European Guidelines for the Nutritional Care of Adult Renal Patients

European Dialysis and Transplantation Nurses Association / European Renal Care Association

Dietitians Special Interest Group October 2002

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European Guidelines for the Nutritional Care of Adult Renal Patients

Introduction

These guidelines are aimed at improving the nutritional care of patients with renal disease throughout Europe. They aim to promote best practice based on expert opinion and scientific evidence. This first publication is aimed at the care of adults with chronic renal disease and does not include guidelines for paediatrics, nephrotic syndrome, transplantation, diabetes or acute renal failure. These will follow at a later stage.

In 1998 the Nutrition Project Group of the EDTNA/ERCA produced the document, European Standards for Nutrition Advice for Patients with Renal Diseases (Adult Renal Patients over 18 years). This draft document was developed from the Standards of the Renal Nutrition Group of the British Dietetic Association and followed extensive consultation with dietitians, doctors and nurses across Europe on the nutritional management of patients with renal failure.

Despite a consensus being reached in many areas, there were some aspects of care where there was insufficient evidence or agreement. In these cases a compromise was reached.

Examples include:

- The determination of ideal body weight (IBW) and the implications for the calculation of individual nutrient requirements [Appendix I].
- The level of protein restriction in the pre-dialysis renal patient. Some units use a protein restriction of 0.6g/kg IBW/day; others recommend 0.8 to 1.0g/kg IBW/day to reduce the risk of malnutrition.
- The method of calculating fluid allowances in dialysis patients.

Examination of the scientific literature shows a paucity of evidence on dietary advice in renal failure. Therefore, the guidelines are based on scientific evidence, where available, and on a consensus of what constitutes 'best practice'. In order to provide a basis for audit and evaluation, 'Outcomes' have been described for the practitioner to assess their own effectiveness in meeting the needs of the patient.

The nutrition advisors in renal units in Europe are a heterogeneous group. The guidelines have been produced to support the range of healthcare professionals who take on the task of nutrition advice. However, it should be recognised that renal units without trained renal dietitians and sufficient resources may find it difficult to implement these guidelines fully. Therefore it is hoped that knowledge of the guidelines will support all nutrition advisors in their care of renal patients and highlight areas where further training and resources may be required.

We would like to express our thanks to the members of the Nutrition Project Group, Hennie Bisschop, Barbara Engel, Annalaura Fantuzzi, Dragica Mlinsek, Franca Pasticci and Ellen Sikkes (Dietitans' SIG Chair, 1996-1999) and to all those who originally participated in collecting the data. The current Chairs of the Dietitians SIG have further developed the Guidelines into their current form. We would also like to acknowledge the EDTNA/ERCA for their technical and financial support throughout.

Gavin James & Helena Jackson
Chair for the Dietitians Special Interest Group of the EDTNA/ERCA
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1.0 Guideline General Principles

Guideline Structure

The Guidelines have been formatted to make them modality-specific. This is intended to make them more accessible to those working in specific areas of renal care.

The structure of each Guideline has been standardised to include the following sections:

- The **Statement** summarises the points of the guideline.
- The **Objective** outlines the desired effect of intervention.
- The **Rationale** describes why the guideline is required, based on current scientific evidence and agreed best practice.
- The **Implementation** describes the actions the dietitian/nutrition advisor has to perform so that the patient is able to reach the described outcomes. It also illustrates how each specific guideline can be applied in practice. In practice this will vary, depending upon the presence of other diseases such as diabetes or cancer and on individual characteristics of the patient.
- The **Outcomes** are the measurable effects of the nutrition intervention. They are specific, patient-centred and achievable in practice given sufficient resources. With the outcomes the dietitian/nutrition advisor can agree goals for each guideline with the patient. The outcomes are also the responsibility of the renal team and the patient because other factors such as medical management, dialysis treatment and patient adherence will influence the outcomes.

Guideline Implementation

There are general principles for providing care. They form the basis for all the guidelines and are as follows:

When advising the patient the dietitian/nutrition advisor will:

- Work closely with other members of the multi-professional team in devising an appropriate nutrition treatment plan.
- Make an appropriate nutrition treatment plan with the patient that aims to meet nutritional goals and maximise quality of life.
- Discuss with the renal team factors such as medication and the adequacy of dialysis.
- Request additional blood tests when necessary in liaison with the renal team.
- Take into consideration any physical and mental disabilities of the patient.

- Take into consideration the cultural, socio-economic and educational background of the patient.

- Make a plan for follow-up and evaluation of treatment.

- Fully document the treatment plan in the relevant multi-professional and dietetic notes.

- Advise the patient and other health professionals on the use of prescribable products in order to meet the patient's nutritional requirements.

- Take into account local guidelines on healthy eating and chronic disease prevention e.g. lipids, antioxidants and life-style.

- Take into consideration the national professional guidelines on conduct of practice of the dietitian or other healthcare professionals.

Guideline Outcomes

- The patient is satisfied with the advice provided by the dietitian/nutrition advisor.

- The patient receives nutritional advice specific to their clinical condition and adapted to their individual requirements.

- The patient's nutritional status is optimised by regular review and appropriate intervention.

- The multi-professional team accepts the dietitian/nutrition advisor as a valued member of the team.

2.0 Introduction to Diet on Haemodialysis

Scope	Stable patients with chronic renal failure treated with regular intermittent haemodialysis.

Haemodialysis is known to affect nutritional intake and the nutritional requirements of the patient. Malnutrition is a common consequence of patients’ inability to meet their requirements and has been shown to be a strong predictor of both morbidity and mortality in haemodialysis patients.

Dietary intervention in this group aims to limit the intake of specific nutrients in an attempt to control the accumulation of waste products during the inter-dialytic period. At the same time it is vital to meet the nutritional requirements of the patient by maintaining the overall adequacy of the diet.

More specifically, the haemodialysis diet has several important functions:

- To limit the build up of waste products (urea, phosphate, potassium, fluid and salt).
- To prevent metabolic complications (e.g. renal bone disease, anorexia etc).
- To replace nutrient losses associated with the dialysis process (nitrogen, vitamins and minerals).
- To optimise/maintain nutritional status.

These guidelines include recommendations on the nutritional requirements of energy, protein, phosphorous, potassium, fluid, sodium, vitamins and minerals in haemodialysis patients.

2.1 Energy

Statement The dietitian/nutrition advisor will advise the haemodialysis patient on an energy intake of 35kcal/kg IBW/day aiming for overall nutritional adequacy (Evidence & Agreed Best Practice).

Reduced intakes (30-35kcal/kg IBW/day) may be appropriate in the elderly and patients with reduced activity (Agreed Best Practice).

