Weight management strategies for those with chronic kidney disease: A consensus report from the Asia Pacific Society of Nephrology and Australia and New Zealand Society of Nephrology 2016 renal dietitians meeting

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Short title: Weight management consensus report

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Abstract

Title: Weight management strategies for those with chronic kidney disease – a consensus report from the Asia Pacific Society of Nephrology and Australia and New Zealand Society of Nephrology 2016 renal dietitians meeting

Aim: Develop a consensus report to guide dietetic management of overweight or obese individuals with Chronic Kidney Disease (CKD).

Methods: Six statements relating weight management in CKD guided a comprehensive review of the literature. A summary of the evidence was then presented at the renal nutrition meeting of the 2016 Asia Pacific Society of Nephrology and Australia and New Zealand Society of Nephrology. Majority agreement was defined as group agreement on a statement of between 50-74%, and consensus was considered ≥ 75% agreement. The recommendations were developed via a mini Delphi process.

Results: Two statements achieved group consensus: the current guidelines used by dietitians to estimate energy requirements for overweight and obese people with CKD are not relevant and weight loss medications may be unsafe or ineffective in isolation for those with CKD. One statement achieved group agreement: Meal replacement formulas are safe and efficacious in those with CKD. No agreement was achieved on the statements of whether there is strong evidence of benefit for weight loss prior to kidney transplantation; whether traditional weight loss strategies can be used in those with CKD and if bariatric surgery in those with end stage kidney disease is feasible and effective.

Conclusion: There is a limited evidence base to guide the dietetic management of overweight and obese individuals with CKD. Medical or surgical strategies to facilitate weight loss are not recommended in isolation and require a multidisciplinary approach with the involvement of a skilled renal dietitian.

INTRODUCTION

Obesity is an independent risk factor for and is associated with an increased incidence of CKD (1, 2). In 2011-2012 the Australian Institute of Health and Welfare reported that 63% of people with CKD were overweight or obese compared to 61% of those without CKD. It also showed among those with CKD, obesity increased rapidly with age; with the older age groups of 40-54 and over 50 years of age having double the prevalence of those aged 18-39 (3).

ANZDATA (Australia and New Zealand Dialysis and Transplant) Registry data shows the number of people at the time of first renal replacement therapy (RRT) with a Body Mass Index (BMI) indicating overweight or obese has been increasing over time. In 1980-1984 approximately 19% were overweight and 7% obese. Three decades later (2010-2014) the percentage of overweight was 32% and obese 17%. These figures are likely to be mirrored globally.

Few practice guidelines exist for renal dietitians regarding appropriate strategies for managing obesity in those with CKD. Guidelines for overweight or obese kidney transplant recipients (4), and for patients with early CKD (5) suggest caloric restriction under the guidance of a dietitian to achieve weight loss. However due to a lack of research evidence, no further details exist as to the best approach to implement this.

Therefore, in September 2016, a conference workshop with renal dietitians from the Asia Pacific and Australasian region was convened in Perth, Western Australia. The conference workshop was held under the auspices of the annual scientific meeting of the Asia Pacific Congress of Nephrology and Australia and New Zealand Society of Nephrology. The goal of

the conference workshop was to develop consensus recommendations based on the most recent evidence in order to guide dietetic practice in regard to the following topics related to weight management in chronic kidney disease (CKD): the use of traditional weight loss strategies for people with CKD; calculation of energy requirements in those with CKD; the use of very low calorie diets in those with CKD; weight loss pre kidney transplantation; the use of weight loss medications in those with CKD; and dietetic management of patients undergoing bariatric surgery with CKD. In addition, conference participants were asked to identify key knowledge gaps based on the presentations regarding the evidence and to suggest potential areas or topics for future research.

METHOD:

We used the mini Delphi technique (6) to obtain consensus recommendations on a range of statements relating to weight management in CKD. The mini Delphi technique is a systematic method of soliciting and collating informed judgements or opinions on a topic. The process used in this conference meeting consisted of six stages. Firstly, a core group of seven renal dietitians were selected to present a review of the evidence one of the six statements based on their extensive clinical experience and expertise on the topic area. A targeted review of the literature was then undertaken using PubMed, CINAHL, Embase, ProQuest and the Cochrane Library with no date restrictions. Each statement was examined using a PICO (Population; Intervention/ Indicator / Issue; Comparator; Outcome) style question where applicable or able (see Figure 1). Next, conference participants present at the annual renal nutrition workshop listened to a review of the evidence on each topic area. The conference participants were all dietitians with expertise in renal nutrition. The next stage was for conference participants to anonymously vote on the statements related to each statement. Voting consisted of scoring

each statement on a 5-point Likert scale (from 1: strongly agree to 5: strongly disagree). Results of these responses were then collated and feedback provided to the group on the consensus achieved for each topic. A group discussion was then undertaken to elicit areas of concern or reasons for disagreement.

