Parenteral Nutrition Adult – Medical Directive

Medical Advisory Committee Approved: 28SEPT2023

☑ Harmonized

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Authorizing Prescriber(s)

All Lakeridge Health (LH) Most Responsible Practitioners (MRP) who prescribe Parenteral Nutrition (PN) Therapy to LH patients.

Authorized to whom

Registered Dietitians (RD) employed at LH who have the knowledge, skill, and judgement as part of their scope of practice in the selection of PN or discontinuation of PN may implement the Medical Directive

Co-implementers: Nurses, laboratory technicians and pharmacists employed at LH may co-implement this Medical Directive

Patient Description / Population

Adult admitted patients (18 years of age or older) who are not able to meet their nutritional requirements enterally

Order and/or Procedure

The RD will order vital signs, monitoring parameters and lab investigations as outlined in the PN order set (Appendix A), and Order table form.

The RD will select the type of amino acid, dextrose and/or lipid solutions, including custom additives if applicable, volume, rate and route as indicated in the PN order set (Appendix A) and Order table form. The RD will monitor and/or adjust therapy on an ongoing basis as appropriate.

The RD will discontinue PN and all associated elements in the PN Order set (Appendix A) after consultation with the MRP

Indications to the implementation of the Directive

RDs may implement this medical directive when all of the following are met:

- The MRP has entered a consult to the RD as either "dietitian to dose PN", or has selected "parenteral nutrition" from the drop down menu, and/or the RD in collaboration with the MRP have determined PN is an appropriate route for nutrition therapy via electronic or verbal communication
- The RD has completed a nutrition assessment

- Consent has been obtained from the patient or substitute decision maker (SDM)
- A central venous access device (CVAD), peripheral vascular access device (PVAD) or midline catheter is in place, or is ordered/planned for insertion to administer the PN
- The MRP has collaborated with the RD to discontinue the PN (e.g. during rounds)

Contraindications to the implementation of the Directive

- Consent has not been obtained from the patient or SDM.
- PN is not indicated as per the RD assessment
- No CVAD,PVAD or midline catheter is available or planned/ordered to be inserted for the administration of PN
- The patient has a medical condition that would be adversely affected by PN, see specific contraindications as per the Order Table Form

Consent

The RD and/or MRP will obtain informed consent from the patient or SDM prior to the implementation of this medical directive per the *Consent Policy Procedure*

Documentation Requirements

In addition to standard documentation practices, the RD implementing this Medical Directive must ensure the following is documented in the patient's electronic health record:

- The PN order set will be signed using the order mode of "per medical directive"
- The name of the RD will be the Ordering Provider
- The name of the MRP will be the authorizing provider
- The full name of this medical directive will be outlined in the comment section (e.g. Adult Parenteral Nutrition Medical Directive)

Review/Evaluation Process

This medical directive will be reviewed every 2 years by Inpatient Clinical Nutrition and Interprofessional Practice.

References

Ayers, P. et al (2014) ASPEN Parenteral Nutrition Safety Consensus Recommendations. *Journal of Parenteral and Enteral Nutrition* 28(3) 296-333
DOI: 10.1177/0148607113511992

ASPEN (2017) Management of Parenteral Nutrition in Hospitalized Adult Patients. *Journal of Parenteral and Enteral Nutrition* 41(4) 535-549
DOI: 10.1177/0148607116667060

Boullata, J.I. et al (2014) ASPEN Clinical Guidelines: Parenteral Nutrition Ordering, Order Review, Compounding, Labeling and Dispensing. *Journal of Parenteral and Enteral Nutrition* 38(3) 334-377
DOI: 10.1177/0148607114521833

This table must **not** be used independently from this Medical Directive

Order Table Form

Vital signs and monitoring			
Order	**Indications**	**Contraindications**	**Notes**
Vital signs will be assessed per hospital policy	To monitor for refeeding complications		Vital signs are assessed at minimum every 8 hours or per patient care standard
For new onset of fever (temperature greater than or equal to 38C) and or chills/rigors • The PN will be stopped and the MRP will be notified • Blood culture and sensitivity (C&S) x2 • D10W will run at the same rate if PN is interrupted • If purulent discharge at catheter insertion site obtain swab culture	PN is a high risk medication for infection		
Height (once) and weight (weekly)	To ensure calculations of nutritional needs are done with accurate parameters		
Intake and output every shift	To adequately capture fluid intake and output		Intake and output will be captured every shift or per patient care standard