Objective

To ensure that all haemodialysis patients achieve the recommended energy intake for that individual. A target of 35kcal/kg IBW/day will ensure that the majority of patients meet their energy requirements. A reduced target of 30-35kcal/kg IBW/day may be appropriate in the elderly and patients with reduced activity.

Rationale

It is important to accurately assess energy requirements to prevent malnutrition. An adequate energy intake will promote an optimal body weight and positive nitrogen balance.

The requirements of patients on haemodialysis are thought to be similar to those of the general population (1,2). Energy intake plays a very important part in achieving nitrogen balance in haemodialysis patients (3). As is the case in the general population, energy requirements in certain individuals, such as the elderly and those with low activity levels, may be reduced (4).

Evidence indicates that there is a high prevalence of malnutrition in the haemodialysis population (5,6). The effects of malnutrition are widely accepted in this group and have been linked to increased morbidity and mortality (7,8). Although malnutrition is undoubtedly multi-factorial in nature, a decreased intake is likely to play an important role. Studies have indicated that energy intakes in many haemodialysis patients are below the recommended levels (9).

The effect of the dialysis process should also be taken into account. For example, losses and gains of glucose may occur depending on the type of dialysis solution used (10).

Implementation

The dietitian/nutrition advisor will:

- Advise the patient on how to achieve an appropriate energy intake.
- Estimate energy requirements as 35kcal/kg IBW/day for non-catabolic patients [Appendix I]. A reduction in energy requirements to 30kcal/kg IBW/day may be appropriate in the elderly and patients with reduced mobility.

  NB. In certain renal units alternative methods of calculation of energy requirements such as the use of Schofield equations to estimate basal metabolic rate may be preferred (11).

Outcome Measures

- The dietitian/nutrition advisor will regularly assess the patient's energy intake in relation to their estimated energy requirements.
- The nutritional status of the patient will be regularly assessed and monitored to ensure that estimated energy requirements are appropriate for that individual.
- The patient is able to state sources of energy in their diet and how to achieve the recommended energy intake.

2.2 Protein

Statement The dietitian/nutrition advisor will advise the haemodialysis patient on a dietary protein intake of 1-1.2g/kg IBW/day for active, non-catabolic patients (Evidence & Agreed Best Practice).

Objective

To ensure that all patients achieve a protein intake which meets their requirements. An intake of 1.0-1.2/kg IBW/day is recommended for active, non-catabolic patients.

Rationale

It is important to accurately assess protein requirements to prevent malnutrition and to prescribe an optimal dietary protein intake (DPI).

Current understanding of protein requirements in haemodialysis patients is based on nitrogen balance studies involving small numbers of subjects under test conditions (1,3). Despite the difficulties of extrapolating this data to the requirements of free-living individuals, the available evidence indicates that a DPI of 1.2g/kg/day should be recommended to ensure neutral or positive nitrogen balance in most clinically stable haemodialysis patients.

The haemodialysis process contributes to the requirement for dietary protein. Dialysate losses of proteins, including amino acids, peptides and whole proteins, are estimated to be approximately 10-12g per session (12,13). However, there is much evidence to indicate that many patients have sub-optimal intakes of protein, typically <1.0g/kg/day. This may be associated with other powerful indicators of morbidity and mortality such as hypoalbuminaemia (14-16).

It is important to note that an adequate energy intake is required to achieve positive nitrogen balance (Guideline 2.1).

Implementation

The dietitian/nutrition advisor will:

- Advise the patient on how to achieve a protein intake of 1.0 – 1.2 g/kg IBW/day for stable, non-catabolic patients [Appendix I].
- Provide individualised advice on suitable dietary sources of protein.
- Regularly assess and monitor the patient's protein intake in relation to their estimated protein requirements.

Outcome Measures

- The patient is able to state sources of protein in their diet and how to achieve the recommended protein intake.
- The nutritional status of the patient will be regularly assessed and monitored.

2.3 Phosphorous

Statement The dietitian/nutrition advisor will advise the haemodialysis patient on a phosphorus intake of 1000-1400mg/day (32-45mmol/day) (Evidence & Agreed Best Practice).

Objective

To ensure that all haemodialysis patients receive advice on how to maintain acceptable serum phosphate levels. This will be achieved through dietary modification and the appropriate use of phosphate binding medication. The nutritional adequacy of the diet will be maintained.

Rationale

In health, the kidneys play a key role in regulating serum phosphate and calcium levels. Hyperphosphataemia is a common consequence of renal failure treated by haemodialysis due to several factors. These include the limited dialysability of phosphate and the need for an adequate protein intake with its associated phosphorus load (17,18).

Hyperphosphataemia contributes to the development of renal bone disease through the stimulation of parathyroid hormone (19). There is also growing evidence of the effect of poor calcium and phosphate control on morbidity and mortality due to increased cardiovascular calcification. (20,21). Dietary phosphorus restriction is an essential part of controlling serum phosphate levels. However, the need to provide both an adequate dietary protein intake and a palatable diet limits the degree to which dietary phosphate can be restricted (18).

The appropriate prescription (selection, dose and timing) of phosphate binders is equally important in controlling serum phosphate levels. However, difficulties with poor compliance and side effects, including hypercalcaemia and adynamic bone disease, may be experienced.

Implementation

The dietitian/nutrition advisor will:

- Document clinical factors that may influence serum phosphate levels.
- Explain the importance of controlling serum phosphate levels.
- Ensure that the phosphorus restriction does not compromise overall nutritional adequacy of the diet.
- Advise on an appropriate intake of phosphorus using the following guidelines:

  1000-1400mg (32-45mmol) phosphorus per day

NB. These amounts are based on the average sized patient (60-80kg) and may need adjusting for patients with a body weight outside this range.

- Inform the patient about the acceptable serum phosphate levels (agreed locally).
- Advise on the purpose and timing of phosphate binders where appropriate.
- Advise the patient on dietary sources of phosphorus, which foods can be taken freely, which can be eaten in moderation and those that should be avoided.
- Identify any non-dietary causes of hyperphosphataemia in liaison with the multi-professional team.

Outcome Measures

- The patient is able to identify dietary sources of phosphorus, which foods can be taken freely, which can be eaten in moderation and any foods that should be avoided.
- The patient is able to identify their phosphate binder and state the appropriate dose and timing.
- The patient maintains acceptable serum phosphate levels, although any non-dietary causes of abnormal serum phosphate levels should be identified and corrected if possible.