Likert scale scores were aggregated into three groups: 1or 2 agreement; 3 neither agreement or disagreement; and 4 or 5 disagreement. Following methodology used in other consensus reports, consensus on a topic was considered when there was ≥ 75% agreement by the group on a topic, and agreement when there was between 50-75% group agreement on a topic (7).

RESULTS

A total of six statements were presented and evaluated by a total of 28 renal dietitians. Two of the statements achieved consensus (Statement 2 and Statement 5, Figure 2). One statement achieved agreement (Statement 3, Figure 2). Consensus or agreement on three other statements was not achieved (Statements1, 4, 6; Figure 2). Background information on each statement is presented below. A summary of the evidence and recommendations for future research based on the statements is also described briefly.

Statement 1. Traditional weight loss diet strategies (such as using general healthy eating principles) are as effective in people with CKD as they are in the general population

Strength of agreement: 40%, no consensus

A systematic search of the literature was conducted to determine if traditional weight loss strategies were as effective in obese or overweight people with CKD. CINAHL, ProQuest, PubMed, Medline and Embase databases were searched for appropriate articles and initially provided 30 studies. Three randomised (n= 58 subjects) and twelve non-randomised trials (n=882 subjects) as well as one narrative review (8) and one systematic review (9) were included for review. The combined sample size in the systematic review was 2013 subjects (n= 574 receiving medication only; n=562 undertaking bariatric surgery; n=877 included in diet and lifestyle interventions (9).The intervention time of studies with lifestyle and dietary intervention ranged from 4 weeks to 24 months. Dietary intervention included a calorie restricted diet (deficit of 500 calories from usual diet or a set calorie intake of 740 – 1410 calories per day) with some physical activity; and four studies included calorie restriction and Orlistat. The result of this review was that weight reduction using traditional weight loss strategies was associated with a significant reduction in BMI or improved outcomes in albuminuria and proteinuria in mild to moderate CKD. Close monitoring and follow up was recommended in people with CKD following low carbohydrate or high protein diets (10).

Of note, Straznicky et al (11) indicated that exercise is often overlooked as a useful weight loss strategy in patients with kidney disease. In this study a DASH diet model (22% protein) was used in 38 overweight or obese individuals in conjunction with a 40-minute bike ride every other day for 12 weeks (11). There were statistically significant reductions in body weight of 8% in the diet only group compared to almost 11 % in the diet and exercise group.

Recommendations for practice:

Weight loss in obese adults who have mild to moderate CKD results in a significant decrease in proteinuria and albuminuria, irrespective of the weight loss strategy applied (12).The current evidence regarding the use of traditional weight loss strategies in those with CKD is limited to mainly prospective, non-randomised controlled trials or single arm cohort intervention studies with low sample size, and of short duration and follow up. There is also a lack of studies on the effect of using traditional weight loss strategies on progression of disease or its impact on cardiovascular risk factors. One further limitation of the current body of evidence is that a cautious interpretation of renal progression according to change in eGFR (13) as some studies used the Modification of Diet in Renal Disease (MDRD) or Cockcroft – Gault formulas to report renal function (eGFR) and are known to be unreliable equations in obese patients.

Therefore, following a healthy balanced diet as per Australian healthy eating guidelines (www.eatforhealth.gov.au) with appropriate energy consumption under the guidance of an accredited practising renal dietitian is recommended until further research is completed.

Areas for future research

Future research needs to specifically investigate the relationship between progression of disease and the impact of traditional weight loss interventions over a longer duration with regular follow up. Specific follow up of study participants after cessation of the intervention is also required i.e. observation of behaviours without the support of the study environment.

Research on the activity levels of dialysis patients is required. Comparable data exists for the healthy population. However, dialysis patients (especially those undertaking haemodialysis

(HD)) appear to be more sedentary than the healthy population due to the constraints imposed by dialysis, and factors relating to sarcopenia, reduced physical fitness and anaemia. Furthermore, research developing strategies to manage the sedentary behaviours and high prevalence of sarcopenic obesity (high fat mass, low muscle mass) known to occur within dialysis populations are needed. This includes developing and testing clinically applicable and translatable interventions to prevent the decline in muscle mass and physical fitness with or without weight loss.

