Full Title of Guideline: Guideline for the use and administration of intradialytic parenteral nutrition (IDPN) in adult patients on haemodialysis.

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Division & Speciality: Clinical support (Dietetics and Nutrition) 
CAS (Renal and Transplant Unit)

Scope (Target audience, state if Trust wide): Speciality specific guideline

Review date (when this version goes out of date): December 2020

Explicit definition of patient group to which it applies (e.g. inclusion and exclusion criteria, diagnosis):

Inclusion Criteria: Malnourished patients on haemodialysis where enteral and oral feeding have failed to maintain nutritional status, after discussion with a renal consultant and a renal dietitian

Exclusion Criteria:
- Allergy to fish, eggs, soya, peanuts, corn, sulphites and any other ingredients of SmofKabiven.
- Palliative patients with no anticipated increase in quality of life
- Fluid overload e.g. patients with gains >4% of dry weight
- Hyperglycaemia (blood glucose >15 mmol/l)
- If receiving a blood transfusion on the dialysis day
- Deranged liver function tests
- Severe hyperlipidaemia
- Congenital errors of amino acid metabolism e.g. Phenylketonuria
- Septic patients and chronic infection (with elevated CRP)
Patients who are acutely unwell and not metabolically stable

Changes from previous version (not applicable if this is a new guideline, enter below if extensive):
No new evidence since previous version however KDOQI guidelines for nutrition are due in 2018. Snack provision amended in view of changes in glucose content of Lucozade. IDPN regimen has been amended. Evaluation strategy added.

Summary of evidence base this guideline has been created from:
This guideline is based on the current scientific evidence available. This equal to level 4 – expert committee reports or opinions and / or clinical experiences of respected authorities

This guideline has been registered with the trust. However, clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt contact a senior colleague or expert. Caution is advised when using guidelines after the review date or outside of the Trust.
Introduction

This guideline is aimed at adult patients on haemodialysis (HD) who require intradialytic parenteral nutrition (IDPN).

Definition

IDPN is a cyclic parenteral nutrition administered three times a week through the venous blood chamber of the haemodialysis blood line. IDPN is not nutritionally complete and typically provides 800–1100 kcal three times weekly, in the form of glucose, lipid emulsion and 6-8g of nitrogen. IDPN does contain a minimum amount of phosphate (2.8mmol/l) but does not provide any other electrolytes, trace elements or vitamins.

Indication

IDPN should only be used if the patient is clinically malnourished, as identified by the renal dietitian, and where oral nutritional support (food fortification advice and the use of oral nutritional supplements) and enteral feeding (such as nasogastric and nasojejunal feeding) have been first considered and tried with intense dietetic support and failed to improve nutritional status. In addition, IDPN may be considered where enteral feeding is unsafe or not practical.

IDPN is recommended in patients who are malnourished or at risk of malnutrition, as identified by dietetic assessment. Evidence suggests that IDPN should only be used if spontaneous nutritional intake is >20kcal/kg/ideal body weight and >0.8g protein/kg/ideal body weight (Fouque et al. 2007), however this should be considered on an individual case basis. IDPN should not be used in patients who cannot consume at least 50% of their estimated nutritional requirements (Tattersall et al. 2007).

Evidence supporting the use of IDPN in patients on HD who are malnourished remains controversial (Corbello et al. 2009; Brown et al. 2010) as most of the studies are retrospective and poorly designed (Wolfson, 1994).

From a metabolic point of view IDPN has been shown to reverse the catabolic process on haemodialysis by maintaining a normal plasma concentration of amino acids (Cano et al. 2010). However, in clinical practice it is not clear yet if IDPN reduces hospitalization rates, improves mortality or quality of life. In a large RCT, mortality rates for patients receiving IDPN was no different than those patients who received oral nutritional supplements without IDPN (Cano et al. 2007), but evidence for the use of IDPN is conflicting and overall there is lack of high quality evidence (Cano et al. 2009; Corbello et al. 2009; Brown et al. 2010).

The American Society for Parenteral and Enteral Nutrition (ASPEN) guidelines for nutrition support in adult acute and chronic renal failure (Brown et al. 2010) does not support the use of IDPN in patients on HD because the evidence is conflicting as mentioned above. In a retrospective medical record review, patients who were malnourished, with normal albumin, who received
IDPN had a higher rate of mortality than those who received no IDPN (Chertow et al. 1994). However, in the same study, patients who were malnourished with low serum albumin (< 3 g/dL) had lower mortality with IDPN (Chertow et al. 1994).