2.4 Potassium

Statement The dietitian/nutrition advisor will advise the haemodialysis patient on a potassium intake of 2000-2500mg/day (50-65mmol/day) (Agreed Best Practice).

Objective

To ensure that all haemodialysis patients receive advice to maintain acceptable serum potassium levels. This will be achieved through dietary modification. The nutritional adequacy of the diet will be maintained.

Rationale

In health, the kidneys play a key role in regulating serum potassium levels. For haemodialysis patients the control of dietary potassium is important in preventing intra-dialytic hyperkalaemia to reduce the risk of arrhythmias. It is also important to consider other factors that may affect serum potassium levels. These include loss of residual renal function, constipation, steroids, acidosis, catabolism and adequacy of dialysis (22).

In renal failure there is an increase in faecal potassium losses, which becomes an important source of potassium removal from the body (23). Constipation should be avoided or treated promptly to assist with serum potassium control. Conversely diarrhoea may result in increased potassium losses.

When managing hyperkalaemia due to under-dialysis, dietary restriction should only be considered as a short-term solution due to the risk of compromising nutritional adequacy and quality of life in the longer term.

The intake of high potassium foods during a haemodialysis session should not be encouraged. The potassium will not be removed during the dialysis period and may contribute to inter-dialytic hyperkalaemia (24).

Implementation

The dietitian/nutrition advisor will:

- Identify any non-dietary causes of hyperkalaemia in liaison with the multi-professional team. These should be corrected if possible
- Explain the importance of controlling serum potassium levels.
- Ensure that the potassium restriction does not compromise overall nutritional adequacy of the diet.

- Advise on an appropriate intake of potassium using the following guidelines:

  2000-2500mg (50-65mmol) potassium/day

  NB. These amounts are based on the average sized patient (60-80kg) and may need adjusting for patients with a body weight outside this range.

- Inform the patient about the acceptable serum levels of potassium (agreed locally).
- Advise the patient on dietary sources of potassium, which foods can be taken freely, which can be eaten in moderation and those that should be avoided.
- Advise the patient on methods of food preparation that will reduce potassium content.

Outcome Measures

- The patient is able to identify dietary sources of potassium, which foods can be taken freely, which can be eaten in moderation and any foods that should be avoided.
- The patient is able to identify methods of food preparation that will reduce potassium content.
- The patient maintains acceptable serum potassium levels providing that no non-dietary causes of abnormal serum potassium levels have been identified and corrected.

2.5 Sodium and Fluid Management

Statement The dietitian/nutrition advisor will advise the haemodialysis patient on a sodium intake of 1800-2500mg/day (80-110 mmol/day) and a fluid allowance of 500ml plus a volume equal to daily urine output. (Evidence & Agreed Best Practice).

Objective

To ensure that all haemodialysis patients receive advice to control their dietary intake of sodium and fluid whilst maintaining overall nutritional adequacy of the diet.

Rationale

In health, the kidneys help to maintain normal osmolarity and volume of body fluids through the excretion of sodium and water.

In haemodialysis patients, hypertension is associated with persistently high inter-dialytic fluid gains and excessive fluid retention. This leads to an increased risk of cardiovascular complications and mortality (25,26). The primary means of regulating fluid balance is by the control of dietary fluid intake and fluid removal on dialysis. However, the rapid removal of large amounts of fluid at a haemodialysis session may contribute to hypotension, cramps, arrhythmias, and angina. (27). By consensus, most European haemodialysis units advise a maximum inter-dialytic weight gain of 1.5-2.0kg or 4% dry body weight.

Dietary sodium restriction is important for the regulation of sodium and fluid balance and for the control of fluid intake by reducing thirst (28).

Implementation

The dietitian/nutrition advisor will:

- Advise on the appropriate sodium and fluid allowances using the following guidelines.

Sodium	1800-2500mg/day (80-110 mmol/day)
Fluid	500ml + volume equal to daily urine output (includes only foods that are liquid at room temperature and those with a high fluid content that are set e.g. jelly, gravy, soup, ice-cream)

- Advise on the methods of food preparation that help to limit sodium/fluid intake.
- Explain the effect of renal failure on fluid balance and the consequences of fluid overload and dehydration.
- Explain the benefit of a reduced sodium intake in controlling thirst and fluid intake.

- Define ideal weight, dry weight and actual weight for the benefit of the patient (definitions should be standardised within the renal team).
- Advise on the maximum inter-dialytic weight gain between two dialysis sessions of 1.5-2.0kg or 4% of dry weight. In the overweight, i.e. BMI >25, a weight equivalent to a BMI of 25 should be substituted for dry weight [Appendix I].

Outcome Measures

- Inter-dialytic fluid gain is within recommended limits.
- The patient is able to state their fluid allowance.
- The patient can state the maximum recommended inter-dialytic weight gain and is aware if this has been exceeded.
- The patient is able to state the benefit of limiting their sodium/fluid intake.
- The patient can identify which foods should be avoided due to their high sodium/fluid content.
- The patient can identify methods of food preparation that help to limit sodium/fluid intake.
- The patient is able to measure and report their 24-hour urinary output, monthly or when required.
- The patient can state their 'dry', ideal and actual body weights and explain the differences between these measures.

2.6 Vitamins and Minerals

Statement The dietitian/nutrition advisor will ensure that the dietary intake of vitamins and minerals in the haemodialysis patient is adequate and advise on supplements as required (Agreed Best Practice).

Objective

To ensure that all haemodialysis patients have an adequate intake of vitamins and minerals and receive supplementation if required.

Rationale

The vitamin and mineral status of haemodialysis patients remains a controversial topic. There is inconclusive evidence on issues such as the effect of renal disease and failure on requirements and the magnitude of the losses during haemodialysis.

There are several factors that may lead to a micronutrient deficiency. Water-soluble vitamins are removed during haemodialysis, although this may be offset by reduced urinary losses and reduced renal catabolism of certain vitamins and minerals. Anorexia, co-morbid conditions or therapeutic dietary restrictions resulting in an unpalatable diet, may lead to poor food intake and an inadequate intake of vitamin and minerals. Drug-nutrient interactions may also contribute to deficiencies (29).

In some renal units there are already protocols for routine supplementation of vitamins and minerals. Vitamin D analogues are medically prescribed to treat renal osteodystrophy if necessary. Iron and folate monitoring and supplementation are an integral part of anaemia management (30). At this time it would seem prudent to ensure that local recommended daily allowances for vitamins and minerals are achieved in the haemodialysis population.