Statement2. The current guidelines used by dietitians to estimate energy requirements for overweight and obese people with CKD are not relevant

Strength of agreement: 85%, consensus

Current recommendations for estimating the energy requirements of patients on dialysis are not applicable in those who are obese. Kidney Disease Outcomes and Quality Initiative (K/DOQI) recommendations are for high energy intakes of 35 kcal (146 kJ) per kg of body weight per day; or for individuals over 60 years, 30-35 kcal (or 125-146 kJ) per kg of body weight per day (K/DOQI). These guidelines are formed from a very small evidence base. The level of energy intake required to maintain nitrogen balance as 35 kcal/kg/day is drawn from a single metabolic balance study conducted in the 1960s on 6 maintenance HD patients, all of whom were within the healthy weight range (14). However, over the following 50 years, improvements in the efficiency of dialysis techniques and management of kidney disease are likely to reduce the metabolic impact on the dialysis procedure. Furthermore, the profile of the dialysis population has changed.

Body weight forms the basis of calculation formulas for energy requirements. This becomes troublesome in states of extreme body weight (underweight or obesity), where calculating requirements based on current weight may under or overestimate requirements. In obesity, requirements tend to be based on an 'adjusted' body weight, which aims to capture what is considered to be 'metabolically active' weight, rather than excess adiposity (15). Thus it is a very crude measure and has not been empirically derived. There is also evidence that traditional energy equations including Schofield Equation consistently overestimates measured energy requirements in dialysis (16). This therefore brings into question the assumption of high energy needs within the modern-day clinical management of dialysis patients, which may in fact be harmful when applied in obesity.

In fact, recent evidence suggests energy expenditure across pre-dialysis, (HD and peritoneal dialysis (PD) populations is the same or lower than healthy matched controls. Several studies have found resting energy expenditure (REE) to be no different on HD (17) or PD (18), and lower in CKD (19), particularly elderly populations (20) compared with healthy controls. An exception to this may be a range of comorbidities related to marginally increased REE in dialysis patients including diabetes (21); secondary hyperparathyroidism (which resolves following parathyroidectomy)(22) and inflammation (19). People treated with dialysis are also incredibly sedentary, with recorded Physical Activity Level lower than the international standard of 1.3 times REE for sedentary, which appears to be even worse on dialysis days (23).

Overall there is no recent or convincing evidence to support that patients receiving dialysis or the wider CKD population have greater energy requirements than those without CKD. The

equations available to estimate energy requirements are likely to overestimate energy needs, and are not relevant in obese people with CKD.

Recommendations for practice:

In practice, using equations based on the healthy population would be appropriate, along with clinical judgement and tracking weight change over time to evaluate appropriate intake matches needs.

Areas for future research

Well-controlled metabolic studies and/or randomised-controlled trials to different energy levels are needed to determine energy requirements in obese CKD patients. However, these studies are expensive and time-consuming. A more straightforward investigation would be to measure REE using indirect calorimetry in a dialysis population, matched across the weight spectrum to determine the influence of body weight on basal energy needs as it applies to obesity.

Statement 3. Meal replacement formulas are safe and efficacious in those with CKD

Strength of agreement: 54%, agreement

Meal replacement options, include shakes, bars and soups, and are readily available and commonly used by those wanting to lose weight. Benefits of meal replacements include ease of use, relatively low cost, and rapid results which can improve motivation and micronutrient provision(24). Renal disease is listed as a contraindication for use but robust investigation has not occurred in this group. A number of published case reports indicate that patients with CKD have successfully used meal replacements (25, 26), but require close monitoring to

prevent side effects. There have been some prospective studies using meal replacement formulas in people with CKD stage 3-4 (27) showing improvement in parameters such as proteinuria, glomerular filtration, diabetes status and risk factors for progression after weight loss, but numbers were small. Minimal side effects were reported. Since weight loss has been associated with a significant decrease in proteinuria and albuminuria in obese adults with or without CKD (12), regardless of study design, use of meal replacements may be a useful method of reducing the risk and rate of progression of CKD in this group.

Possible problems with meal replacement formulas include hyperkalaemia, fluid overload, constipation, uraemia, and compromised blood glucose control in diabetic patients. These can all be managed by regular monitoring by a renal dietitian working as part of the renal team. The stage of CKD is also important, particularly as recommended protein intake varies markedly between CKD 2-4 and 5, and some formulas are higher in protein than others. The optimal amount of protein for weight loss in early CKD is not known (28).