Lab investigations initial, daily and weekly			
Order	**Indications**	**Contraindications**	**Notes**
CBC and differential	To monitor for line infection		
APTT	To ensure vitamin K dose is correct		PN formulation may be adjusted per results
INR, PT	To ensure vitamin K dose is correct		PN formulation may be adjusted per results
Electrolytes (Na, K, Cl, CO2)	To ensure that the PN formulation does not require modification		PN formulation may be adjusted per results
Glucose	To monitor for signs and symptoms of hypoglycemia/hyperglycemia		Frequency may need adjustment for patients on existing point of care glucose testing (POCT) and/or insulin administration regimens PN formulation may be adjusted per results
Urea	To ensure protein administration is appropriate and to monitor renal status		PN formulation may be adjusted per results
CRT, eGFR	To monitor renal status		PN formulation may be adjusted per results
Liver function panel - Protein total, albumin, bilirubin total, alkaline phosphate (ALP), alanine aminotransferase (ALT)	To determine need for cyclic vs continuous PN administration		Adjust carbohydrate delivery as required for fluctuations in liver function Adjust PN administration timing (cyclic vs continuous) as required per results Protein total may or may not be used

			PN formulation may be adjusted per results
Albumin	To correct calcium and/or magnesium		PN formulation may be adjusted per results
Parenteral Nutrition Triglyceride	To monitor clearance of lipids		PN formulation may be adjusted per results
Lab investigations: POCT glucose upon TPN initiation			
Order	**Indications**	**Contraindications**	**Notes**
POCT glucose - Q6h x1st 48h	To monitor and treat signs and symptoms of hypoglycemia		If POCT glucose frequency is already established and conflicts with q6h frequency, Q6h POCT testing may be modified PN formulation may be adjusted per results
Hypoglycemia protocol	To monitor and treat signs and symptoms of hypoglycemia		If hypoglycemia protocol already ordered for the patient, this may be de-selected from the order set
Adult TPN Custom Ion Based 3 in 1 formulation			
Order	**Indications**	**Contraindications**	**Notes**
Continuous infusion 25-125mL/hr for 24 hours	Patients not able to meet their nutritional needs orally or enterally	Patient is able to meet their nutritional requirements enterally	Dextrose infusion less than or equal to 7g/kg/d Lipid infusion of no more than 1g/kg/d or less than 30% of daily kcal If osmolarity is equal to or less than 900mOsm/L, a PVAD or midline may be used; if osmolarity is greater

			than 900mOsm/L only a CVAD may be used for administration
Cyclic infusion parenteral solution 25-200mL/hr for less than 24 hours	Patients not able to meet their nutritional needs orally or enterally Abnormal liver function Planning for discharge home Increasing ambulation	Patient is able to meet their nutritional requirements enterally	Dextrose infusion rate of no more than 7g/kg/d Lipid infusion of no more than 1 g/kg/d *higher doses (up to 1.5g/kg/d) of composite lipid emulsion containing fish oil may be well tolerated with reduced hepatic complications If osmolarity is less than 900mOsm/L, a PVAD or midline may be used; if osmolarity is greater than 900mOsm/L only a CVAD may be used for administration
Amino Acids			
Order	**Indications**	**Contraindications**	**Notes**
Travasol 10% Protein 0.8-2g/kg	Provision of protein in patients not able to meet their protein needs orally or enterally	Congenital abnormality of amino acid metabolism Patient is able to meet their nutritional requirements enterally	Content/L: 100g protein, 16.8g Nitrogen (400kcal) If osmolarity is less than 900mOsm/L, a PVAD or midline may be used; if osmolarity is greater than 900mOsm/L only a CVAD may be used for administration

Prosol 20%	Provision of protein in patients not able to meet their protein needs orally or enterally	Congenital abnormality of amino acid metabolism Patient is able to meet their nutritional requirements enterally	Content/L: 200g protein, 32.1g Nitrogen, (800 kcal) If osmolarity is less than 900mOsm/L, a PVAD or midline may be used; if osmolarity is greater than 900mOsm/L only a CVAD may be used for administration
Dextrose			
Order	**Indications**	**Contraindications**	**Notes**
Dextrose 0-700g	Provision of energy in patients unable to meet their energy needs orally or enterally		Dextrose grams are determined based on total energy needs (kcal/day) and proportion of carbohydrates required for the total solution Pharmacy converts dextrose grams to a percentage to determine percent of dextrose as the base solution If osmolarity is less than 900mOsm/L, a PVAD or midline may be used; if osmolarity is greater than 900mOsm/L only a CVAD may be used for administration
Lipids			
Order	**Indications**	**Contraindications**	**Notes**
SMOF lipid SMOF Lipid at 0-25mL/h	Provision of energy and essential fatty acids requirements in patients not able	Allergy to fish, soy, egg or peanuts	Clarify allergies; if true allergy to fish, use Intralipid