Implementation

The dietitian/nutrition advisor will:

- Ensure that the diet meets requirements for protein and energy intake.
- Ensure that the diet is free from any inappropriate dietary restrictions, liasing with the multi-professional team as required.
- Take into account any potential effect on vitamin and mineral intake and make appropriate recommendations when prescribing restrictive diets.
- Use clinical and laboratory investigations to confirm suspected vitamin/mineral deficiencies.
- Advise the multi-professional team on the need for vitamin/mineral supplementation as appropriate.

Outcome Measures

- The patient is free from any biochemical, clinical or other signs of vitamin and mineral deficiencies.
- The patient is only following those dietary restrictions that are clinically indicated.

3.0 Introduction to Diet on Peritoneal Dialysis

Scope	Stable patients with chronic renal failure treated with continuous ambulatory peritoneal dialysis (CAPD)

Peritoneal dialysis is known to affect both the nutritional intake and the nutritional requirements of the patient. Malnutrition is a common consequence of patients' inability to meet their requirements and has been shown to be a strong predictor of both morbidity and mortality in peritoneal dialysis patients

Dietary intervention in this group aims to meet the nutritional requirements of the patient and to limit the intake of specific nutrients in an attempt to control the accumulation of waste products. There is a need to compensate for the losses of protein/amino acids and gains of glucose across the peritoneal membrane. It is important to maintain the overall adequacy of the diet.

More specifically, the diet has several important functions:

- To limit the build up of waste products (urea, phosphate, potassium, fluid and salt).
- To prevent metabolic complications (e.g. renal bone disease, anorexia, obesity).
- To replace nutrient losses associated with the dialysis process (nitrogen, vitamins and minerals).
- To take into account the calories absorbed from the dialysis fluid.
- To maintain nutritional status.

These guidelines include recommendations on the nutritional requirements of energy, protein, phosphorous, potassium, fluid, sodium, vitamins and minerals in CAPD patients.

3.1 Energy

Statement The dietitian/nutrition advisor will advise the peritoneal dialysis patient on an energy intake (35kcal/kg IBW/day, including calories from peritoneal absorption of glucose) aiming for overall nutritional adequacy (Evidence & Agreed Best Practice).

Reduced intakes (30-35kcal/kg IBW/day) may be appropriate in the elderly and patients with reduced activity (Agreed Best Practice).

Objective

To ensure that all peritoneal dialysis patients achieve the recommended energy intake for that individual. A target of 35kcal/kg IBW/day (including calories from peritoneal absorption of glucose) will ensure that the majority of patients meet their energy requirements. A reduced target of 30-35kcal/kg IBW/day may be appropriate in the elderly and patients with reduced activity.

Rationale

It is important to accurately assess energy requirements to prevent malnutrition. An adequate energy intake will promote an optimal body weight and positive nitrogen balance.

The energy requirements of patients on peritoneal dialysis are thought to be similar to that of the general population (1,31). As is the case in the general population, energy requirements in certain individuals, such as the elderly and those with low activity levels, may be reduced (4).

Peritoneal dialysis patients have an additional source of calories via the peritoneal absorption of glucose from dialysis fluid. Approximately 60-75% of the dialysis fluid glucose may be absorbed during a six-hour dwell (32). Despite this, there is evidence to indicate that up to half of all peritoneal dialysis patients have some degree of malnutrition (33,34). Malnutrition has been shown to be associated with an increased relative risk of death and increased hospitalisation rates (33).

Malnutrition in peritoneal dialysis patients is multi-factorial in nature and decreased intake plays an important role. Inhibitors of adequate energy intake include early satiety due to abdominal discomfort from the presence of dialysis fluid, psychosocial factors, over-restrictive diets and peritonitis-induced anorexia. Appropriate nutritional monitoring and intervention is essential if these problems are to be overcome.

Implementation

The dietitian/nutrition advisor will:

- Advise the patient on how to achieve an appropriate energy intake.
- Estimate energy requirements as 35kcal/kg IBW/day (including calories from peritoneal absorption of glucose) for non-catabolic patients [Appendix I]. A reduction in energy requirements to 30kcal/kg IBW/day may be appropriate in the elderly and patients with reduced mobility.

  NB. In certain renal units alternative methods of calculation of energy requirements such as the use of Schofield equations to estimate basal metabolic rate may be preferred (11).

Outcome Measures

- The dietitian/nutrition advisor will regularly assess the patient's energy intake in relation to their estimated energy requirements.
- The nutritional status of the patient will be regularly assessed and monitored to ensure that estimated energy requirements are appropriate for that individual.
- The patient is able to state sources of energy in their diet and how to achieve the recommended energy intake.

3.2 Protein

Statement The dietitian/nutrition advisor will educate the peritoneal dialysis patient on a dietary protein intake of 1-1.2g/kg IBW/day for active, non-catabolic patients. A higher intake of 1.5g/kg IBW/day is recommended for patients with peritonitis (Evidence & Agreed Best Practice).

Objective

To ensure that all patients achieve a protein intake, which meets their requirements. A minimum intake of 1.0/kg IBW/day is recommended for active, non-catabolic patients. A higher intake of 1.5g/kg IBW/day is recommended for patients with peritonitis.

Rationale

It is important to accurately assess protein requirements to prevent malnutrition and to advise or prescribe an optimal dietary protein intake (DPI).

Estimations of protein requirements in peritoneal dialysis patients are based on nitrogen balance studies involving small numbers of subjects under test conditions (35-37). Although some patients are able to achieve nitrogen balance on lower protein intakes, a minimum DPI of 1.0g/kg/day is recommended in clinically stable patients on peritoneal dialysis.

On average, peritoneal losses of proteins of approximately 4-12g occur in patients on peritoneal dialysis (37,38). The development of peritonitis may cause an increase in dialysate protein and albumin loss by as much as 70% during the infectious episode 38,39). This will result in increased protein requirements.

It is important to note that an adequate energy intake is required to achieve positive nitrogen balance (Guideline 3.1).

Implementation

The dietitian/nutrition advisor will:

- Advise the patient on how to achieve a protein intake of 1.0-1.5g/kg IBW/day [Appendix I].
- Provide individualised advice on suitable dietary sources of protein.

Outcome Measures

- The patient is able to state sources of protein in their diet and how to achieve the recommended protein intake.
- The dietitian/nutrition advisor will regularly assess and monitor the patient's protein intake in relation to their estimated protein requirements.

- The nutritional status of the patient will be regularly assessed and monitored.

3.3 Phosphorus

Statement The dietitian/nutrition advisor will advise the peritoneal dialysis patient on a phosphorus intake of 1000-1400mg/day (32-45mmol/day) (Evidence & Agreed Best Practice).

