

Kidney Functions	NIS (cont)	Biochem (cont)
Removes waste - urea, creatinine and excess fluid	Hypokalaemia	Albumin ↓ Indictor of mortality. (RR = 35-50g/L) Affected by urinary losses, liver function, inflammation etc.
Electrolyte balance - regulates Na, K, Ca, PO4	Poorly controlled uraemic S/S -dry mouth, avoiding protein foods, N/V/D, ↓ appetite, Metallic taste, ↓ weight, fluid retention, anaemia	Urinary losses or fluid overload
Acid-base balance: Excretes H+, reabsorbs HCO3-	Polypharmacy – lots of S/E/S/S	
RAAS systems - BP regulation	Losses in dialysis: Water soluble vitamins, protein	
Erythropoietin production - stimulates RBC production		
Vit D activation - converts to calcitriol		
CKD Stages	Biochem	
Stage	Marker	Expected in CKD
Stage 1: Normal-high GFR	Urea (RR = 2.5-7.5 mmol/L)	↑ Urea Reduction Ratio (URR) used to assess dialysis adequacy. ≥70% reduction in blood urea levels per session. <70% may indicate inadequate clearance of waste products - potential malnutrition
Stage 2: Mild CKD		
Stage 3A: Moderate CKD		
Stage 3B: Moderate CKD		
Stage 4: Severe CKD		
Stage 5: End-stage	Creatinine (RR = 35-50g/L)	↓ Reflects muscle mass/turnover. ↓ Cr = ↓ muscle mass = ↑ mortality.
Stage 5D: End-stage on dialysis		
Assessment		
DRY Wt Hx – consider fluid status. Diuretics? Oedema? Ascites? Fluid restriction?		
Higher weight = lower mortality = don't want to encourage weight loss while they are on dialysis. Optimal Nutrition Status = BMI 23 – 26 kg/m2		
NIS		
Protein-energy malnutrition		
Inadequate fibre intake		
Knowledge deficit – high K, PO4, Na foods		
Excessive K+, PO4, Na intake <i>only a key concern if it reflects in biochem</i>		



By Michellephillips02

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Biochem (cont)		Fluid quick reference (cont)	Intervention
Lipids	↓	Dyslipidaemia is common.	Early stage: prevent co-morbidities
	HDL	Targets are similar to people with CVD or T2DM	Late stage: preventing & treating malnutrition. Conserve lean body mass
eGFR		<i>Amount of blood filtered by the kidney per minute</i>	Maintain weight/weight reduction – to be eligible for a transplant – correct malnutrition first, and then focus on weight control – communicate with team
		Stage 1: > 90 mL/min	ONS Nephro HP - stage 4 or more severe, energy dense, low electrolyte, mod protein
		Stage 2: 60-89 mL/min	ONS Nephro LP - energy dense, low electrolyte, low protein
		Stage 3A: 45-59 mL/min	
		Stage 3B: 30-44 mL/min	
		Stage 4: 15-29 mL/min	Lower K+ ONS: resource fruit, fortijuice, nutren, forticreme
		Stage 5: <15 mL/min	Declining cognition = Invite family to attend. Write down. Give out resources. Repeating information. Keeping sessions short
Fluid quick reference		Conventional HD: In clinic. 3x 4 hour sessions a week	Reduce dairy & meat portions, avoid protein fortified products
1/2 cup custard = 100mL fluid		Home HD: Tend to be done overnight. Less fluid restrictions due to longer dialysis. More flexible & less impact on life. Have to have support & health literacy.	Na: No added salt diet. Educate on flavour alternatives
1/2 cup canned fruit = 80mL fluid		Dialysate ("bath"): The solution (water and electrolytes) that passes through the artificial kidney to remove excess fluids and waste products from the blood.	Fluid: Educate: what is a fluid? Jug method to measure fluid intake. For dry mouth: sucking on mints, chewing gum, brush teeth
Plastic feeder glass of fluid = 200mL fluid		Interdialytic weight gain (IDWG)	Constipation: fibre supplements. Medications. (lack of fibre from K restriction)
Coffee cup of fluid = 150mL fluid		~2kg	PO4: Restrict in late stages. Promote whole, plant foods – less bioavailable PO4
Fruit juice Tetra Pak of fluid = 250mL fluid		Less = poor oral intake, losses (stomas, diarrhoea etc), loss of LBM	Serum K+ constantly elevated = restrict K+
Juice glass = 120mL fluid		More (usually due to fluid/Na intake). Glycaemic control – hypoglycaemia = thirst.	
3/4 cup thick soup = 150mL fluid		<i>Weight will stay in the body, due to not producing urine to expel it. Relying on dialysis to remove excess fluid.</i>	
2 scoops ice-cream = 70mL fluid		<i>Pumping around so excess fluid = ↑ CVD & puts more pressure on your heart – causing hypertension, oedema, shortness of breath, large IDWG</i>	

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Strategies

Label reading - Na. Low Salt: 120mg per 100g or less, Reduced Salt: 400mg per 100g or less

Salt-free flavour additives: fresh herbs, lemon/lime juice, pepper, garlic, ginger

Choose low salt, reduced salt, and no added salt products when available

Reduce processed meats like ham, bacon, sausages, deli meats, rotisserie chicken.