	to meet their nutritional needs orally or enterally		May be administered via CVAD, PVAD or midline catheter
Intralipid Intralipid at 0-15mL/h	Provision of energy and essential fatty acids requirements in patients not able to meet their nutritional needs orally or enterally		Use if patient has severe fish, egg, or soy allergy. The RD may need to complete an additional risk assessment and collaborate with the MRP Lipid infusion of no more than 1 g/kg/d May be administered via CVAD, PVAD or midline catheter
Electrolytes			
Order	**Indications**	**Contraindications**	**Notes**
Sodium (Na) 0-4 mmol/kg per 24 hours	To provide daily electrolyte requirements	NA	PN formulation may be adjusted per blood work results
Potassium (K+) 0-4 mmol/kg per 24 hours	To provide daily electrolyte requirements	NA	PN formulation may be adjusted per blood work results
Magnesium (Mg) 0-25 mmol/kg per 24 hours	To provide daily electrolyte requirements	NA	PN formulation may be adjusted per blood work results
Calcium (Ca) 0-15 mmol/kg per 24 hours	To provide daily electrolyte requirements	NA	PN formulation may be adjusted per blood work results
Phosphate (PO4) 0-60 mmol per 24 hours	To provide daily electrolyte requirements	NA	PN formulation may be adjusted per blood work results
Trace elements 0-1 mL per 24 hours	To provide daily trace mineral requirements	NA	PN formulation may be adjusted per blood work results
Multivitamins (Multi12) 0-10 mL per 24 hours	To provide daily vitamin requirements	NA	If already receiving multivitamins there may not be a need via PN
Phytonadione Vitamin K	To provide adequate vitamin K requirements	Abnormal INR	Weekly vitamin K may or may not be ordered for patients on ongoing

0-3 mg IV minibag once per week, as per PN order set		Patient meeting Vitamin K needs through alternate source	warfarin therapy; Consultation with pharmacy can occur as required for a daily dose.
Thiamine (first dose administered prior to starting PN 100-500mg IV daily x 3 – 7 days	To mitigate risk of refeeding syndrome; If Thiamine deficiency expected	Patient with documented allergy to thiamine Patient has pre-existing thiamine orders	Could be ordered beyond 7 days for severe malnutrition
Chloride Acetate Ratio	To balance serum chloride and serum bicarbonate		PN formulation may be adjusted per blood work results
Adult TPN Commercial Premixed Solution 3 in 1 formulation: After Hours			
Order	**Indications**	**Contraindications**	**Notes**
Continuous infusion 25-125mL/hr for 24 hours	Patients not able to meet their nutritional needs orally or enterally	Patient is able to meet their nutritional requirements enterally	Dextrose infusion less than or equal to 7g/kg/d Lipid infusion of no more than 1g/kg/d or less than 30% of daily kcal Osmolarity for commercially premixed solutions is equal to or less than 900mOsm/L and may be administered via PVAD, midline or CVAD
Cyclic infusion parenteral solution 25-200mL/hr for less than 24 hours	Patients not able to meet their nutritional needs orally or enterally Abnormal liver function	Patient is able to meet their nutritional requirements enterally	Dextrose infusion rate of no more than 7g/kg/d Lipid infusion of no more than 1 g/kg/d *higher doses (up to

	Planning for discharge home Increasing ambulation		1.5g/kg/d) of composite lipid emulsion containing fish oil may be well tolerated with reduced hepatic complications Osmolarity for commercially premixed solutions is equal to or less than 900mOsm/L and may be administered via PVAD, midline or CVAD
SMOF Kabiven 3.2% Amino Acid, 7.1% Dextrose, 2.8% Lipid	Patients not able to meet their nutritional needs orally or enterally The patient required parenteral nutrition after the cut-off time for custom PN	Patient is able to meet their nutritional requirements enterally	The cut-off time for customized PN formulations is 1200pm Anhydrous Dextrose provides 4kcal/g in this solution Osmolarity for commercially premixed solutions is equal to or less than 900mOsm/L and may be administered via PVAD, midline or CVAD

Appendix A

Order set name	Orders
IP total Parenteral Nutrition (TPN)	Nursing • Vital signs and monitoring o Fever management, height and weight, intake and output,
	Lab investigations (initial) • CBC and differential, APTT, INR/PT, Electrolytes, glucose, calcium, magnesium, phosphate, albumin, parenteral nutrition triglyceride, osmolarity • Liver function panel o Protein total, albumin, bilirubin total, alkaline phosphate (ALP), alanine aminotransferase (ALT)
	Lab investigations POCT glucose upon TPN initiation
	Lab investigations (daily)
	Lab investigations (weekly)
	Medications • PN: AA, Dextrose, Lipids • After hours Additional medications • Phytonadione (vitamin K1) • Thiamine