Objective

To ensure that all peritoneal dialysis patients receive advice to maintain acceptable serum phosphate levels through dietary modification and the appropriate use of phosphorous binding medication. The overall nutritional adequacy of the diet will be maintained.

Rationale

In health, the kidneys play a key role in regulating serum phosphate and calcium levels. Hyperphosphataemia is common in patients on peritoneal dialysis due to several factors. These include the poor dialysability of phosphate and the need to keep an adequate protein intake with its associated phosphorus load (18,40).

Hyperphosphataemia contributes to the development of renal bone disease through the stimulation of parathyroid hormone production (19). There is also growing evidence of the effect of poor calcium and phosphate control on morbidity and mortality due to increased cardiovascular calcification (21). Dietary phosphorus restriction is an essential part of controlling serum phosphate levels. However, the need to provide both an adequate dietary protein intake and a palatable diet limits the degree to which dietary phosphate can be restricted (18).

The appropriate prescription (selection, dose and timing) of phosphate binders is equally important in controlling serum levels. However, difficulties with poor compliance and side effects, including hypercalcaemia and adynamic bone disease, may be experienced.

Implementation

The dietitian/nutrition advisor will:

- Document medical factors that may influence serum phosphate levels.
- Explain the importance of controlling serum phosphate levels.
- Ensure that the phosphorus restriction does not compromise overall nutritional adequacy of the diet.

- Advise on an appropriate intake of phosphorus using the following guidelines:

  1000-1400mg (32-45mmol) phosphorus per day

  NB. These amounts are based on the average sized patient (60-80kg) and may need adjusting for patients with a body weight outside this range

- Inform the patient about the acceptable serum levels of phosphate (agreed locally).
- Advise on the purpose and timing of phosphate binders where appropriate.
- Advise the patient on dietary sources of phosphorus, which foods can be taken freely, which can be eaten in moderation and those that should be avoided.
- Identify any non-dietary causes of hyperphosphataemia in liaison with the multi-professional team.

Outcome Measures

- The patient is able to identify dietary sources of phosphorus, which foods can be taken freely, which can be eaten in moderation and any foods that should be avoided.
- The patient is able to identify their phosphate binder and state the appropriate dose and timing.
- The patient maintains acceptable serum phosphate levels, although any non-dietary causes of abnormal serum phosphate levels should be identified and corrected if possible.

3.4 Potassium

Statement The dietitian/nutrition advisor will advise the peritoneal dialysis patient on a potassium intake of 2000-2500mg (50-65mmol) (Evidence & Agreed Best Practice).

Objective

To ensure that all peritoneal dialysis patients receive advice to maintain acceptable serum potassium levels. This will be achieved through dietary modification. The nutritional adequacy of the diet will be maintained.

Rationale

In health, the kidneys play a key role in regulating serum potassium levels. On peritoneal dialysis the control of dietary potassium is important in preventing hyperkalaemic episodes to reduce the risk of arrhythmias. It is also important to consider other factors that may affect serum potassium levels. These include loss of residual renal function, constipation, steroids, acidosis, catabolism and adequacy of dialysis (22). Conversely, there is also a potential for hypokalaemia in these patients, particularly if they retain some residual renal function, if their diets are over-restricted or during periods of poor food intake.

In renal failure there is an increase in faecal potassium losses, which becomes an important source of potassium removal from the body (23). Constipation should be avoided or treated promptly to assist overall control over serum potassium. Conversely diarrhoea may result in increased potassium losses.

When managing hyperkalaemia due to under-dialysis, dietary restriction should only ever be considered a short-term solution to avoid compromising nutritional adequacy and quality of life in the longer term.

Implementation

The dietitian/nutrition advisor will:

- Identify any non-dietary causes of hyperkalaemia in liaison with the multi-professional team. These should be corrected if possible.
- Explain the importance of controlling serum potassium levels.
- Ensure that the potassium restriction does not compromise overall nutritional adequacy of the diet.

- Advise on an appropriate intake of potassium using the following guidelines:

  2000-2500mg (50-65mmol) potassium per day

  NB. These amounts are based on the average sized patient (60-80kg) and may need adjusting for patients with a body weight outside this range

- Inform the patient about the acceptable serum levels of potassium (agreed locally).
- Advise the patient on dietary sources of potassium, which foods can be taken freely, which can be eaten in moderation and those that should be avoided.
- Advise the patient on methods of food preparation that will reduce potassium content, if appropriate.

Outcome Measures

- The patient is able to identify dietary sources of potassium, which foods can be taken freely, which can be eaten in moderation and any foods that should be avoided.
- The patient is able to identify methods of food preparation that will reduce potassium content, if appropriate.
- The patient maintains acceptable serum potassium levels providing that no non-dietary causes of abnormal serum potassium levels have been identified and corrected.

3.5 Sodium and Fluid Management

Statement The dietitian/nutrition advisor will advise the peritoneal dialysis patient on a sodium intake of 1800-2500mg/day (80-110 mmol/day) and a fluid allowance of 800ml plus a volume equal to daily urine output (Evidence & Agreed Best Practice).

Objective

To ensure that all peritoneal dialysis patients receive advice to control their dietary intake of sodium and fluid whilst maintaining overall nutritional adequacy of the diet.

Rationale

In health, the kidneys help to maintain normal osmolarity and volume of body fluids through the excretion of sodium and water.

In peritoneal dialysis the primary means of controlling fluid balance is by ultrafiltration and a reduced dietary fluid intake. Peritoneal membrane characteristics determine the patient's ability to ultrafiltrate and will need to be taken into account when prescribing individualised fluid allowances.

Dietary sodium restriction is important for the regulation of sodium and fluid balance and for the control of fluid intake by reducing thirst (28).

Fluid overload is usually treated by increased ultrafiltration through the use of hypertonic exchanges. The over-reliance on hypertonic solutions to control the symptoms of fluid overload is associated with an increased glucose load upon the body. This increases the risk of obesity, hypertriglyceridaemia and damage to the peritoneal membrane. Therefore, the patient should be advised on the control of fluid intake rather than using hypertonic solutions to prevent the accumulation of fluid.

Implementation

The dietitian/nutrition advisor will:

- Advise on the appropriate sodium and fluid allowances using the following guidelines

Sodium	1800-2500mg/day (80-110 mmol/day)
Fluid	800ml + volume equal to daily urine output (includes only foods that are liquid at room temperature and those with a high fluid content that are set e.g. tea, coffee, yoghurt, jelly, gravy, soup). The ultrafiltration capacity of each patient will need to be taken into account.

