Renastep™

A practical guide to the use of Renastep™ as part of the dietary management of paediatric kidney disease

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Supporting education in the dietary management of rare diseases

Important information

This practical guide is for the use of **Renastep**. It should be read in conjunction with the Kidney Disease Outcome Quality Initiative Clinical Practice Guidelines for Nutrition in Children with CKD: 2008 Update[1] and the Clinical Practice Recommendations published by the Pediatric Renal Nutrition Taskforce[2-4].

This practical guide is for use by healthcare professionals working with children and young people diagnosed with kidney disease.

- It is **not** for **parents/caregivers** of children with kidney disease or **patients with kidney disease**.
- **It is for general information only and must not be used to replace professional medical advice.**

Product information

Renastep is a Food for Special Medical Purposes and must be used under medical supervision.

Renastep is a ready to use feed for the dietary management of kidney disease from 3 years of age onwards. It is not suitable as a sole source of nutrition. Regular monitoring of nutritional status and electrolyte levels is required. **Renastep** contains **milk** and **fish**. **Renastep** is Halal certified.

Any product information contained in this practical guide, although accurate at the time of publication, is subject to change. The most current product information may be obtained by referring to product labels and **www.vitafloweb.com**.

Introducing and adjusting **Renastep** is dependent on the individual patient. Practical examples are given in this guide; however, it is the responsibility of the managing healthcare professional to use clinical judgement to introduce and adjust **Renastep** in the most appropriate way for individual patients. It may not always be appropriate to refer to this practical guide.

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Foreword

Children with kidney disease often struggle to meet their nutritional requirements due to:

i) symptoms such as nausea, vomiting, taste changes and a reduced appetite;

ii) multiple dietary restrictions (potassium, phosphate, salt, fluid) to help maintain plasma biochemistry[1, 5].

This can lead to malnutrition, poor growth and consequently a negative impact on quality of life[1]. Many children with CKD require nutritional support including oral nutritional supplements or tube feeding to meet nutritional requirements[5].

Optimising nutrition can improve growth and reduce mortality for children with chronic kidney disease (CKD)[6].

Up to now, there has been no ready to use feed specifically designed for children aged 3 years onwards with kidney disease.

Current dietetic practice for children aged 3 years and over involves either prescribing a powdered food for special medical purposes, in variable concentrations, or manipulating a renal feed formulated for adults to construct a modular feed. This may involve addition of carbohydrate or fat modules to meet the individual requirements of a paediatric patient with CKD. For example, in older children modular feeding recipes may include multiple scoops of a product needing to be used which can be time consuming, complicated and there is a risk of preparation error leading to over or under concentration of key nutrients[7]. Therefore, calculation and preparation of feeds for this patient group has been complex, time consuming and often stressful for the child and their family.

Renastep is a ready to use, high energy, low volume liquid feed which contains protein, carbohydrate, fat, vitamins, minerals and trace elements and docosahexaenoic acid (DHA) with low levels of potassium, phosphorus, calcium, chloride and vitamin A. It provides 200kcal and 4.0g protein per 100ml and can be used at all stages of kidney disease. The amount needed will depend on the patient's age, nutritional requirements, biochemistry and level of kidney function.

Renastep is not intended to be used as a sole source of nutrition due to the reduced levels of specific nutrients and should be titrated with standard feeds or used alongside oral diet with close monitoring of electrolytes.

This practical guide has been developed to explain the practical use of **Renastep** for children aged 3 years onwards with kidney disease.