The European Society for Clinical Nutrition and Metabolism (ESPEN) guidelines (Cano et al. 2009), the European best practice guidelines (Fouque et al. 2007) and the Renal Association guidelines (Wright et al. 2011) recommend the use of IDPN where alternative interventions such as oral nutritional support and enteral feeding have been unsuccessful.

A systematic review in 2010 showed that there is insufficient evidence to demonstrate either a net benefit or a net harm associated with the providing IDPN to malnourished patients on HD (Sigrist et al. 2010). A more recent review suggested that IDPN is a safe and efficacious modality of nutritional support and could represent an adjunctive strategy for patients with reduced spontaneous dietary intake when intensive dietetic counselling and oral supplementation have failed (Sabatino et al. 2014).

A randomized controlled trial suggested that IDPN should be given at least 3 times a week for 16 consecutive weeks in order to be clinically significant, as this resulted in a significant and clinically relevant increase in mean serum pre-albumin (Marsen et al. 2015).

IDPN may be associated with a lower than expected delivered dose of dialysis due, possibly, to increased urea generation (McCann et al. 1999).

The decision to commence IDPN should be made in conjunction with a nephrology consultant and a renal dietitian and should be assessed on an individual patient basis.

**Contraindications**

IDPN should not be used in the following situations:
- Allergy to fish, eggs, soya, peanuts, corn, sulphites and any other ingredients of SmofKabiven.
- Palliative patients with no anticipated increase in quality of life
- Fluid overload e.g. patients with gains >4% of dry weight
- Hyperglycaemia (blood glucose above 15 mmol/l)
- If receiving a blood transfusion on the dialysis day
- Deranged liver function tests
- Severe hyperlipidaemia
- Congenital errors of amino acid metabolism e.g Phenylketonuria
- Septic patients and chronic infection (with elevated CRP)
- Patients who are acutely unwell and not metabolically stable
Consideration of refeeding syndrome

IDPN is electrolyte and vitamin free, although it contains 2.8mmol/l of phosphate (which is in the form of phospholipid). The patient’s risk of refeeding syndrome should be assessed by the managing renal dietitian. If the patient is considered to be at risk of refeeding syndrome, please refer to the Trust’s refeeding guideline.

Routes

IDPN should always be administrated via the venous blood chamber of the haemodialysis blood line, whilst the patients receive haemodialysis.

Requesting and prescribing IDPN

IDPN is never an emergency and its prescription should be made in conjunction with a renal dietitian and a consultant nephrologist. All prescriptions for IDPN should be prescribed on the Trust’s ‘Adult Renal Outpatient and Transplant Prescription and Administration Record’. IDPN should be prescribed until the next anticipated date that treatment will be reviewed by patient’s nephrologist/dietitian (i.e. next scheduled HD MDT).

IDPN must be prescribed by a renal consultant on the IV drug chart used in the dialysis unit. The renal doctor should prescribe the following: “SmofKabiven 8gN Electrolyte Free (also known as SmofKabiven 8EF)”. The renal dietitian will provide a regime individualized for the patient. IDPN must be ordered through pharmacy (store at room temperature – not in the fridge). The renal pharmacist should be contacted and will provide SmofKabiven 8EF. Supplies of IDPN should be obtained from TRUST Pharmacy at NCH Campus (ext: 55613, 55616 or 59007).

Administering IDPN

IDPN should only be given by trained nurses who are both competent and confident in administering this solution. There should be written documentation of training given and competence achieved.

The expiry date must be checked before preparing the IDPN.

Follow the manufactures instructions very carefully when preparing IDPN for use and always check the date. Aseptic techniques and the correct mixing of the SmofKabiven 8EF three chambers bags are vital for a complete and safe product. Discard the product in case of leakage. Attach SmofKabiven 8EF to an IV infusion pump and administer via the venous return chamber. Additions must not be made to the IDPN.

Do not commence SmofKabiven 8EF if blood flow rate < 200ml/min.

There are no definitive guidelines on how to initiate IDPN. Prior to administering IDPN – the prescription and bag must be checked by a second
nurse. IDPN should be infused at a constant rate during a typical 4 hours dialysis session. Infusion should take place slowly and continuously from the beginning of dialysis to the end. Starting slowly and working up to a level that provides maximum nutrients will assist in preventing adverse effects.