Limit red meat to 1-2 times per week

More lentils, chickpeas, kidney beans, baked beans, cannellini beans, black beans, fish, poultry, lean meat, tofu, nuts and seeds

Only drinking from one measured bottle/measuring jug

Limit fluid from drinks, foods, and fluid you take with tablets

Spread your fluid allowance over the day - don't drink it all at once

Drink from small cups rather than large, or half fill cups

Try to stay out of the heat & use a wet washer to stay cool

Freeze some of your fluid allowance. Use ice, ice blocks, or frozen fruit

Sucking mints, peppermints, a slice of lemon or chewing gum

Keep lips moist by using lip balm.

Pharmacist can help with oral lubricants.

Na - Choose fresh foods over processed

Guidelines & References

Ikizler et al. KDOQI clinical practice guideline for nutrition in CKD: 2020

Ash et al. Evidence based practice guidelines for nutritional management of chronic kidney disease

Handbook p217

Nut Reqs (KDOQI)

EER

Stage 3: 105-147kj/kg

Stage 4: 105-147kj/kg. 125-146/kg >60 years

Stage 5: 105-147kj/kg

Protein: *Low = ~0.6-0.8g. just meet, or slightly under**

Stage 3: 0.55-0.6g or 0.6-0.8g (diabetes)

Stage 4: 0.55-0.6g or 0.6-0.8g (diabetes) *higher end if malnourished

Stage 5: 1.0-1.2g

Na < 2.3g per day (<100mmol/day (DAA & KDOQI). Low Salt: 120mg per 100g or less

Fluid: *Guided by nephrologist

Stage 3-4: Individualized based on CKD, oedema, hypertension etc

Stage 5: 500mL + PDUO (HDX)

Stage 5: 800mL+ PDUO (PD)

K *Up to stage 3 not usually restricted*

Stage 4: 1 mmol/kg

Nut Reqs (KDOQI) (cont)

Stage 5: 1 mmol/kg

Phosphate 800-100mg/day

Example PESS

Chronic disease or condition related malnutrition (NC-4.1.2) related uraemic S/S of CKD (nausea, ↓d appetite, fatigue), as evidenced by SGA-14B/9.5% LOW in 12/12/1.7% LOS 2/12/Dietary intake inconsistent with dietary reference standards.

Serum K+

Cause: constipation, elevated BGL, medications, missing dialysis or not enough time, acidosis, muscle breakdown & rapid weight loss

Avoid "salt-free" salt

Chop vegetables into small pieces and soak/boil

Boil rather than steam, stir-fry or microwave

High K foods = fruit, processed meat foods, fried foods, sausages, steak, deli meats, chocolate, vegemite toast, dairy, fruit juice, coffee, milkshakes

Drink mostly water. Reduce alcoholic drinks, coffees, milkshakes, fruit and vegetable juices

Swap processed snacks for higher fibre, lower K options.



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Lower K swaps

High K	Lower K
Potatos (all types)	Pasta, rice, couscous
Cow's milk	Soy, rice or almond milk
Cereal w/ dried fruit	Plain, honey-coated or sugar-coated breakfast cereals, oatmeal
Chips	Rice snacks, popcorn and pretzel
Cookies	Plain, fruit-filled or wafer cookies
Choc cake	Plain cake filled with cream or jam, toaster pastry, doughnuts, scones
Juice	Lemonade, cranberry cocktail, flavored water
Nutella, peanut butter	Jam/honey
Choc/fudge	Jelly beans, mints, marshmallows
Tomato sauce	Mayo

Phosphate Restriction (cont)

Swap processed foods for fresh foods
Reduce large serves of milk or large serves of all type of meats
<i>Phosphate binder medication helps to lower your blood phosphate levels by attaching to the phosphate and phosphorus in your food, stopping it from going into your blood</i>
Check w/ MD dose is correct
Take phosphate binders with food
High PO4 foods: coke, processed cheeses, 2-min noodles, cakes, chicken nuggets, sausage rolls, sausages, corned beef, sauce, bacon
Moderate PO4 foods: Fresh fish/seafood. Have fish 1-2/week. Beef, lamb, chicken, canned tuna, eggs, soy milk, yoghurt
Low PO4 foods: vegetables, lentils, brown rice, pasta, nuts, fruit, seeds, EVOO, almond/oat milk, soft cheeses, nut butter

Phosphate Restriction

Restrict IF serum levels are high

Used as a food additive in processed and pre-packed foods. Naturally in meats, cheese, milk, nuts and seeds

Additive numbers: 101, 339, 340, 341, 342, 343, 450, 451, 452, 541, 542, 1410, 1412, 1413, 1414, 1442



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