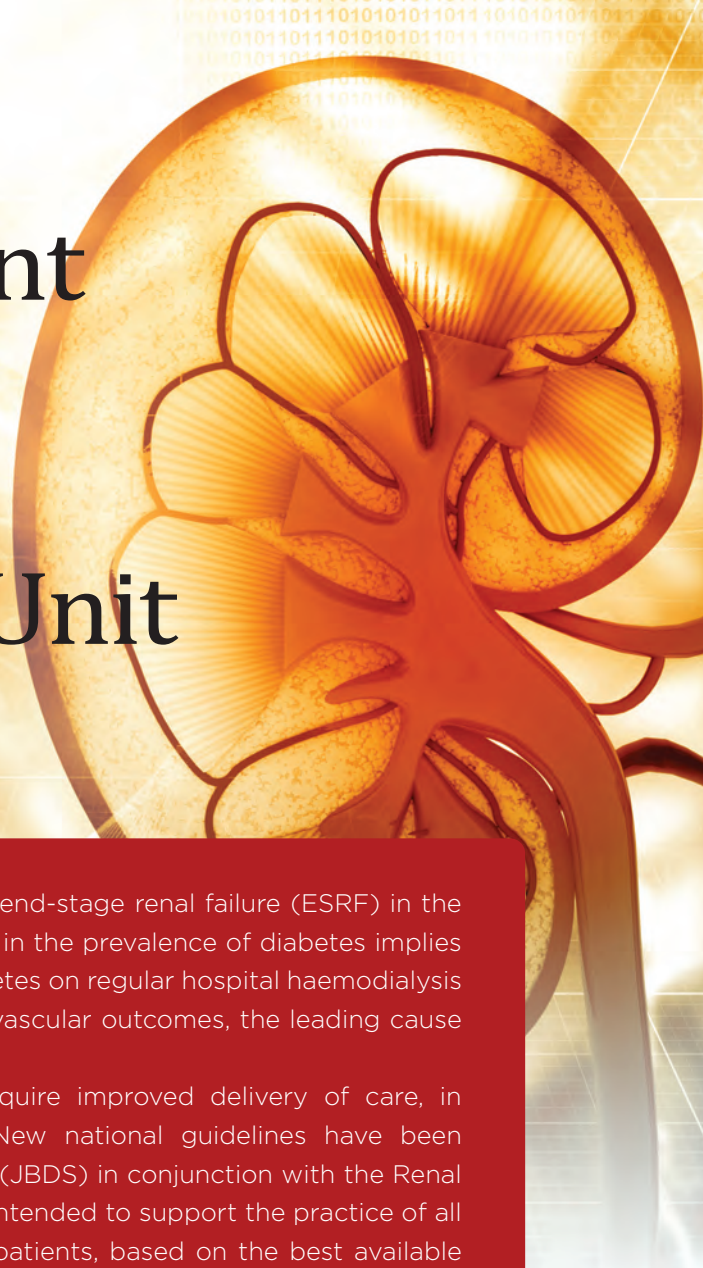


# The Management of Adults with Diabetes on the Haemodialysis Unit



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Diabetic nephropathy remains the principal cause of end-stage renal failure (ESRF) in the UK,<sup>1</sup> and the well-described projected global increase in the prevalence of diabetes implies an increasing burden of this disease. People with diabetes on regular hospital haemodialysis are a vulnerable group at high risk of adverse cardiovascular outcomes, the leading cause of mortality in this population.<sup>2</sup>

Accordingly, people with diabetes and ESRF require improved delivery of care, in particular to overcome organisational difficulties. New national guidelines have been commissioned by the Joint British Diabetes Societies (JBDS) in conjunction with the Renal Association – the first in this area. The guidelines are intended to support the practice of all healthcare professionals who care for this group of patients, based on the best available evidence or on expert opinion where there is no clear evidence to inform practice.

The guidelines cover six key aspects of diabetic care in this patient group, however, in this article we focus on the key nutritional recommendations. An abridged version of the nutritional recommendations are presented to provide an overview. The full guidance is available online,<sup>3</sup> which should be consulted before designing a therapeutic intervention.

Evidence grades for recommendations:

- 1A Strong recommendation. High quality evidence
- 1B Strong recommendation. Moderate quality evidence
- 1C Strong recommendation. Low quality evidence
- 1D Strong recommendation. Very low quality evidence
- 2A Weak recommendation. High quality evidence
- 2B Weak recommendation. Moderate quality evidence
- 2C Weak recommendation. Low quality evidence
- 2D Weak Recommendation. Very low quality evidence.