- Explain the effect of renal failure on fluid balance and the consequences of fluid overload and dehydration.
- Explain the benefit of a reduced sodium intake in controlling thirst and fluid intake
- Define ideal weight, dry weight and actual weight for the benefit of the patient (definitions should be standardised within the renal team).

Outcome Measures

- Weight gain is within recommended limits.
- The patient is able to state their individualised fluid allowance.
- The patient is able to state the benefit of limiting their sodium/fluid intake.
- The patient can identify which foods should be avoided due to their high sodium/fluid content.
- The patient can identify methods of food preparation that help to limit sodium/fluid intake.
- The patient is able to measure and report their 24-hour urinary output, monthly or when required.
- The patient can state their 'dry' ideal and actual body weights and explain the differences between these measures.

3.6 Vitamins & Minerals

Statement The dietitian/nutrition advisor will ensure that the dietary intake of vitamins and minerals in the peritoneal dialysis patient is adequate and advise on supplements as required (Agreed Best Practice).

Objective

To ensure that all peritoneal dialysis patients have an adequate intake of vitamins and minerals and receive supplementation if required.

Rationale

The vitamin and mineral status of peritoneal dialysis patients remains a controversial topic. There is inconclusive evidence on issues such as the magnitude of the losses during dialysis and the effect of renal disease and failure on requirements. There are several factors that may lead to a micronutrient deficiency. Water-soluble vitamins are removed during peritoneal dialysis, although this may be offset by reduced urinary losses and reduced renal catabolism of certain vitamins and minerals. Anorexia, co-morbid conditions or therapeutic dietary restrictions resulting in an unpalatable diet, may lead to poor food intake and an inadequate intake of vitamin and minerals. Drug-nutrient interactions may also contribute to deficiencies (29).

In some renal units there are already protocols for routine supplementation of vitamins and minerals. Vitamin D analogues are medically prescribed to treat renal osteodystrophy if necessary. Iron and folate monitoring and supplementation are an integral part of anaemia management (30). At this time it would seem prudent to ensure that local recommended daily allowances for vitamins and minerals are achieved in the haemodialysis population.

Implementation

The dietitian/nutrition advisor will:

- Ensure that the diet is free from any inappropriate dietary restrictions, liasing with the multi-professional team as required.
- Take into account any potential effect on vitamin and mineral intake and make appropriate recommendations when prescribing restrictive diets.
- Use clinical and laboratory investigations to confirm suspected vitamin and mineral deficiencies.

Outcome Measures

- The patient is free from any biochemical, clinical or other signs of vitamin and mineral deficiencies.
- The patient is following only those dietary restrictions that are clinically indicated.

4.0 Introduction to Diet for the Pre-dialysis Patient

Scope	Stable patients with chronic renal failure who are approaching end-stage renal failure but for whom dialysis is not yet indicated.

It is known that anorexia is a common symptom of chronic renal disease and patients are at risk of malnutrition as a result of inadequate nutritional intake. Metabolic changes in chronic renal failure (CRF) also contribute to the development of malnutrition in this patient group. Malnutrition in CRF patients has been shown to be a strong predictor of both morbidity and mortality. Preservation of nutritional status is of primary importance as loss of lean body mass is difficult to reverse, even after the initiation of dialysis.

Therefore, dietary intervention in this group is important to ensure the overall adequacy of the diet in order to maintain good nutritional status. It also aims to limit the intake of specific nutrients in an attempt to control the accumulation of waste products. More specifically, the diet has several important functions:

- To limit the build up of waste products e.g. urea, phosphate, potassium.
- To prevent metabolic complications e.g. renal bone disease, anorexia, obesity.
- To attempt to delay the progression of renal failure in certain patient groups.
- To maintain nutritional status.

These guidelines include recommendations on the nutritional requirements of energy, protein, phosphorous, potassium, fluid, sodium, vitamins and minerals in pre-dialysis patients.

4.1 Energy

Statement The dietitian/nutrition advisor will advise the pre-dialysis patient on an appropriate energy intake of 35kcal/kg IBW/day (Evidence & Agreed Best Practice).

Reduced intakes (30-35kcal/kg IBW/day) may be appropriate in the elderly and patients with reduced activity (Agreed Best Practice).

Objective

To ensure that all pre-dialysis patients achieve the recommended energy intake for the individual. A target of 35kcal/kg IBW/day will ensure that the majority of patients meet their energy requirements. A reduced target of 30-35kcal/kg IBW/day may be appropriate in the elderly and patients with reduced activity.

Rationale

It is important to accurately assess energy requirements in order to prescribe an adequate energy intake and to promote an optimal body weight and prevent malnutrition. Adequate energy intake is important in achieving a positive nitrogen balance particularly if protein intake is restricted (41).

The requirements of stable non-catabolic patients with chronic renal failure in the pre-dialysis stage are thought to be similar to that of the general population (2). Energy requirements in certain individuals, such as the elderly and those with low activity levels, are likely to be reduced to 30kcal/kg IBW /day (4).

The pre-dialysis patient is at high risk from malnutrition. There is evidence to show that many patients with chronic renal failure spontaneously reduce their energy intake as glomerular filtration rate (GFR) decreases (42). The failure to maintain energy intake may be due to several factors including anaemia, anorexia, nausea, fatigue, restrictive therapeutic diets, co-morbid diseases and psychosocial factors. Malnutrition in these patients is difficult to treat and has a significant impact on mortality and morbidity on dialysis (43). Early intervention and regular dietetic review are required to overcome these obstacles and prevent malnutrition and its consequences.

Implementation

The dietitian/nutrition advisor will:

- Advise the patient on how to achieve an appropriate energy intake.
- Estimate energy requirements as 35kcal/kg IBW/day for non-catabolic patients [Appendix I]. A reduction in energy requirements to 30kcal/kg IBW/day may be appropriate in the elderly and patients with reduced mobility.

NB. In certain renal units alternative methods of calculation of energy requirements such as the use of Schofield equations to estimate basal metabolic rate may be preferred (11).

Outcome Measures

- The dietitian/nutrition advisor will regularly assess the patient's energy intake in relation to their estimated energy requirements.
- The nutritional status of the patient will be regularly assessed and monitored to ensure that estimated energy requirements are appropriate for that individual.
- The patient is able to state sources of energy in their diet and how to achieve the recommended energy intake.

4.2 Protein

Statement The dietitian/nutrition advisor will advise the pre-dialysis patient on a dietary protein intake of 0.6-1.0g/kg IBW/day for active, non-catabolic patients (Evidence & Agreed Best Practice).