Caroline Anderson

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1.0 Introducing Renastep

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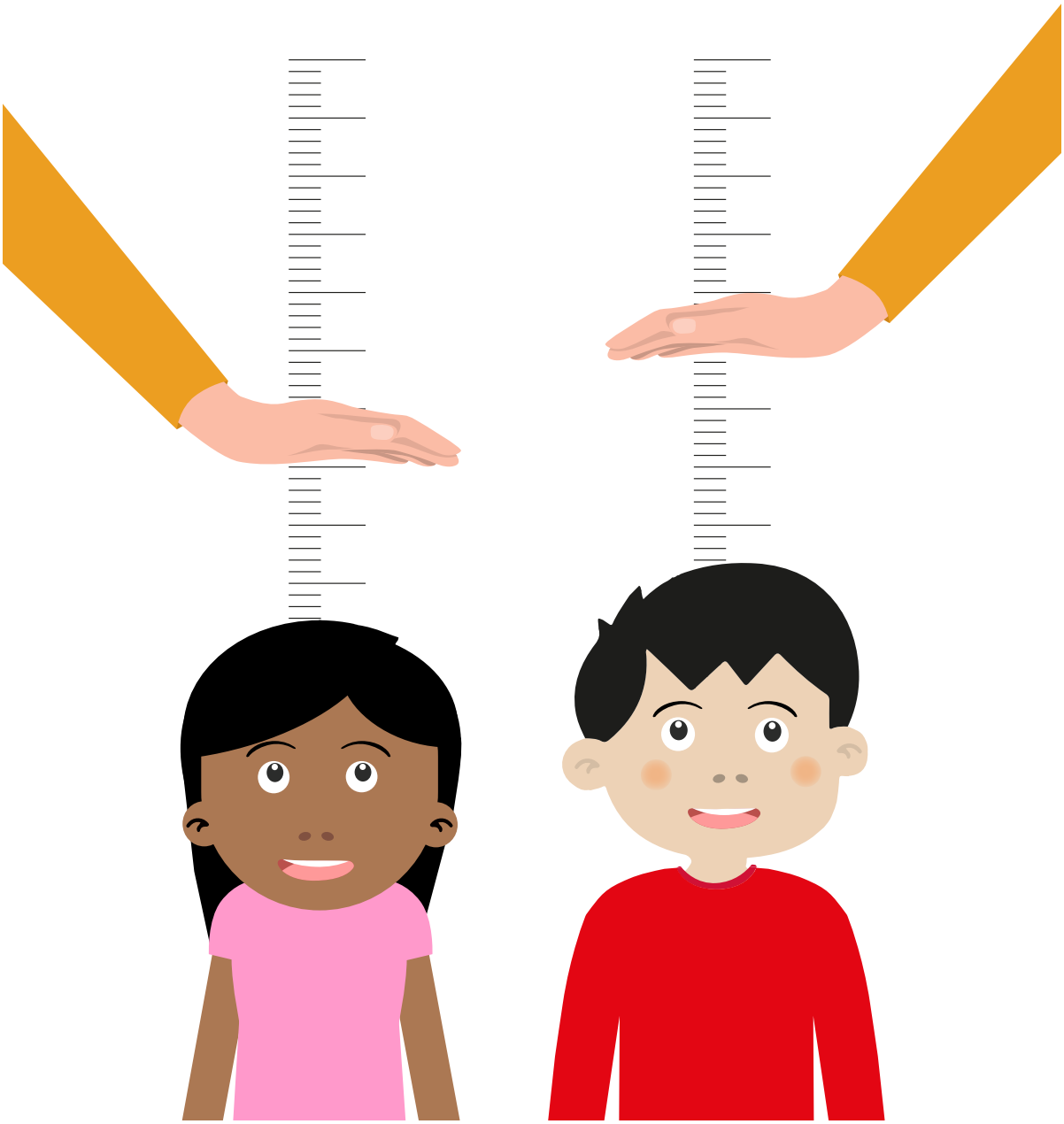
Kidney disease has a significant effect on metabolism and nutritional intake[1,5]. Optimising nutritional intake at all stages of chronic kidney disease, and at all ages of childhood, is important to ensure adequate growth and to prevent long term complications[5].

Normal growth and development is a key goal of paediatric CKD management. However, due to the often restrictive nature of the diet prescribed for patients with CKD, it can be difficult to achieve an adequate nutritional intake that provides sufficient energy, protein and micronutrients to support growth as well as manage biochemistry[5].

Poor growth in children with CKD is associated with worse clinical outcomes, increased hospitalisation, low school attendance, a negative impact on quality of life and mortality[8-11]. Early and appropriate nutritional intervention may improve both growth and mortality in CKD patients[1,6].



The need for Renastep: a paediatric, renal-specific, ready to use feed

To help reduce dietary potassium and/or phosphate intake, support kidney function and meet specific nutritional requirements, a specialised feed for the management of kidney disease is often needed[1, 5, 12-14]. This feed may be used alongside oral diet or titrated with standard enteral feeds.

Renastep has been developed in line with globally recognised evidence-based guidelines for the nutritional management of paediatric kidney disease; The Kidney Disease Outcome Quality Initiative Clinical Practice Guidelines for Nutrition in Children with CKD; 2008 Update[1] and expert opinion from leading UK Paediatric Renal Dietitians.

Renastep is a ready to use, high energy, low volume liquid feed, containing protein, carbohydrate, fat, vitamins, minerals, trace elements and docosahexaenoic acid (DHA). It contains low levels of potassium, phosphorus, calcium, chloride and vitamin A. **Renastep** has been specifically designed for use in the dietary management of kidney disease for children aged 3 years onwards through its specific nutritional formulation, sensory properties and packaging design.