A recent report of five HD patients who were prescribed 3 meal replacements, (Optifast®), one main meal and 2 serves of low-potassium fruits per day (950kcal and 100g protein) concluded that this regimen was safe and effective (28). These patients developed none of the postulated fluid and biochemical issues, as they were monitored and any necessary adjustments to medications or dialysis schedule were made. One patient developed hyperkalaemia, but this was as a result of non-adherence with their home dialysis regime.

Recommendations for practice:

Despite a paucity of studies, it seems that meal replacement formulas can successfully be used for weight loss in those with CKD, including those on dialysis. Close monitoring, particularly in the initial weeks, is recommended so adjustments to medication and dialysis program can be made if needed, and to monitor compliance (with dialysis, medication and intake.)

Management of dialysis patients using meal replacement options should include the following (25):

- Management should include a renal dietitian, nephrologist, haemodialysis nurses and GP.
- Review weekly for the first 2 weeks, then monthly for remainder of the program
- Monitor biochemistry for any abnormalities (especially in potassium, uric acid and liver function)
- Assess dietary intake for over- or under- consumption
- Check interdialyitc weight gain and fluid status.
- Aim for: 1.0-1.2g/kg/day of protein, ~1mmol/kg of potassium and 800-1000mg/day of phosphate and adhere to the patient's usual fluid restriction.
- A suggested meal plan for additional food items when using 2 shakes per day and 1 bar per day (e.g. Optifast ^{TM}) is to include an additional 150g lean meat, 1 cup low-potassium vegetables, 1 serve of 15g carbohydrate food and 2 serves of low-potassium fruit.

Areas for future research

Adequately powered, controlled studies would be helpful to guide practice. Future investigations are required to establish what is the optimal review period, how often should

serum biochemistry be checked, how long patients should remain on such modified diets, what are the most common issues seen with meal replacement formulas in the CKD population, and are there differences in recommendations depending on the stage of CKD.

Statement 4. There is no strong evidence of benefit for weight loss prior to kidney transplantation in overweight or obese renal patients

Strength of agreement: 75% neutral, no agreement

Since the early 2000s it has been recognised that obesity defined by BMI is associated with a survival advantage in HD patients (29). Although there has been debate as to the utility of BMI and whether fat or lean mass is more important predictor of survival in dialysis patients (30), there appears to be consensus that actively encouraging weight loss for survival benefit in dialysis patients is not always warranted. However, for many years, intentional weight loss in obese renal transplant candidates has been considered very important for renal transplant graft and patient survival despite conflicting evidence.

Chang et al (31) using ANZDATA registry data showed increased risk of Delayed Graft Function (DGF) and acute rejection in obese transplant patients but no difference in long term renal transplant outcomes. Similarly, Bardonnaud et al (32) and Hill et al (33) showed BMI >30 was associated with longer hospital stays and DGF but not long term graft or patient survival. Marks et al (34) showed successfully transplanted morbidly obese persons have a survival advantage over those that remain on dialysis, and provides quality-of-life advantages of transplantation despite higher risks of DGF, wound complications and hospital readmissions. Detwiler et al (35) also highlight the delayed access to renal transplantation for obese dialysis patients when weight loss is mandated and concluded that weight loss may be

acceptable when it occurs without adverse consequences on overall nutritional status and body composition, but unqualified weight loss should not be the primary objective.

For those renal centres who recommend weight loss prior to transplantation, it is recommended that the weight loss diets be constructed and supervised by renal dietitians to prevent the development of malnutrition. Inadequate diet planning, especially in the form of uncontrolled weight loss, may lead to loss of muscle mass. This is important because it is well known that there is a 22% improved graft and patient survival advantage in transplant recipients whose muscle mass has been preserved (36).

Options for pre transplant weight loss include lifestyle changes, prescribed diets, appetite suppressants and/or bariatric surgery (37). All weight loss methods rely on food restriction and/or malabsorption. Bariatric surgery is the only proven method that maintains significant weight loss in this population but has its own risks with surgical complications, effects on immunosuppression as well as the impact on nutritional status and muscle mass loss (38, 39) .

Recommendations for practice:

In summary, although careful patient selection is required, and post-operative expectations may need to be adjusted, there is no strong evidence to avoid renal transplantation in obese recipients, and there is inadequate evidence to support unqualified intentional weight loss in overweight or obese kidney transplant candidates. Weight loss in patients who are motivated and supervised should be encouraged especially in those with no pre-existing diabetes.