IDPN delivery should be progressively increased starting at 8 ml/kg of dry body weight (i.e. total volume 480 ml for a 60 kg patient) during the first week, to a maximum of 16 ml/kg without exceeding 1000 ml/ for each HD session. The volume infused needs to be added on to the total ultrafiltration (UF) to be removed from the patient.

Unless otherwise directed build up the volume of IDPN as follows:

<table>
<thead>
<tr>
<th></th>
<th>Volume per hour</th>
<th>Total volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st IDPN session</td>
<td>125ml/hr (minimum rate)</td>
<td>500ml</td>
</tr>
<tr>
<td>2nd IDPN session</td>
<td>200ml/hr</td>
<td>800ml</td>
</tr>
<tr>
<td>3rd IDPN session and onwards</td>
<td>240ml/hr (maximum rate)</td>
<td>960ml (maximum volume)</td>
</tr>
</tbody>
</table>

The renal dietitian will advise about the regimen prescription for IDPN (See appendix).

Always take a blood glucose reading before the patient goes home, and give the patient a snack of 15-30g carbohydrate (i.e. a slice of toast or 2 digestive biscuits) during the last 30 minutes of the IDPN infusion. Alternatively, consider reducing the rate of IDPN to 100ml/h in the final hour to reduce the risk of rebound hypoglycaemia.

If IDPN is stopped prematurely, patients should be given a 15-30g carbohydrate snack as above and blood glucose should be checked at the time of stopping and prior to the patient going home.

**Nutritional monitoring of patient receiving IDPN**

Progress with IDPN should be reviewed weekly by the renal dietitian in the first month and then at least monthly thereafter (but more frequently if problems are identified). A renal dietitian will liaise with medical team regularly and advise on any changes.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient clinical condition</td>
<td>Possible reactions are nausea, vomiting, discomfort, hypo/hyperglycaemia, hypotension and, rarely, cardiac arrhythmias. Patients should be monitored for these and the Dietitian/Doctor informed if any occur. If the patient becomes obviously unwell stop the IDPN and inform a Doctor.</td>
</tr>
<tr>
<td>Temperature, blood pressure and pulse</td>
<td>Pyrexia, tachycardia and hypotension could all be associated with sepsis. Suspicion of sepsis requires urgent review by clinicians/doctor and IDPN must be stopped immediately.</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| **Blood glucose**                   | Check blood glucose prior to commencing HD and IDPN.  

People without Diabetes:  
Monitor hourly and at the end of dialysis for the first 6 sessions, then reduce to pre and post haemodialysis dialysis blood sugars if patient stable.  

People with Diabetes:  
Do pre dialysis then hourly for every session plus 30 minutes post dialysis. Insulin may be needed – liaise with Doctors. |
| **Dry Weight**                      | Once the patient is established on IDPN, their dry weight should be reassessed weekly (to monitor weight gain). The renal dietitian will assess regularly to monitor progress on nutritional status. |
| **Anthropometry**                   | Hand grip strength (HGS) should be measured before starting IDPN and then every 2 months by the renal dietitian. |
| **Total energy intake/energy requirements** | The renal dietitian will estimate nutritional requirements and develop a nutritional plan for the patient.  
Documentation of IDPN given is essential to ensure that this matches IDPN prescribed. |

### Biochemical monitoring of patient receiving IDPN

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blood glucose</strong></td>
<td>Prior to commencing HD and hourly during HD (see nutritional monitoring section)</td>
</tr>
<tr>
<td>Sodium</td>
<td>Once a week for the first 4 weeks then monthly</td>
</tr>
<tr>
<td>Potassium</td>
<td>Once a week for the first 4 weeks then monthly</td>
</tr>
<tr>
<td>Urea</td>
<td>Once a week for the first 4 weeks then monthly</td>
</tr>
<tr>
<td>Creatinine</td>
<td>Once a week for the first 4 weeks then monthly</td>
</tr>
<tr>
<td>Calcium</td>
<td>Once a week for the first 4 weeks then monthly</td>
</tr>
<tr>
<td>Phosphate</td>
<td>Once a week for the first 4 weeks then monthly</td>
</tr>
<tr>
<td>Magnesium</td>
<td>Once a week for the first 4 weeks then monthly</td>
</tr>
<tr>
<td>FBC</td>
<td>Once a week for the first 4 weeks then monthly</td>
</tr>
<tr>
<td>CRP</td>
<td>Before starting IDPN then monthly</td>
</tr>
<tr>
<td>LFTs</td>
<td>Before starting IDPN then monthly</td>
</tr>
<tr>
<td>Lipid profile</td>
<td>Before starting IDPN then monthly</td>
</tr>
</tbody>
</table>
| Copper    | There is no need to check trace elements and vitamins in patients receiving IDPN since Smofkabiven 8EF does not contain any trace elements or vitamins.  
Trace elements and vitamins should only be checked if patients have signs and/or symptoms of deficiency or if clinically indicated based on their medical condition. |
| Selenium  |                                        |
| Zinc      |                                        |
| Vitamin A |                                        |
| Vitamin E |                                        |
Dialysis adequacy (URR) should be monitored monthly, due to the potential for the reduction in dialysis adequacy as a result of urea generation.