Objective

To ensure that all active, non-catabolic, pre-dialysis patients achieve a protein intake of between 0.6 – 1.0/kg IBW/day. To ensure that patients who are advised to reduce their intake to below 0.8/kg IBW/day are provided with adequate follow-up by trained renal dietitians due to the increased risk of malnutrition.

Rationale

Chronic renal failure is associated with abnormalities in protein and amino acid metabolism that may influence the dietary requirements of these nutrients (44,45). Co-morbid conditions such as diabetes, infection and malignancy may impose additional metabolic stress.

Many patients with chronic renal failure demonstrate a spontaneous reduction in protein intake with advancing renal failure (46). This, combined with an inadequate energy intake, will result in a negative nitrogen balance and muscle wasting (2,41,45). Therefore, many patients will require intervention to achieve adequate intakes of both protein and energy (Guideline 4.1).

There is some evidence indicating that initiation of a low protein diet may reduce the rate of progression of renal failure in certain patients (47,48). However, the literature is somewhat inconclusive and these diets are often difficult to achieve and are associated with deterioration in nutritional status (49-51). In many European centres an intake of 0.6 g/kg/day is used. Others recommend a 'controlled' protein intake of 0.8-1.0g/kg/day due to concerns about the increased risk of malnutrition associated with the more restrictive diets (52).

Therefore, when using low protein diets in pre-dialysis patients, it is important to be aware of the need for adequate monitoring of dietary intake and nutritional status by trained renal dietitians. A low protein diet of below 0.8g/kg/day should provide at least 55% of protein as high biological value to ensure an adequate intake of essential amino acids (53). An adequate energy intake is required to achieve a positive nitrogen balance (Guideline 4.1).

Implementation

The dietitian/nutrition advisor will:

- Advise the patient on how to achieve a protein intake of 0.6 – 1.0g/kg IBW/day [Appendix I]. Patients who are prescribed a protein intake of below 0.8g/kg IBW/day will be regularly reviewed by a trained renal dietitian to ensure adequacy of the diet and reduce the risk of malnutrition.

- Give individualised advice on suitable dietary sources of protein.
- Regularly assess and monitor the patient's protein intake in relation to their estimated protein requirements.

Outcome Measures

- The patient is able to state sources of protein in their diet and how to achieve the recommended protein intake.
- The nutritional status of the patient will be regularly assessed and monitored.
- Patients will not be prescribed a protein intake of below 0.8g/kg IBW/day unless they have access to a trained renal dietitian for regular assessment and monitoring.

4.3 Phosphorus

Statement The dietitian/nutrition advisor will advise the pre-dialysis patient on a phosphorus intake of 600 – 1000mg/day (19-32mmol/day) (Evidence & Agreed Best Practice).

Objective

To ensure that all pre-dialysis patients receive advice to maintain acceptable serum phosphate levels through dietary modification and the appropriate use of phosphate binding medication. The nutritional adequacy of the diet should be maintained.

Rationale

In health, the kidneys play a key role in regulating serum phosphate and calcium levels. Hyperphosphataemia is a common consequence of renal failure due to several factors including phosphate retention and altered metabolism.

Hyperphosphataemia contributes to the development of renal bone disease through the stimulation of parathyroid hormone production (19). There is also growing evidence of the effect of poor calcium and phosphate control on morbidity and mortality due to increased cardiovascular calcification (21).

Dietary phosphorus restriction is an essential part of controlling serum phosphate levels. The appropriate prescription (selection, dose and timing) of phosphate binders is equally important in controlling serum phosphate levels. However, difficulties with poor compliance and side-effects, including hypercalcaemia and adynamic bone disease, may be experienced.

A phosphorus intake of less than 800mg per day is unlikely to be achieved without restricting dietary protein intake to below 0.8g/kg IBW/day. Therefore this should not be attempted without regular review by a trained renal dietitian (Guideline 4.2).

Implementation

The dietitian/nutrition advisor will:

- Document medical factors, which may influence serum phosphate levels.
- Explain the importance of controlling serum phosphate levels.
- Ensure that the phosphorus restriction does not compromise overall nutritional adequacy of the diet.

- Advise on an appropriate intake of phosphorus using the following guidelines:

  600-1000mg (19-32mmol) phosphorus per day

  NB. These amounts are based on the average sized patient (60-80kg) and may need adjusting for patients with a body weight outside this range.

- Inform the patient about the acceptable serum levels of phosphate (agreed locally).
- Advise on the purpose and timing of phosphate binders where appropriate.
- Advise the patient on dietary sources of phosphorus, which foods can be taken freely, which can be eaten in moderation and those that should be avoided.
- Identify any non-dietary causes of hyperphosphataemia in liaison with the multi-professional team.

Outcome Measures

- The patient is able to identify dietary sources of phosphorus, which foods can be taken freely, which can be eaten in moderation and any foods that should be avoided.
- The patient is able to identify their phosphate binder and state the appropriate dose and timing.
- The patient maintains acceptable serum phosphate levels, although any non-dietary causes of abnormal serum phosphate levels should be identified and corrected.

4.4 Potassium

Statement The dietitian/nutrition advisor will advise the pre-dialysis patient on a potassium intake of 2000-2500mg/day (50-65mmol/day) (Agreed Best Practice).

Objective

To ensure that all pre-dialysis patients receive advice to maintain acceptable serum potassium levels through dietary modification. The nutritional adequacy of the diet will be maintained.

Rationale

In health, the kidneys plays a key role regulating serum potassium levels. In patients with renal insufficiency the control of dietary potassium is important in preventing hyperkalaemic episodes to reduce the risk of arrhythmias. It is also important to consider other factors that may affect serum potassium levels. These include the continued loss of residual renal function, ACE inhibitors, constipation, steroids, acidosis and catabolism (22). Conversely, there is also a potential for hypokalaemia in these patients, particularly in those on potassium-loosing diuretics with good residual capacity or poor dietary intakes

In renal failure, there is an increase in faecal potassium losses, which becomes an important source of potassium removal from the body. Constipation should be avoided or treated promptly to assist with serum potassium control (23). Conversely diarrhoea may result in increased potassium losses.

When managing hyperkalaemia due to delayed initiation of dialysis, dietary restriction should only ever be considered a short-term solution to avoid compromising nutritional adequacy and quality of life in the longer term.

Implementation

The dietitian/nutrition advisor will:

- Identify any non-dietary causes of hyperkalaemia in liaison with the multi-professional team. These should be corrected if possible.
- Explain the importance of controlling serum potassium levels.
- Ensure that the potassium restriction does not compromise overall nutritional adequacy of the diet.
- Advise on an appropriate intake of potassium using the following guidelines:

  2000-2500mg (50-65mmol) potassium/day

  NB. These amounts are based on the average sized patient (60-80kg) and may need adjusting for patients with a body weight outside this range.

