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Long-term monitoring advice sheet for individuals with cardiorenal disease on RAASi* therapy with hyperkalaemia

Two key aims:

1 **The optimisation of RAASi therapies for cardiorenal protection**

2 **The prevention and management of hyperkalaemia**

All individuals with cardiorenal disease require regular monitoring

✓ Continued optimisation of care ✓ Detection of progress of disease or co-morbidities ✓ Discussion of any new advances in care[1]

Monitoring MUST include

- ✓ **Clinical review**, e.g. blood pressure, fluid status, risk prediction tools, symptoms
- ✓ **Medication review**, e.g. assess need to start/stop/alter doses, adherence, side effects
- ✓ **Blood monitoring**, e.g. potassium and renal function
- ✓ **Other relevant investigations**, e.g. ECG, echo

Frequency of monitoring

- ✓ Frequency of monitoring is determined by the underlying cardiorenal condition and its stage/severity, as well as co-morbidities
- ✓ For individuals with co-morbidities, e.g. chronic kidney disease (CKD) and heart failure (HF), take the most conservative (frequent) approach to monitoring

Two specific concerns MUST be addressed at each review

RAASi therapy optimisation:

- ✓ Is RAASi therapy optimised for cardiorenal protection?
- ✓ If not, why not? Is there a requirement to further optimise?
  - Valid reason, e.g. symptomatic hypotension
  - Invalid reason, e.g. hyperkalaemia (present or prior – where alternative potassium lowering strategies and therapies have not been instituted)
- ✓ See **'RAASi therapy in the context of hyperkalaemia'**

Hyperkalaemia prevention and management:

- ✓ Is hyperkalaemia being proactively prevented and managed?
- ✓ See **'Potassium lowering strategies and therapies'**

Circumstances requiring additional monitoring[1–4]

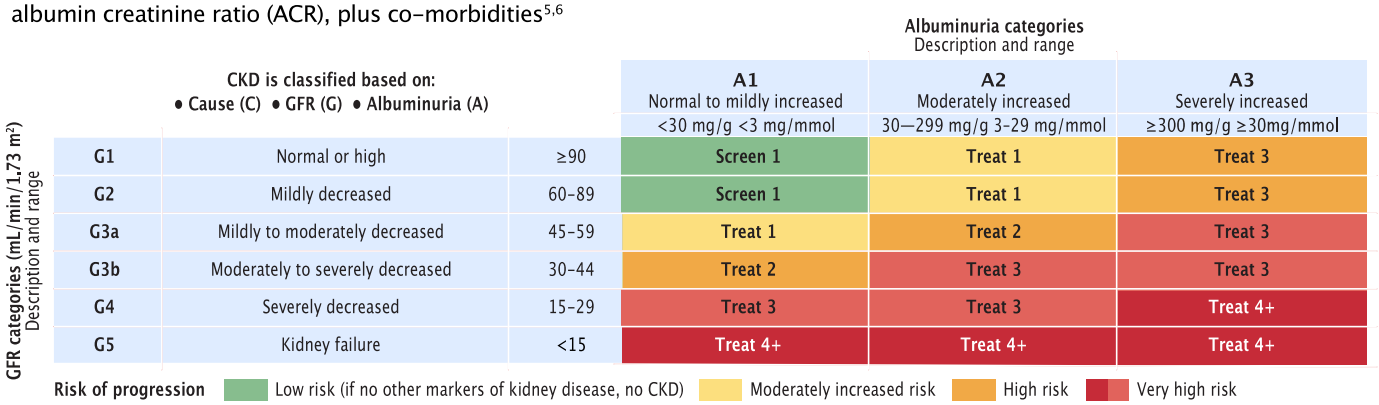
- ✓ **Medication changes** – in particular medications that affect potassium levels or renal function, e.g. potassium lowering therapies, RAASi therapies
- ✓ **Intercurrent illness** – in particular those with the potential to affect renal function or cause acute kidney injury (AKI), e.g. sepsis, hypovolaemia
- ✓ **Change in the underlying condition(s)**

Guidelines for the monitoring of individuals with HF[1,2]

- ✓ Monitoring should occur at least 6 monthly if the condition is stable
- ✓ Monitoring requirements increase if the condition is not stable, e.g. from days to weeks

Guidelines for the monitoring of individuals with CKD

- ✓ Monitoring should occur from 1–4+ times per year, tailored to the underlying cause of CKD, rate of decline of eGFR or increase in albumin creatinine ratio (ACR), plus co-morbidities[5,6]



Reproduced from: de Boer IH et al. Kidney Int. 2022;102:974–989.
Notes: Albuminuria and GFR grid reflects the risk of progression by intensity of coloring (green, yellow, orange, red, and deep red). The numbers in the boxes are a guide to the frequency of screening or monitoring (number of times per year).
CKD = chronic kidney disease; GFR = estimated glomerular filtration rate; KDIGO = Kidney Disease: Improving Global Outcomes.
KDIGO CKD Work Group. Kidney Int. 2024;105(4S):S117–S314.