Areas of future research

Studies investigating the impact and effect size of a range of weight loss methods (such as lifestyle change, reduced calorie diets, appetite suppressants and bariatric surgery) on nutritional status and muscle mass prior to transplantation would be helpful.

Statement 5. Weight loss medications are not safe or effective in those with CKD

Strength of agreement: 93%, consensus

The most commonly used weight loss medications currently available in Australia are: Orlistat (Xenical, Alli), Phentermine (Duromine), Topiramate with Phentermine (Topamax), Selective Serotonin Reuptake Inhibitors: Fluoxetine (Prozac) & Sertraline (Zoloft), Bupropion (Wellbutrin, Zyban) and Naltrexone with Bupropion (Contrav). Orlistat is the preferred option due to the least side effects.

Orlistat aids weight loss by altering fat digestion; it blocks approximately 30% of triglyceride absorption from the gut lumen. Potential side effects include steatorrhoea, abdominal pain, flatulence, increased defecation and faecal urgency. Trials have found that Orlistat, when used in combination with a diet and lifestyle program, leads to a modest reduction in weight in CKD patients (40, 41) . However, there are concerns that Orlistat can increase the risk of oxalate nephropathy and renal stones particularly in patients with renal impairment (42). No studies currently exist evaluating the safety or efficacy in renal transplant populations. As Orlistat interferes with cyclosporine absorption (43, 44), and it should not be prescribed to patients on Cyclosporin. The effect of Orlistat on calcineurin inhibitors such as Tacrolimus have also not been tested.

Phentermine (Duromine/Metermine) or Phetermine with Topiramate (Qsymia) is a

sympathomimetic drug that has an appetite suppressant effect. Sympathomimetic drugs can increase heart rate, blood pressure and cause insomnia, dry mouth, constipation, and nervousness. Formal evaluation of safety and efficacy of sympathomimetic drug are necessary in the renal population. Similarly, the safety of use of antidepressants for weight loss such as Fluoxetine (Prozac), Sertraline (Zoloft), Bupropion (Wellbutrin, Zyban), Naltrexone with Bupropion (Contrav) is not well established in CKD.

Recommendations for practice:

Although several drugs are available for the treatment of obesity, many are contraindicated or have not been adequately tested in adults with CKD. Orlistat can be used but the clinical effect is modest in CKD and it places patients at increased risk of renal stones.

Areas of future research

Further research is required to establish the safety of weight loss medications in the CKD and renal transplant population with consideration of potential drug interactions.

Statement 6. Bariatric surgery in those with end stage kidney disease is feasible and effective

Strength of agreement: 43%, no consensus

Bariatric surgery is a well-established treatment for obesity that produces dramatic weight loss. A meta-analysis by Li et al (45) showed that bariatric surgery could prevent further decline in renal function and reduce the effects of kidney disease risk factors by reducing proteinuria, albuminuria and improving glomerular hyperfiltration in obese patients with mildly impaired renal function. However, large, randomized prospective studies with a

longer follow-up are needed to answer the question of whether bariatric surgery delays progression to ESKD. Patients with CKD stages 1-3 rarely need dietary potassium, protein, phosphorus or fluid restrictions, therefore the nutritional management of the post-bariatric surgery patient with mildly impaired renal function should follow existing post-op protocols.

The obese patient with ESKD approaching the need for renal replacement therapy, or undergoing dialysis, however, have specific renal nutrition issues that make bariatric surgery nutritional management more complex.

Bariatric surgery is effective for weight loss in people with ESKD and dialysis (46-48) and has been successfully performed globally over the past 20 years, albeit infrequently. Patients with ESKD treated by maintenance dialysis who undergo bariatric surgery for obesity management likely will experience weight loss (in the range of 50%-60% excess weight lost at 1 year) similar to patients without kidney disease (49, 50). Bariatric surgery, not unlike other elective surgical procedures in individuals with kidney disease, has higher risk for complications than otherwise healthy individuals (47, 51). Although patients with higher CKD stage had higher complication rates, the absolute incidence of complications remained <10% in both CKD and non-CKD patients.

Risk of death may decrease with surgical experience (48, 49). Whether the potential substantial benefits of weight loss outweigh the risks of complication in this population continues to be debated and needs further investigation (51). Weight loss is associated with a reduction in peri-operative complications with renal transplantation and continues to be a motivating factor for bariatric surgery as discussed previously.