**Discontinuing IDPN**

IDPN should be given for a minimum of 16 weeks. IDPN should not be stopped until the multidisciplinary team is satisfied that an adequate nutritional status has been achieved (for example: increasing dry weight, improved subjective global assessment score, increased energy and protein intake) or medical staff decide to discontinue treatment for medical reasons. If the treatment goal of IDPN is not met after 6 months consideration should be given to stopping IDPN.

**Special considerations**

Antibiotics, iron products and blood products given during dialysis should not be infused through the same chambers as IDPN. The IDPN infusion should be temporarily discontinued.

If the patient goes on holiday, IDPN should be temporarily discontinued. IDPN would usually be offered to patients on hospital and satellite based haemodialysis and could be considered for patients on home HD in exceptional circumstances after discussion with the home therapy team and renal consultant.

**Management of patients with increased blood glucose levels caused by the administration of IDPN on haemodialysis**

1. Blood glucose levels should be monitored as described in the protocol for IDPN administration
2. If, after 3 dialysis sessions, a pattern of persistently raised blood glucose levels is apparent patients should commence insulin when receiving IDPN
3. The renal consultant will prescribe the insulin regime based on a sliding scale regime
4. IDPN should not be given if the blood glucose levels are greater than 15 mmol/L (please contact the renal dietitian if blood glucose is persistently above 15mmol/l)
5. No insulin should be administered during the last hour of dialysis
Evaluation strategy

In order to assess the implementation of these guidelines the following data will be collected:

- numbers initiated per year
- duration of feeding
- patients outcomes, including full dietetic assessments (at baseline and 16 weeks after starting IDPN)
- serious adverse events in those patients (related to IDPN or not)

Prior to the 2020 review of these guidelines, data will be fed back to the Complex Nutrition Group at NUH.

References


Appendix - Intradialytic Parenteral Nutrition (IDPN) regime

Administration rate for SmofKabiven 8EF:

<table>
<thead>
<tr>
<th>Date</th>
<th>Dose progression</th>
<th>Rate (ml/hour)</th>
<th>Volume (ml)</th>
<th>Duration (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st dose of SmofKabiven 8EF</td>
<td>125ml/hr</td>
<td>125</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2nd dose of SmofKabiven 8EF</td>
<td>200ml/hr</td>
<td>200</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3rd dose of SmofKabiven 8EF</td>
<td>240ml/hr</td>
<td>240</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Continue as per 3rd dose each session unless otherwise indicated</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Do not commence SmofKabiven 8EF if blood flow rate < 200ml/min. It is essential to check and monitor blood glucose in patients on IDPN.

Patients with diabetes:
- Check blood glucose prior to commencing HD
- Monitor blood glucose hourly during HD
- Check blood glucose 30 mins after HD

Patients without diabetes:
- Check blood glucose prior to commencing HD
- Monitor blood glucose hourly during HD for the first 6 sessions of IDPN
- If blood glucose stable after first 6 sessions, reduce blood glucose monitoring to pre and post HD.

If blood glucose >15mmol/l stop SmofKabiven 8EF and contact Doctor and let your renal dietitian know.

Take blood glucose reading before the patient goes home and give the patient a snack of 15-30g carbohydrate (i.e. a slice of toast or 2 digestive biscuits) during the last 30 minutes of the IDPN infusion, or consider reducing the rate of IDPN to 100ml/h in the final hour to reduce the risk of rebound hypoglycaemia.

Aim for blood sugar above 4.0mmol/l. Refer to guidelines on administration of IDPN.

Renal Dietitian........................................

Contact number........................................