Renastep can be used in Chronic Kidney Disease (CKD) and Acute Kidney Injury (AKI).

The treatment of kidney disease in children is multifaceted therefore the use of **Renastep** should be carried out in conjunction with appropriate members of the Paediatric Renal Team including a renal dietitian, nephrologist and dialysis nurse. Modification of food and/or feed is typically the first line management for hyperkalemia and hyperphosphatemia in children with kidney disease[5]. Other treatments may be used in conjunction with food and/or feed modification including medications, fluid management and dialysis prescriptions[1, 5].

Regular monitoring of nutritional status and electrolyte levels is required. The amount of Renastep needed will be determined by the clinican or dietitian and is dependant upon the age, body weight and medical condition of the patient.

1.0 Nutritional profile of Renastep

Energy

Poor nutrition is a common cause of poor growth in children with CKD[1, 5]. It is recognised that there are several factors which may contribute to a poor energy intake in children with CKD including poor appetite, nausea, vomiting, altered taste sensation and dietary restrictions[1, 5].

The Pediatric Renal Nutrition Taskforce (PRNT) recommend that, in children who are experiencing poor weight gain and linear growth, energy intakes should be at the upper end of the Suggested Dietary Intake (SDI) in order to promote optimal growth[2].

Renastep is high in energy (2kcal/ml) enabling nutritional requirements to be met in a small volume. This is of benefit to those patients who are following a fluid restriction[15].

Protein

Protein requirements for children with CKD vary[2]. The PRNT suggest that the target protein intake in children with CKD 2-5 and on dialysis should be at the upper end of the SDI[2]. However, they also note that children with persistently high blood urea levels may require protein intakes closer to the lower end of the SDI[2].

Renastep has a tailored level of protein (2g per 100kcal) to ensure protein requirements are met to optimise growth, without exceeding requirements.

Micronutrients

Renastep has a tailored micronutrient content specific for children aged 3 years of age onwards with kidney disease which enables individuals to meet nutritional requirements[16] when dietary intake is poor as a result of kidney disease.

For children who are having enteral feeds, the use of a renal-specific feed is the preferred option to reduce dietary potassium intake[3].

Potassium

The adjustment of potassium intake in children with CKD is critically important as hyperkalemia can be life threatening[3].

Recently published clinical practice recommendations by the PRNT state that, in those children with persistent or recurrent hyperkalemia, the dietary intake of potassium needs to be managed. For children who are receiving a standard paediatric enteral feed, potassium intake should be reduced by using a renal-specific low potassium feed[3].

Renastep is a renal-specific feed with low levels of potassium compared to standard paediatric enteral feeds. **Renastep** is commonly used in conjunction with oral diet or with a standard paediatric enteral feed to reduce potassium intake whilst enabling energy, protein and micronutrient requirements to be met.

Renastep can be used alone (**in the short term only**) for the management of moderate to severe hyperkalemia. However it is important that electrolyte levels are monitored regularly[3].

Including **Renastep** as an oral nutritional supplement can promote greater flexibility with other oral intake, enabling a wider variety of foods to be consumed[3].

The PRNT suggest that, if a child has elevated serum potassium and phosphate levels and is struggling to meet their nutritional requirements [16], then a high energy paediatric renal specific nutritional supplement could be used to enable energy and protein requirements to be met, whilst managing serum potassium and phosphate levels[2].

Phosphorus

Renastep has low levels of phosphorus compared to standard paediatric enteral feeds and cow's milk to support the provision of a reduced dietary phosphate intake. This is commonly needed in the management of kidney disease to prevent long term complications, namely CKD mineral bone disease (CKD-MBD) and cardiovascular disease[4, 17]. **Renastep** can be used as an alternative to drinks which have higher levels of phosphorus, such as cow's milk, to provide additional energy and protein without excessively increasing potassium and phosphate intake[4].

Calcium

Calcium-based phosphate binders are often used to manage high serum phosphate levels[1]. **Renastep** has low levels of calcium compared to standard paediatric enteral feeds to accommodate the use of such binders, and thus can help to ensure calcium intakes do not exceed those recommended in the KDOQI guidelines[1, 4].

Vitamin A

Elevated retinol levels have been observed in children with CKD stages 2-5D and are associated with hypercalcemia[18]. Renastep is low in vitamin A compared to standard paediatric enteral feeds to enable the avoidance of excessive vitamin A intakes and potential risk of hypervitaminosis A[18].

Renastep can be used as an oral nutritional supplement or as a tube feed to help reduce potassium and phosphate intake, whilst ensuring energy, protein and micronutrient needs are met.