- Inform the patient about the acceptable serum levels of potassium (agreed locally).
- Advise the patient on dietary sources of potassium, which foods can be taken freely, which can be eaten in moderation and those that should be avoided.
- Advise the patient on methods of food preparation that will reduce potassium content, if appropriate.

Outcome Measures

- The patient is able to identify dietary sources of potassium, which foods can be taken freely, which can be eaten in moderation and any foods that should be avoided.
- The patient is able to identify methods of food preparation that will reduce potassium content, if appropriate.
- The patient maintains acceptable serum potassium levels providing that no non-dietary causes of abnormal serum potassium levels have been identified and corrected.

4.5 Sodium and Fluid Management

Statement The dietitian/nutrition advisor will advise the pre-dialysis patient on a sodium intake of 1800-2500mg/day (80-110 mmol/day). The patient will be advised on a reduced fluid intake if oedematous or otherwise medically indicated (Evidence & Agreed Best Practice).

Objective

To ensure that all pre-dialysis patients receive advice to control their dietary intake of sodium whilst maintaining overall nutritional adequacy of the diet. This will include sodium supplementation for salt-losing conditions if necessary. To ensure that fluid intake is restricted if medically indicated.

Rationale

In health, the kidneys help to maintain normal osmolarity and volume of body fluids through the excretion of sodium and water. This ability occurs over the wide range of sodium intakes that may occur in normal diets.

In chronic renal failure, sodium excretion may not be adequate to maintain satisfactory sodium balance and control extracellular fluid (ECF) volume on higher sodium intakes. A high salt intake limits the efficacy of antihypertensive medication. Sodium restriction in combination with antihypertensive medication is therefore necessary for the control of ECF volume and blood pressure in these patients (28).

Fluid retention may be a problem in some patients and they will require individualised advice on fluid intake if medically indicated. In certain conditions excessive loss of sodium occur and sodium supplementation may be required.

Implementation

The dietitian/nutrition advisor will:

- Advise on the appropriate sodium and fluid allowances using the following guidelines:

Sodium	1800-2500mg/day (80-110 mmol/day)
Fluid	Restricted if required to a level as medically indicated

- Advise on the methods of food preparation that help to limit sodium/fluid intake.
- Explain the effect of renal failure on fluid balance and the consequences of fluid overload and dehydration.
- Explain the benefit of a reduced sodium intake in controlling blood pressure, thirst and fluid intake.

Outcome Measures

- The patient is able to state the benefit of limiting their sodium/fluid intake.
- The patient can identify which foods should be avoided due to their high sodium/fluid content.
- The patient can identify methods of food preparation that help to limit sodium/fluid intake.
- The patient is able to state their fluid allowance, if applicable.

4.6 Vitamins & Minerals

Statement The dietitian/nutrition advisor will ensure that the dietary intake of vitamins and minerals in the pre-dialysis patient is adequate and advise on supplements as required (Agreed Best Practice).

Objective

To ensure that all patients have an adequate intake of vitamins and minerals and receive supplementation if required.

Rationale

The vitamin and mineral status of pre-dialysis patients remains a controversial topic. There is inconclusive evidence on issues such as the magnitude of the effect of renal disease and failure on requirements.

There are several factors that may lead to a micronutrient deficiency. These include a spontaneous reduction in dietary intake and the imposition of therapeutic diets. However, these may be offset to some extent by reduced urinary losses and reduced renal catabolism of certain vitamins and minerals. Drug-nutrient interactions may also contribute to deficiencies (29).

In some renal units there are already protocols for routine supplementation of vitamins and minerals. Vitamin D analogues are medically prescribed to treat renal osteodystrophy if necessary. Iron and folate monitoring and supplementation are an integral part of anaemia management (30). At this time it would seem prudent to ensure that local recommended daily allowances for vitamins and minerals are achieved in the pre-dialysis population.

Implementation

The dietitian/nutrition advisor will:

- Ensure that the diet meets requirements for protein and energy intake.
- Ensure that the diet is free from any inappropriate dietary restrictions, liasing with the multi-professional team as required.
- Take into account any potential effect on vitamin and mineral intake and make appropriate recommendations when prescribing restrictive diets.
- Use clinical and laboratory investigations to confirm suspected vitamin and mineral deficiencies.
- Advise the multi-professional team on the need for vitamin/mineral supplementation as appropriate.

Outcome Measures

- The patient is free from any biochemical, clinical or other signs of vitamin and mineral deficiencies.
- The patient is only following those dietary restrictions that are clinically indicated.

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APPENDIX 1. Estimation of Ideal Body Weight

Statement The dietitian/nutrition advisor will calculate Ideal Body Weight (IBW) as a Body Mass Index (BMI) in the range for males and females 20 –25 kg/m^2.
For those patients who are underweight (BMI<20) IBW is estimated as a weight equivalent to BMI 20. For those patients who are overweight (BMI>25) IBW is estimated as a weight equivalent to BMI 25 (Agreed Best Practice).

Objective

To ensure that ideal body weight (IBW) is individually estimated for all patients based on the calculation of body mass index (BMI). When calculating IBW to use a weight equivalent to BMI 20 for patients whose BMI is below 20 and a weight equivalent to BMI 25 for patients whose BMI is above 25. For patients whose weight is equivalent to a BMI between 20 and 25 that weight should be considered to be the IBW.

Rationale

IBW is used to calculate individual requirements for energy, protein and other nutrients. Therefore it is important to standardise the method of estimating IBW. The measurement of body weight is complicated by the accumulation of fluids. Therefore, estimation of actual body weight should take into account the degree of fluid overload or depletion. This should be assessed with the help of an experienced renal clinician.

Implementation

- IBW will be estimated from an accurate measure of height and weight using the BMI.
- BMI will be calculated using the following formula: BMI = weight (kg) / height^2 (m)
- For those patients who are underweight (BMI<20) IBW is estimated as a weight equivalent to BMI 20. For those patients who are overweight (BMI>25) IBW is estimated as a weight equivalent to BMI 25.
- Example calculations of IBW:
  - i) Dry weight = 60kg, Height = 1.65m. BMI = 60 /1.65^2 = 22.
    BMI is between 20-25, therefore IBW = actual weight = 60kg
  - ii) Dry weight = 95kg, Height = 1.65m. BMI = 95 /1.65^2 = 36.
    BMI>25, therefore IBW = BMI 25 = 68kg

Outcome Measures

- Weight is assessed by the recommended method
- All publications containing body weight and IBW should state the methods used to calculate it.