The current body of evidence provides little insight into the practical management of post-bariatric surgery care in people with kidney disease, especially those on dialysis. There are currently no specific guidelines for the nutrition management of the ESKD patient

undergoing bariatric surgery, and there is widespread uncertainty from dietitians practising in both renal and bariatric nutrition about optimal nutrition management.

Recommendations for clinical practice:

Established post-bariatric surgery nutrition protocols are likely to be suitable but evidence is lacking. It is therefore suggested that clinicians exercise their clinical judgment when utilising existing protocols for post-operative bariatric care management. Highly restrictive diets post bariatric surgery will lead to dietary intakes of potassium, phosphorus and protein well below the evidence based guidelines for ESKD nutritional management; therefore malnutrition is a higher risk than excessive intake in this group of patients. Foods considered high in potassium or phosphorus are usually suitable to include because of the serve size restrictions that bariatric surgery requires. Phosphate binding medication prescriptions need review, and are often not required or ineffective due to the change in gastrointestinal function. In the absence of any specific evidence, additional micronutrient supplementation, including liquid formulations, similar to the bariatric patient without kidney disease is suggested. The early post-operative period is highly dynamic and the patient requires support and cooperation from the whole multi-disciplinary team. Dialysis patients need special attention paid to post dialysis weight targets that are likely to change rapidly, as well as blood pressure, blood glucose levels and gastrointestinal function. Inadequate oral fluid intake may be of greater concern than excess fluid intake.

The absorption of immunosuppressive medications (50) does not appear to be adversely affected in the bariatric surgery patient who is subsequently transplanted, however long term nutrient deficiencies remain an obvious concern that require close monitoring in all patients.

Areas for future research:

Further research is needed into long term nutritional outcomes and effective post-operative protocols to ensure clinicians feel confident managing post-bariatric surgical care of the patient with End Stage Kidney Disease, especially those being dialysed. There is little reference to nutritional outcomes other than weight loss in the published literature; therefore research into short and longer term nutritional outcomes such as nutritional status, biochemistry, nutrition impact symptoms and effective nutritional practices are required.

Discussion

This consensus report has attempted to address the common clinical questions arising in clinical practice when treating overweight or obese individuals with CKD. Evidence regarding many aspects of weight management in CKD is limited and it is acknowledged that clinicians should continue to rely on their clinical judgment in conjunction with close review and monitoring. Randomised controlled trials of nutritional interventions are difficult – unlike the use of medications, dietary interventions cannot be blinded. Further, identification of appropriate outcomes can be challenging with many biomarkers abnormal in those with CKD.

The intention of this consensus report is to improve the care of overweight and obese adults with CKD. We suggest that the key to successful clinical management of overweight and obesity is a multifactorial approach that includes access to dietary education, medications and other therapeutic options. However, with obesity rates continuing to increase there is also a clear need for new and innovative multidisciplinary collaborations to help address the environmental and behavioural determinants of this disorder as well. For example, collaborations with psychology, social work and public health professionals may be useful.

Also critical to the management of obesity is addressing issues relating to health literacy and adherence to therapy (52)

One of the strengths of this report is the use of a systematic approach to reviewing the evidence by experienced renal dietitians. One major limitation is the paucity of evidence and the differing professional philosophies and approaches to weight management held by the conference participants. This is reflected in the results with only two statements achieving consensus and one statement achieving group agreement. Similarly, the consensus report is based on the opinions of a small number of dietitians present at the conference meeting. The perspectives of other health professionals involved in weight management discussions, such as Nephrologists and Surgeons are not included and their opinions may differ to those of dietitians. However, we believe this consensus report can still be used by clinicians to reliably guide their clinical management. We also encourage further research on this topic, especially in the areas identified as a result of this review.

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Figure 1. Statements used for voting by conference participants on the topic of weight management strategies for those with chronic kidney disease.

1. Traditional weight loss diet strategies (such as using general healthy eating principles) are as effective in people with CKD as they are in the general population
2. The current guidelines used by dietitians to estimate energy requirements for overweight and obese people with CKD are not relevant
3. Meal replacement formulas are safe and efficacious in those with CKD
4. There is no strong evidence of benefit for weight loss prior to kidney transplantation in overweight or obese renal patients
5. Weight loss medications are not safe or effective in those with CKD
6. Bariatric surgery in those with end stage kidney disease is feasible and effective

Figure 2. Percentage of votes for the six statements.