

# Vomiting in Infants with CKD

## A clinical challenge

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**Adequate nutrition is essential in the growth and development of infants, and it is a vital part of chronic kidney disease (CKD) management in this patient group. It is known that malnutrition can lead to protein-energy wasting, increased morbidity and mortality, and is also associated with worsening uremic symptoms.<sup>1</sup> Vomiting frequently occurs in infants with CKD<sup>2, 3</sup> and persistent vomiting can negatively impact upon growth due to the overall reduction in energy intake. Inadequate fluid intake, if not managed promptly, can result in dehydration, which can negatively impact upon an infant's kidney function and increase the risk of an acute kidney injury. Vomiting can also result in electrolyte imbalances which further complicates the medical management of CKD. It is known that persistent vomiting in infancy can lead to learned food aversions.<sup>4</sup> It has also been acknowledged that parents/carers of infants with CKD and feeding difficulties (e.g. vomiting, food refusal) can experience frustration and anxiety in feeding their infants.<sup>5</sup> This article provides an overview of the challenges faced by paediatric nephrologists, paediatric renal dietitians and parents/carers in managing vomiting and nutrition in infants with CKD.**

### Causes of vomiting in infants with CKD

The causes of vomiting in infants with CKD are multifactorial and includes gastro-oesophageal reflux (GOR), the need to concentrate feeds in oliguric infants,<sup>3</sup> delayed gastric emptying,<sup>2</sup> accumulation of cytokines and hormones that affect appetite and satiety (e.g. interleukin-1, interleukin-6, tumour necrosis factor- $\alpha$ , leptin, ghrelin)<sup>5</sup> and abdominal fullness from indwelling peritoneal dialysate in infants requiring peritoneal dialysis.<sup>6</sup> Additional potential contributors to vomiting in infants with CKD include constipation, polypharmacy, hyponatraemia and dehydration.

The National Kidney Foundation Kidney Disease Outcomes Quality Initiative in the US highlighted that infants with polyuric salt wasting forms of CKD may experience vomiting if their sodium and water losses are not corrected.<sup>7</sup> In one study of 24-hour oesophageal pH monitoring,<sup>8</sup> GOR occurred in 73% of infants with CKD who had poor oral

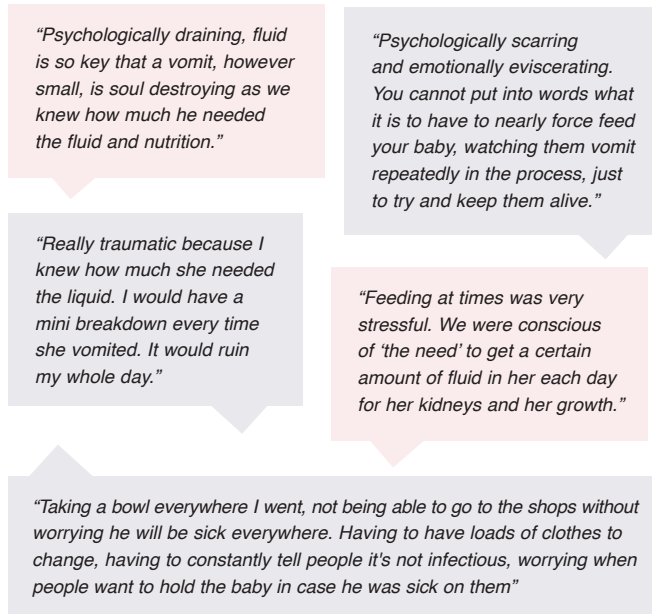
intake and vomiting. However, it has been acknowledged that many children with CKD will continue to vomit despite optimising anti-reflux medications.<sup>6</sup> Our experience in managing vomiting in infants with CKD has also shown that treating reflux and gut motility disorders with proton pump inhibitors and prokinetics is rarely enough, indicating that there are likely to be other underlying factors contributing to this.

### Feedback from parents/carers

A key aspect in the management of vomiting in infants with CKD is to have an understanding of parental/carer experiences and perspectives to be able to better support them and improve the quality of clinical care. In 2022, we completed an electronic survey with parents/carers attending our paediatric CKD clinics to obtain their feedback on perceived causes of vomiting and the impact this vomiting had, not only on their baby, but also on themselves.

Amongst the main reported perceived contributors to vomiting were dehydration, coughs and colds, position when feeding and fluid intake (too much or too little). Several parents/carers reported that feeding their baby took longer as a result of the vomiting, whilst another noted that *“the initial vomiting made him distressed”* and also *“made him not want to drink”* his milk. The feedback from parents/carers on the impact that their baby’s vomiting had on them was profound and is highlighted in **Figure 1**.

**Figure 1: Parent/carer feedback – the impact of vomiting**



## Feedback from UK paediatric renal dietitians

In addition to understanding parental/carer experiences, we also sought to understand the current practices in managing vomiting in infants amongst paediatric renal dietitians in each of the 13 UK paediatric renal centres. In 2022 we completed an electronic survey to identify what impact paediatric renal dietitians felt that vomiting had on infants with CKD, their parents/carers, as well as current practices used to overcome vomiting in this patient group.

The responses received with regards to the impact of the vomiting on parents/carers were similar to those reported by parents/carers themselves. Paediatric renal dietitians noted vomiting in this patient group led to increased feeding times, anxiety/worry about missed feeds and the impact this had upon growth, the added burden of pump feeds, as well as the burden of multiple clothes changes to their daily routine. Paediatric renal dietitians also felt that uncontrolled vomiting in these infants often led to a sense of isolation, loneliness and an impact upon social interactions for parents/carers.