## Dietary recommendations and education

Patients with diabetes who commence maintenance haemodialysis (MHD) may have received dietary advice from the diabetes and renal teams and from a range of healthcare professionals, each with their own priority. This can lead to contradictory information leading to

confusion and, ultimately, poor dietary adherence. Ideally patients should identify achievable goals and changes to lifestyle behaviours, with good communication between specialities. It is therefore important that MHD patients are routinely referred to a registered dietitian, who is qualified to assess their overall diet and offer appropriate, individualised advice.<sup>4</sup> See **Figure 1** for a summary of the key dietary recommendations.

## Dietary recommendations for people with diabetes on MHD

Nutritional management for patients with stage 5 CKD receiving MHD will consider energy, protein, potassium, phosphate, salt and vitamins,<sup>5, 6</sup> but there is little evidence or guidance as how to adapt dietary advice for those with additional dietary needs such as diabetes. A patient's ideal BMI should be considered in the context of recognised better outcomes for patients on MHD with higher BMI,<sup>7</sup> and maintain a BMI of at least  $>23.0 \text{ kg/m}^2$ .<sup>5, 6</sup>

Protein and energy intakes, including carbohydrate, of patients undergoing MHD are known to be lower on dialysis days to non-dialysis days.<sup>8</sup> Education should be provided on insulin dose adjustment and carbohydrate counting, to allow for adjustment to treatment on these days. Requirements for carbohydrate intake differ between Type 1 diabetes and Type 2 diabetes. Carbohydrate is the primary nutritional consideration for glycaemic control for people with Type 1 diabetes, while weight management and total energy intake is the primary nutritional consideration for glycaemic control in people with Type 2 diabetes.<sup>9</sup>

According to the US National Kidney Foundation Kidney Disease Outcomes Quality Initiative,<sup>6</sup> total energy

intake should be:

- 50–60% from CHO
- <30% from fat
- At least 15% from protein (based on  $1.1 \text{ g pr/kg IBW}$ ).

Low potassium dietary advice is indicated if serum  $\text{K}^+$  is  $\geq 6.0 \text{ mmol/L}$ .<sup>10</sup> Low  $\text{K}^+$  fruit, vegetables using appropriate cooking methods and carbohydrate with low-to-moderate GI should be encouraged to allow patients to achieve the recommended '5-A-DAY' fruit and vegetable portions.

Insulin deficiency (and therefore hyperglycaemia) causes  $\text{K}^+$  redistribution and can result in hyperkalaemia;<sup>11</sup> this additional reason for optimal glycaemic control should be emphasised and explained to the patient. Other causes of hyperkalaemia, such as medications, dialysis adequacy, recirculation, acidosis, constipation and spurious results, should be investigated and corrected prior to advising on low potassium dietary advice.

Low phosphate dietary advice should be provided to maintain serum phosphate  $1.1\text{--}1.7 \text{ mmol/L}$ .<sup>12</sup> Previously this revolved around the reduction of dairy foods, eggs, seafood and nuts. These foods, however, are also sources of high biological protein and may be an essential part of the diet for this population. Phosphate additives in foods, such as processed meats and meat products, cake mixes and fizzy drinks, should be targeted first.

### Figure 1: Summary of Key Recommendations

- Each haemodialysis unit should have access to appropriate personalised dietary expertise from a dietitian (*Grade 1D*)
- An energy intake of 30-40 kcal/kg ideal body weight (IBW) (*Grade 1D*)
- A protein intake of  $>1.1 \text{ g/kg IBW}$  (*Grade 1C*)
- Dietary advice should be given for both dialysis and non-dialysis days to minimise significant glycaemic and caloric excursions (*Grade 1D*)
- Total energy should come from 50–60% carbohydrate (CHO), <30% fat and at least 15% from protein (*Grade 1D, expert opinion*)
- Low-potassium ( $\text{K}^+$ ) fruits, vegetables and carbohydrates with low-moderate glycaemic index (GI) should be encouraged (*Grade 1D*)
- Foods containing phosphate additives should be targeted first (*Grade 1D*)
- A salt intake of  $<6 \text{ g/day}$  is recommended (*Grade 1C*)
- Oily fish should be recommended with caution for patients on haemodialysis (*Grade 2D*)
- Maintenance haemodialysis patients should be prescribed a water-soluble vitamin supplement (*Grade 2D*)
- Ideally all patients should be screened for protein energy wasting (PEW) (*Grade 1D*)
- Initiation of nutrition support should be considered in those at risk of PEW (*Grade 1C*)
- Dietary counselling and oral nutrition support is the first-line treatment for patients who are unable to meet their nutritional needs orally (nasogastric, gastrostomy, or intradialytic parenteral nutrition feeding may be necessary if these interventions are insufficient) (*Grade 1D*)
- Appropriate rapid-acting carbohydrates treatment should be provided to take into account fluid, potassium and phosphate restrictions (*Grade 1D*)
- Patients with gastroparesis are encouraged to have a small meal size but frequent that is low-fat and low-fibre (*Grade 1C*)
- Intra-dialytic Weight Gain (IDWG) at  $<4.5\%$  of dry weight or  $<2 \text{ kg}$  if they optimise their HbA1c (*Grade 1C*)
- Overweight/obese patients who are being considered for a kidney transplant should be encouraged to lose weight (*Grade 1B*)
- Bariatric surgery or weight-reducing medication should be considered when appropriate (*Grade 1C*).

