kg/min; corresponding to about a maximum of 200 g glucose over 12 h in 70 kg adult [157,162] or 3–6 g glucose/kg per day [3].

7. Program monitoring (Fig. 7)

7.1. Patient monitoring

7.1.1. Timing

- 54) **Patients receiving HPN shall be monitored at regular intervals, to review the indications, the efficacy and the risks of the treatment.**(R49, grade GPP, strong consensus 100%)

Commentary

The purpose of monitoring is to “secure and improve QoL” of persons on HPN by assessing the nutritional efficacy of the HPN program, preventing and timely diagnosing and treating HPN-related complications and measuring QoL and quality of care [3,4].

After hospital discharge, the HPN NST has contact with patients and caregivers on a regular basis, initially every few days, then weekly and eventually monthly as the patient gains confidence. The clinician who is in contact should be prepared to clarify confusing issues and also to follow weight, urine output, diarrhea or stoma

output, body temperatures (before and within an hour of starting the HPN infusion when required by clinical feature), and general health.

Incidence of CRBSI, incidence of rehospitalization and QoL have been identified as the three major indicators of quality of care HPN patients with either a benign [59] or malignant [51] underlying disease. Survival rate was also considered important when patients with benign disease were considered [165].

- 55) **The time between reviews should be adapted to the patient, care setting and duration of nutrition support; intervals can increase as the patient is stabilized on nutrition support.**(R50, grade GPP, strong consensus 100%)

Commentary

Evidence-based guidelines for monitoring are not available due to the lack of published data [3–12,166,167]. Only one study has been published reporting monitoring practices for HPN across Europe [15]. The results showed that the majority of centers performed a 3-month monitoring interval for stable patients and emphasized that responsibility for monitoring should be assigned to a designated person on the hospital HPN specialist NST [15].

7.1.2. Modalities

- 56) **HPN monitoring should be carried out by the hospital NST in collaboration with experienced home care specialists, home care agencies and/or general practitioners.**(R51, grade GPP, strong consensus 100%)

Commentary

Monitoring of HPN patients should also involve the general practitioner. Healthcare professionals should review the indications, route, risks, benefits and goals of nutrition support at regular intervals.

- 57) **Patients and/or caregivers can be trained to monitor nutritional status, fluid balance and the infusion catheter.**(R52, grade 0, strong consensus 95.7%)

Commentary

In long-term HPN, patients and caregivers should be trained in self-monitoring of their nutritional status, fluid balance and infusion catheter, as well as in recognizing early signs and symptoms of complications and responding to adverse changes in both their well-being and management of their nutritional delivery system.

7.1.3. Parameters to be monitored and frequency of monitoring

- 58) **Monitoring should comprise of nutritional efficacy, tolerance of PN, patient/caregiver management of infusion catheter, QoL and quality of care (e.g. CRBSI rate, readmission rate etc.).**(R53, grade GPP, strong consensus 95.7%)
- 59) **In clinically stable patients on long-term HPN, body weight, body composition and hydration status, energy and fluid balance and biochemistry (hemoglobin, ferritin, albumin, C-reactive protein, electrolytes, venous blood gas analysis, kidney function, liver function and glucose) should be measured at all the scheduled (e.g. every three to six months).**(R54, grade GPP, strong consensus 100%)
- 60) **In patients on long-term HPN, clinical signs and symptoms as well as biochemical indexes of vitamin and trace**