*Renin Angiotensin Aldosterone System inhibitor therapy (ACE inhibitors, angiotensin II receptor blockers, angiotensin receptor/neprilysin inhibitor, mineralocorticoid receptor antagonists)

Potassium lowering strategies and therapies:

1. Address correctable causes of hyperkalaemia:

- ✓ **Adjust potassium elevating drugs**[**4] – Prioritise those that can be swapped/withheld with least adverse consequences. **Down-titrate/discontinue RAASi therapy as a last resort**[6] – see **'RAASi therapy in the context of hyperkalaemia'**
- ✓ **Modify diet** – Advise a healthy, diverse diet with higher consumption of plant-based foods than animal-based foods and low consumption of ultra processed foods.[6] If potassium remains >5.5 mmol/L once non-dietary factors are addressed, refer to specialist dietician[4]
- ✓ **Correct metabolic acidosis**[4] – Metabolic acidosis increases the risk of hyperkalaemia
- ✓ **Optimise glycaemic control**[4] – Poorly controlled diabetes increases the risk of hyperkalaemia
- ✓ **Avoid/address constipation**[4] – Constipation increases the risk of hyperkalaemia

2. Consider potassium lowering medications (acutely or longer term):

- ✓ **Diuretics** – Can increase potassium excretion
- ✓ **Bicarbonate** – Consider adding oral sodium bicarbonate if serum bicarbonate <22 mmol/L
- ✓ **Potassium binders** – Remove potassium from the body via the gastrointestinal tract[4]

3. Prevent recurrence of hyperkalaemia:

- ✓ Recurrence of hyperkalaemia should be anticipated, and steps taken to avoid it[4]
- ✓ Careful prescribing of potassium elevating drugs – use only where clearly indicated, with particular care if combinations are required, e.g. ACEi/ARB/ARNi + MRA for HF[4]
- ✓ Regular review of correctable causes and consideration of the need for potassium lowering medications (as above)[4]
- ✓ Regular monitoring of bloods (potassium and renal function) and review should occur at the frequency appropriate for the disease state and the individual, e.g. 1-4 times per year for CKD[6] and HF[1], with additional monitoring during intercurrent illness (especially dehydrating illness), titration of medications that affect potassium levels or renal function, or change in the underlying cardiorenal condition
- ✓ Education of individuals with cardiorenal disease

- ✗ **Sick day guidance** – A temporary pause of RAASi therapy, diuretics, metformin and sodium-glucose co-transporter-2 inhibitors during acute dehydrating illness may decrease the risk of AKI and hyperkalaemia. However, the evidence base for this is weak and there is potential for harm if these medications are not re-instated. **Sick day guidance should be based on an individual risk assessment and there must be a clear plan to re-instate any paused medications.**[4,6]

****Potassium elevating drugs**[4]

- RAASi (ACE inhibitors, angiotensin II receptor blockers, mineralocorticoid receptor antagonists)
- Potassium supplements
- Potassium-sparing diuretics
- Trimethoprim/co-trimoxazole
- Nonsteroidal anti-inflammatory drugs
- Non-selective beta-blockers
- Antifungals
- Digoxin
- Salt substitutes
- Herbal medicines (e.g. alfalfa, dandelion)

RAASi therapy in the context of hyperkalaemia:

- Hyperkalaemia associated with RAASi use can often be managed by measures to reduce potassium other than down-titration or discontinuation of RAASi therapy[6]
- Down-titration or discontinuation of RAASi therapies is associated with adverse clinical outcomes in CKD and HF[7-10]
- Only down-titrate or discontinue RAASi as a last resort; if hyperkalaemia is uncontrolled despite **'Potassium lowering strategies and therapies'**, or symptomatic hypotension or serum potassium >6.5 mmol/L (until normokalaemia achieved)[6]
- Re-initiate and re-optimise RAASi therapies that are down-titrated or discontinued once normokalaemia is achieved wherever possible – utilise appropriate **'Potassium lowering therapies and strategies'**
- If hyperkalaemia is preventing RAASi optimisation, seek specialist advice
- N.B. If RAASi therapies are discontinued, also discontinue potassium lowering therapies as appropriate

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