Guidelines and Recommendations for selecting the appropriate potassium concentration dialysate

Management Strategies

- Ideal pre-dialysis plasma potassium [K] should be ±5mmol/L
- For chronic dialysis patients
  - **Default** dialysate potassium concentration is **2 mmol/L** ().
  - **Monthly** potassium monitoring should take place.
- Check serum potassium for **all inpatients** prior to commencing dialysis treatment.
- Review bloods each session for **acutely unwell** patients or if potassium is unstable.
- Selection of the appropriate dialysate can be based on the "Guideline for use of Dialysate based on the serum potassium Concentration"(see table below)
- If a change is made in the dialysate, potassium should be monitored for at least another 3 dialysis sessions before deciding on the new prescription, thereafter **the prescription needs review** weekly for a month and revise accordingly.
- **New patients** need **weekly** potassium checks for 4-6weeks to evaluate trends.

Table 1. Guideline for use of Dialysate based on Serum Potassium Concentration

Serum potassium concentration (mmol/L)	**Dialysate** potassium concentration (mmol/L) *(For acute patients / new start to dialysis)*
< ±4.0	Use 4.0K (K4) Bath *(Alert medical team if pre-dialysis potassium consistently < 3.0)*
±4.1 –± 4.5 ±4.6 - ±5.5	Use 3.0K (K3) Bath OR Use 2.0K (K2) Bath *This group may have a range so bath depends on patients potassium trend with monitoring*
±5.6 – ±6.5	Use 2.0K (K2) Bath but sometimes 1.0K (K1) bath may be necessary in the higher range too *(consider longer dialysis hours if able)* *(Review medications and consider Dietician review if persisting trend)*
±6.6 - ±8.0	Initiate with 1.0K (K1) in 1st session then change to 2.0K (K2) bath, depending on underlying disease e.g. cardiac and also the long-term trend Dialyse as long as possible, ideally for 5-6 hrs *(Repeat serum K > 2hrs post dialysis)* *(Consider urgent Dietician & Medical review)*

NOTE: THIS TABLE IS JUST A GUIDE, CLOSE MONITORING OF THE PATIENTS TRENDS IS CRITICALLY IMPORTANT IN ORDER TO DETERMINE THE APPROPRIATE POTASSIUM BATH.

Special Situations

- **Low K^+ dialysate** (1mmol/L) should be **reviewed at each dialysis** session by the team and should not be used long-term.
- If Pre-dialysis **serum K^+ > 8mmol/L** – dialyse against 1.0mmol/L for 1 hour and then change to 2mmol/L with repeat UEC >2hrs post-dialysis
- Significant **acidosis** – monitor serum potassium (intracellular potassium shift upon correction of acidosis)
- Patients on **Digoxin** – aim for serum potassium >4.0 mmol/L (document in Care Plan)
- Underlying **cardiac arrhythmia** – suggest maintain serum potassium > 4.0 mmol/L (along with a dialysate Ca 1.75 mmol/L).

- **Potassium supplements** – need regular review of medications and blood tests.
- **Rhabdomyolysis & refractory hyperkalaemia** – may need CRRT.

Multidisciplinary approach

- Liaise with **medical team** if there is any perceived issue with electrolyte management on haemodialysis.
- **Inform medical team** if patient is currently having concomitant acute therapy like cancer therapy (chemotherapy, radiation or plasmapheresis), elective surgery (private/public) or physiotherapy/rehabilitation.
- **Early involvement** of Dietician and Social Worker as per departmental protocols.

Background Information

A significant challenge in the haemodialysis patient is reducing the risk of sudden cardiac death. During dialysis, the removed potassium comes mainly from the relatively small extracellular compartment. However after a few hours the serum potassium concentration would bounce back as a result of entry of intracellular potassium into the blood. While aggressive ultrafiltration can lead to intra-dialysis hypotension; hypokalaemia and hyperkalaemia can lead to life-threatening cardiac arrhythmias [1, 2].

Patients with end-stage kidney disease are prone to hyperkalaemia. The amount of potassium removed during a haemodialysis treatment is inversely proportional to the potassium concentration in the dialysis bath, but so is the risk of intra-dialysis hypotension [3]. The usual dialysate potassium level is 2 mmol/L and considered safe [4]. Very low concentrations of dialysate potassium should avoided if possible because rapid decline in plasma potassium concentration [5], during the early phase of haemodialysis, is arrhythmogenic [6]. Using longer dialysis sessions allows the application of lower dialysate/plasma gradients for potassium, without jeopardizing total potassium removal and having more favourable outcomes [7].

The management of serum potassium in a haemodialysis patient remains an ongoing challenge, as numerous metabolic variables affect the intracellular/extracellular potassium flux. The concurrent use of newer oral potassium binders will optimise management further. The individualization of dialysis prescription and dialysate composition may improve intra-dialytic morbidity, and perhaps mortality, when coupled with improved clinical practices and quality-control processes.

References

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