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Session Topic : Fluid and Electrolyte

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Potassium Disorders and Prognosis: Lessons from CKD and Dialysis Care

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Potassium imbalances, collectively known as dyskalemia, represent a significant clinical burden due to their strong correlation with adverse outcomes. Both hypokalemia and hyperkalemia serve as potent independent predictors of mortality. Clinical evidence consistently demonstrates that dyskalemia follows a U-shaped mortality curve, where both low and high serum potassium levels are strongly associated with an increased risk of life-threatening ventricular arrhythmias and sudden cardiac death. The etiology of hypokalemia is typically evident through clinical history, such as gastrointestinal distress or diuretic use. Diagnostic stratification relies on two primary pillars: (a) quantifying urinary potassium excretion to differentiate renal wasting from extrarenal losses or intracellular shifts, and (b) evaluating acid-base balance, as the presence of metabolic acidosis or alkalosis serves as a critical diagnostic clue for underlying pathologies. Gradual repletion is advised, prioritizing oral supplementation over intravenous options if the patient is clinically stable. As renal function declines, the prevalence of hyperkalemia rises significantly, occurring in approximately 12% to 18% of patients with chronic kidney disease (CKD). The management of hyperkalemia in CKD requires a strategic approach that distinguishes between acute stabilization and chronic maintenance. Acute treatment focuses on protecting the heart through intravenous calcium and shifting potassium into the intracellular space using insulin or albuterol. For chronic management, the latest evidence-based recommendations emphasize a multidisciplinary approach including expert dietary advice to limit bioavailable potassium from processed foods, effective diuretic therapy, and the use of potassium binders. While renin-angiotensin system inhibitors (RASi) often trigger hyperkalemia, recent evidence suggests that discontinuing these life-saving medications is associated with a higher risk of mortality and major

adverse cardiovascular events. Newer potassium binders, such as patiromer and sodium zirconium cyclosilicate, have been shown to effectively maintain normokalemia, thereby facilitating the persistent use of optimal RASi doses. Furthermore, sodium-glucose transporter 2 inhibitors have emerged as a valuable tool, reducing the risk of serious hyperkalemia by inducing kaliuresis and preserving long-term renal function. In the context of hemodialysis, hyperkalemia remains a particularly dangerous condition, with pre-dialysis levels between 4.6 and 5.3 mEq/L identified as the range associated with the greatest survival. Patients are at their highest risk of death and hospitalization immediately following the long inter-dialytic interval due to excessive fluctuations in fluid and potassium levels. Ultimately, improving patient outcomes in the CKD and dialysis population necessitates individualized care that balances dietary restrictions, pharmacological innovations, and precise dialysis prescriptions.

Keywords: potassium , mortality, dialysis, kidney