Table 1: Comparison of the key nutrients of Renastep, standard paediatric feed and energy dense paediatric enteral feed

Product	Energy (kcal) per 100ml	Protein (g) per 100ml	Protein (g) per 100kcal	Potassium (mg/mmol) per 100kcal	Phosphorus (mg/mmol) per 100kcal	Calcium (mg/mmol) per 100kcal	Sodium (mg/mmol) per 100kcal	Vitamin A (mcg RE/IU) per 100kcal
Renastep	200	4.0	2.0	17.5/0.45	17.5/0.5	23/0.6	42/1.8	19.5/65
Standard paediatric enteral feed[1]	100	2.8	2.8	110/2.8	53/1.7	56/1.4	60/2.6	45/150
Energy dense paediatric enteral feed[2]	150	4.0	2.7	110/2.8	50/1.6	60/1.5	60/2.6	41/137
Adult standard enteral feed[3]	101	4.0	4.0	148/3.8	68/2.2	68/1.7	88/3.8	108/360

1. Source: Calculated from manufacturer's data regarding a standard paediatric enteral feeds (1kcal/ml) widely available in the UK.
2. Source: Calculated from manufacturer's data regarding an energy dense paediatric enteral feeds (1.5kcal/ml) widely available in the UK.
3. Source: Calculated from manufacturer's data regarding an adult standard enteral feeds (1kcal/ml) widely available in UK.

1.0 Other features of Renastep

Palatable

Renastep has a mild vanilla flavour which takes into account both the taste preferences of children and the taste changes associated with kidney disease[19].

Convenient

Renastep is a liquid feed and therefore is ready to use. This format reduces the complexity, burden for caregivers and risk of errors in preparation, which are associated with mixing multiple feeds and/or powdered products[7].

Renastep is packaged in a 125ml bottle which is convenient and portable, facilitating the dietary regime of children aged 3 years onwards when attending nursery or school.

2.0 Using Renastep in clinical practice

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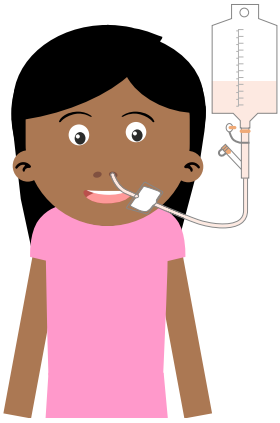
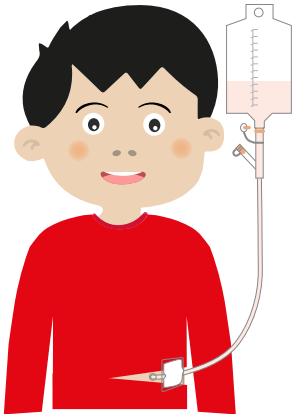
Renastep is designed to be used when hyperkalemia and / or hyperphosphatemia are present and when nutrition support is needed. **Renastep** can be taken orally or via an enteral feeding tube.

Fluid and electrolyte requirements will vary depending on the individual requirements of the patient. Restriction of fluids, sodium, potassium and phosphate are tailored to patients individual needs based on their nutritional requirements, biochemistry, fluid balance and residual kidney function.

Examples of using **Renastep** in different clinical scenarios:

Using Renastep in combination with other feeds via an enteral feeding tube:

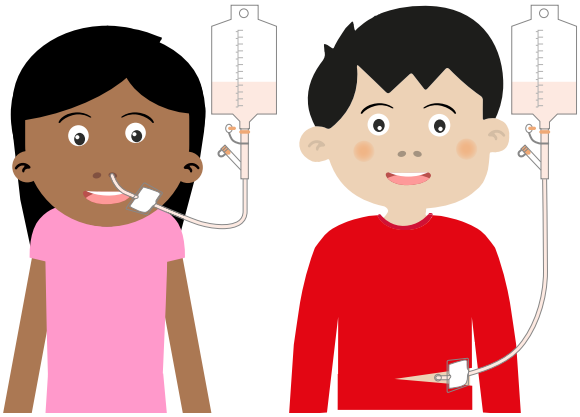




Renastep can be used in combination with standard paediatric enteral feeds given via an enteral feeding tube:

- The **aim** is to keep plasma potassium and/or phosphate levels within the target range while providing the estimated nutritional requirements for growth.
- **Renastep** may be mixed with a standard feed. For example, half of the child's nutritional requirements could be met using **Renastep** with the other half being met using the standard enteral feed.
- In some cases **Renastep** may be used alone in the **short term only** to reduce a high potassium level. This requires **close** monitoring to ensure potassium levels do not become too low.
- If **Renastep** is being used to help reduce **phosphate** intake only, potassium and calcium levels need to be monitored **closely** and the diet adjusted to include more potassium or calcium if needed.