A salt intake of <6 g/day is recommended for both dialysis and those with diabetes.<sup>9</sup> In addition, the importance of reducing salt as part of fluid management should be highlighted.<sup>13</sup> Poor glycaemic control can lead to a vicious cycle of thirst and polydipsia, increasing problems with fluid management also.<sup>14</sup>

### Nutrition support

PEW is considered to be a major cause of morbidity and mortality in MHD patients.<sup>6, 15</sup> It has also been recommended that outpatients should be screened at their first clinic appointment<sup>16</sup> for PEW and/or at initiation of MHD and 3-6 monthly thereafter.<sup>17</sup> Many studies indicate that PEW is more common in diabetic vs. non-diabetic haemodialysis patients;<sup>18, 19</sup> however the underlying mechanisms are not fully understood. Although there is much guidance on the prevention and treatment of wasting in dialysis patients,<sup>20</sup> there is little specific to people with diabetes, but it seems intuitively obvious that some approaches would remain the same, such as ensuring adequate energy and protein intake.

Those identified as being at risk should receive dietary counselling to discuss how to increase the calorie and protein content

of their diets.<sup>5</sup> This may be through the use of diet and/or oral nutritional supplements (ONS). If intake is insufficient despite the use of ONS<sup>5, 17, 21</sup> nasogastric feeding or gastrostomy feeding for long-term use should be considered. Jejunal feeding may be indicated for patients with a history of diabetic gastroparesis.<sup>22</sup>

### Management of mild hypoglycaemia

Hypoglycaemia is the medical term for low blood glucose, and is defined as a blood glucose level of <4 mmol/L. The treatment

of hypoglycaemia in the inpatient/dialysis setting should be based on national guidance issued by the JBDS (**Figure 2**).<sup>3</sup>

In patients on MHD the occurrence of a hypoglycaemic should prompt active intervention and the use of 15-20 g rapid-acting glucose to treat hypoglycaemia episode.<sup>3, 23</sup>