Paediatric renal dietitians reported that parents/carers, understandably, may be averse to feed changes or to giving solids to their baby due to the risk of vomiting. The main concerns reported by paediatric renal dietitians regarding the impact that vomiting had on infants with CKD included a negative impact upon growth (80%), oral aversions with a

negative impact upon weaning (80%), a negative impact upon the infant’s renal blood results (20%) (e.g. blood creatinine, urea and potassium levels), and delayed milestones.

## Strategies to help manage vomiting in infants with CKD

There are numerous medical and dietetic strategies that can be utilised in the management of vomiting in infants with CKD. Giving smaller and more frequent feeds,<sup>6,9</sup> concentrating the formula with the aim of reducing the feed volume<sup>1,7,9</sup> and continuous enteral feeding to slow the delivery of feeds<sup>6,9</sup> have been suggested to help manage vomiting in this patient group. In addition, optimising fluid intake as water either added to feeds and/or given separately, may help in the management of vomiting.<sup>10</sup> In our paediatric renal centre, we monitor the fluid intake in infants with CKD on a regular basis and increase their fluid intake when modifying their oral or enteral feeds, in line with their weight gain, to help reduce the risk of vomiting and to help maintain weight gain.<sup>10</sup>

In our survey, the main interventions or strategies that UK paediatric renal dietitians use or discuss with their paediatric renal teams to help manage vomiting, included: reducing the volume of each feed, giving more frequent feeds (100%), gastrostomy tube feeding (88%), continuous enteral feeds (88%), changes to feed positioning during and after feeding (88%) and concentrating feeds (55%). To a much lesser extent, the use of thickeners added to feeds (43%) and jejunal tube feeding (42%) were options considered or discussed with the paediatric renal teams. From their experiences, paediatric renal dietitians in the UK felt that the most successful interventions for the management of vomiting in this patient group were gastrostomy tube feeding (90%), continuous enteral feeds (80%), changes to feed positioning during and after feeds (60%), and reducing the volume of each feed, giving more frequent feeds (60%). The least successful interventions reported by UK paediatric renal dietitians for the management of vomiting were the use of thickeners added to feeds (20%) and concentrating feeds (20%).

## In summary

Vomiting occurs frequently in infants with CKD, the cause of which is multifactorial and represents a challenge for paediatric renal teams, including paediatric renal dietitians, to manage. Persistent vomiting in infants with CKD can impact upon their weight gain, growth, feeding experiences and could lead to feeding difficulties, including a negative impact upon weaning. It can also result in electrolyte imbalances and inadequate fluid intake, which, if not managed promptly, can result in dehydration and can have a negative impact upon their kidney function.

Vomiting in infants with CKD also has a profound impact upon parents/carers, including increased stress/anxiety not only around feeding times but also with regards to their infant’s weight gain and kidney function. In our paediatric renal centre, we regularly monitor fluid intake in infants with CKD and increase their fluid intake when modifying their oral or enteral feeds, in line with their weight gain, to help reduce the risk of vomiting and to help maintain weight gain.

References: 1. Shaw V, et al. (2020). Energy and protein requirements for children with CKD stages 2-5 and on dialysis—clinical practice recommendations from the Pediatric Renal Nutrition Taskforce. *Pediatr Nephrol.*; 35(3): 519–531. 2. Rees L, Jones H. (2013) Nutritional management and growth in children with chronic kidney disease. *Pediatr Nephrol.*; 28(4): 527–536. 3. Rees L, Brandt ML. (2010). Tube feeding in children with chronic kidney disease: technical and practical issues. *Pediatr Nephrol.*; 25(4): 699–704. 4. Harris G, Blissett J, Johnson R. (2000). Food refusal associated with illness. *J Child Psychol Psychiatry.*; 5: 148–156. 5. Samaan S, Secker D. (2014). Oral Feeding Challenges in Infants with Chronic Kidney Disease: Assessment and Intervention. *ICAN: Infant, Child, & Adolescent Nutrition.*; 6(3): 164–171. 6. Rees L, et al. (2021) Delivery of a nutritional prescription by enteral tube feeding in children with chronic kidney disease stages 2–5 and on dialysis—clinical practice recommendations from the Pediatric Renal Nutrition Taskforce. *Pediatr Nephrol.*; 36(1): 187–204. 7. National Kidney Foundation Kidney Disease Outcomes Quality Initiative (K/DOQI). (2009). Clinical Practice Guideline for Nutrition in Children with CKD: 2008 Update. *Am J Kidney Dis.*; 53(3 Suppl 2): S1–104. 8. Ruley EJ, et al. (1989). Feeding disorders and gastroesophageal reflux in infants with chronic renal failure. *Pediatr Nephrol.*; 3: 424–429. 9. Shaw V, et al. (2023). Nutritional management of the infant with chronic kidney disease stages 2–5 and on dialysis. *Pediatr Nephrol.*; 38(1): 87–103. 10. Joyce T, et al. (2017). Optimizing fluid intake helps in the management of vomiting in infants and children with chronic kidney disease: a case series. Abstracts of the 50th Anniversary ESPN Meeting, Glasgow, September 2017. *Pediatr Nephrol.*; 32: 1643–1834.