Using Renastep as a supplementary enteral tube feed in combination with a less restrictive oral diet:



Renastep can also be used alongside oral intake to allow a less restrictive diet.

- The **aim** is to keep plasma potassium and/or phosphate levels within the target range. This is helpful for children who have a poor appetite. This can allow more flexibility with the oral diet.
- **Renastep** provides part of the individual child's nutritional intake.

Using Renastep as an oral nutritional supplement:

Renastep can be used as an oral nutritional supplement when nutrition support is needed and a dietary phosphate and/or potassium restriction is in place.

Renastep can be given in small volumes such as 30-40ml shots or as a drink. This can be useful in times of illness or reduced oral intake to help meet nutritional requirements.

- The **aim** is to give a nutritional top up in a convenient format, when needed, without the need for a NGT/G.
- One bottle (125ml) of **Renastep** provides 250kcal and 5g protein.

3.0 Clinician's considerations for the use of Renastep

3.0 Clinician's considerations for the use of Renastep

High plasma potassium (>5.0 mmol/L#) and nutrition support

Check alternative causes of the high serum potassium level

- Haemolysed blood sample
- Medication causes; for example, ACE* inhibitors/potassium sparing diuretics/ NSAIDs**/potassium chloride
- Treatment modality/dialysis clearance
- Potential acidosis and/or catabolism
- Absorption and excretion issues

Refer to specialist paediatric renal dietitian for assesment of

- Nutritional status and growth (potential for catabolism/acidosis)
- Nutritional requirements
- Current dietary intake from food, oral nutritional supplements and / or feeds for energy, protein and potassium content
- Compliance with current dietetic plan
- Psycho-social factors

Identify / diagnose issues with nutrition and biochemistry

- Such as raised serum potassium levels due to CKD
- Poor growth as evidenced by static weight/growth chart due to inadequate energy and protein intake secondary to CKD symptoms

Plan

- Agree a plan that meets the child's, family/carer's healthcare needs
- Adjust oral food/nutritional supplement/enteral feed plan to reduce potassium content
  - Consider introduction of **Renastep** as an oral nutritional supplement alongside potassium restricted diet or
  - Consider introduction of **Renastep** mixed with standard enteral feed as a supplementary feed
- Provide education and support on how to reduce dietary potassium intake from foods, supplements and / or feed. May also need education on a high energy diet for nutrition support.
- Provide an appropriate written plan and agree follow up monitoring

Monitor

- Clinical status and biochemistry - particularly potassium and phosphate levels
- Calcium, sodium, vitamin and mineral status
- Growth
- Compliance and tolerance of oral/enteral feeding plan advised, assess if current plan is being achieved, if not why?
- Adjust feeding plan if required and provide an updated written plan
- Agree clear monitoring plan

Hyperkalemia is defined as serum potassium level above 5.0 mmol/L in children and adolescents[3].
* ACE inhibitors = Angiotensin-converting enzyme inhibitors.
** NSAIDs = Nonsteriodal anti-inflammatory drugs.

4.0 Summary

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What do we know about nutritional management of CKD in children?

- Optimising nutritional management at all stages of CKD is important to ensure adequate growth, development and to reduce the risk of long term complications[1, 5].
- Nutritional management of children with CKD requires a multidisciplinary team approach and regular monitoring is key.
- Feeding regimes used in this patient group can often be complex. A ready to use liquid feed may reduce the complexity and burden associated with feed preparation.

What does this guide add to the nutritional management of children with CKD?

This guide provides practical guidance on how to use **Renastep**, a ready to use, high energy, low volume nutritional supplement specifically designed for use in the dietary management of kidney disease for children aged 3 years onwards.

For more information on paediatric kidney disease and educational resources refer to Vitaflo's website for Healthcare Professionals called VIA; **www.vitaflo-VIA.com**

5.0 References

5.0 References

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6.0 Reflective learning questions

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Q1. Why is optimal nutritional management of CKD in children important?

Q2. Describe the key nutrients to be assessed in the diet in CKD?

Q3. What biochemistry should you monitor in a patient with CKD?

Q4. How can Renastep be used in the management of CKD? What are the benefits of using Renastep?

Q5. What are your key learning points from reading this guide?

Q6. How will you use the information in this guide to change or add to your current clinical practice? Does the information in the guide highlight any strengths in your clinical practice? Are there any areas for improvement?

Q7. Are there any areas you would like further information on? What is your action plan to find this information?

Notes

This information is intended for Healthcare Professionals only

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