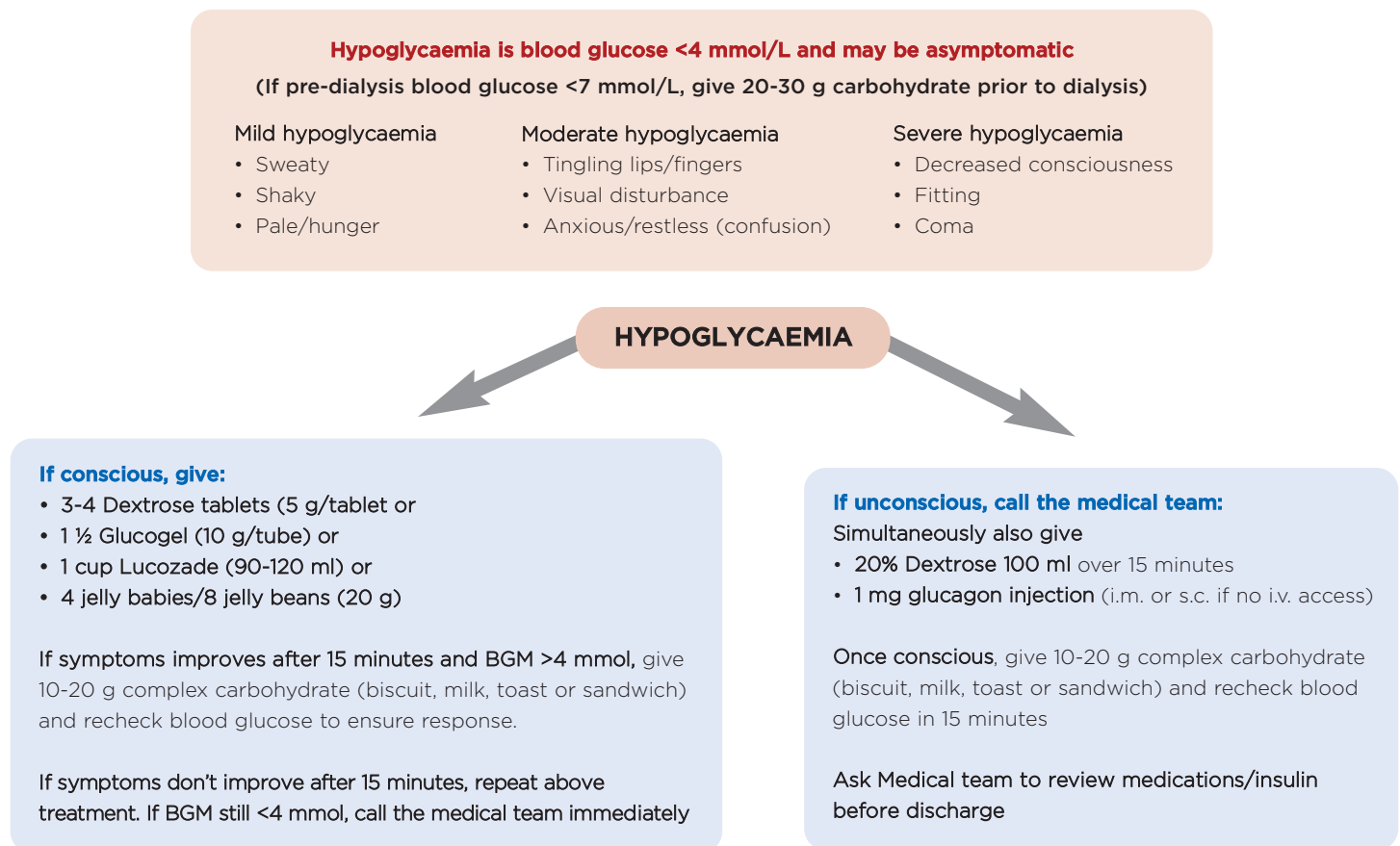
Many of the rapid acting glucose preparations recommended for treating hypoglycaemia can be inappropriate for MHD. **Table Two** shows the recommended hypoglycaemia treatment for patients with hyperkalaemia, hyperphosphataemia and anuria.

Table Two: Recommended Hypoglycaemia Treatments

Source of rapid CHO	Amount to provide 15 g CHO
Lucozade (Original)	90-120 ml
Dextrose tablets (5 g per tablet)	3-4 tablets
Glucogel (10 g per tube)	1½ tubes
Jelly babies	4 (20 g <sup>a</sup> )
Fruit pastilles	5 (19 g <sup>a</sup> )
Jelly beans	8

<sup>a</sup> Estimated actual amount of CHO.

Figure 2: JBDS Recommendations on Managing Hypoglycaemia<sup>3</sup>





## Management of gastroparesis

Gastroparesis is a serious complication of diabetes and is defined as delayed gastric emptying without any mechanical obstruction in the stomach.<sup>24, 25</sup> Gastric emptying is significantly delayed in MHD patients and this can affect nutritional status,<sup>26</sup> due to nausea, vomiting and dyspeptic symptoms such as early satiety, fullness or postprandial discomfort and bloating as well as anorexia.<sup>25</sup>

The aim of dietetic management is to restore and maintain nutritional status as well as to improve glycaemic control. A suitable diet for the individual with gastroparesis is small, frequent, low in fibre and fat, with increased liquid nutrient intake; alcohol and carbonated drinks should be discouraged.<sup>27</sup>

## Management of obesity

Patients with BMI >30 kg/m<sup>2</sup> may benefit from weight reduction, but there are virtually no standards, guidelines or studies with regards to obesity in patients with diabetes on MHD. There has been slightly more guidance and research on obesity and MHD, and we can probably

presume that a significant proportion of these patients would have diabetes.

Obesity within the dialysis population is confusing, as some research results suggest that obesity is positively correlated with survival of patients on dialysis, i.e. a higher BMI predicts a lower mortality rate, especially for extremely obese patients.<sup>7, 28</sup> However, some authors question the existence of the obesity paradox. They suggest that obese individuals are actually protected in the short-term, but later on are susceptible to higher mortality risks than people of normal body weight.

Guidelines for obesity in Type 2 diabetes suggest that for overweight and obese patients the focus should be on total energy rather than the source of energy in the diet for optimal glycaemic control and weight reduction.<sup>9, 29-31</sup> Bariatric surgery should be considered for those requiring a transplant but, overall, there is very limited evidence of the benefits of bariatric surgery for weight loss in the CKD population, especially amongst patients on MHD.<sup>32, 33</sup> Again, there is limited evidence, but a pharmacological, calorie-restricted diet and aerobic exercise on MHD patient can be considered.<sup>34</sup>

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