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Hypernatremia in CRRT: Multicenter Analysis of Prevalence and Institutional Outcome Variation in Korea

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Objectives : Hypernatremia is independently associated with increased mortality in critically ill patients requiring continuous renal replacement therapy (CRRT). However, its prevalence, clinical impact, and institutional variability remain poorly characterized, particularly in Asian populations. Using a large-scale Korean multicenter cohort, we investigated the distribution of baseline hypernatremia and compared clinical outcomes across centers stratified by CRRT volume.

Methods : We identified patients who underwent CRRT for 3 or more consecutive days between 2014 and 2024 at eight tertiary referral academic hospitals in South Korea. Centers were categorized by CRRT volume: Large (G1), Medium (G2), and Small (G3). Patients were stratified by initial serum sodium levels: normal (135–145 mmol/L), mild hypernatremia (146–154 mmol/L), and severe hypernatremia (≥ 155 mmol/L). High-severity patients were defined as those with SOFA ≥ 10 , APACHE-II ≥ 15 , or SAPS3 ≥ 65 scores.

Results : Of 4,945 patients who received CRRT, baseline hypernatremia was observed in 18.3% of patients (15.5% mild, 2.8% severe). G2 centers exhibited the highest prevalence of hypernatremia (G1, mild 15.1%, severe 2.2%; G2, mild 16.8%, severe 4.5%; G3, mild 15%, severe 3.1%; $P < 0.001$) with the highest use of preventive measures for overcorrection with concomitant hypotonic fluid infusion (G1, 3%; G2, 6.8%; G3, 4.7%; $P < 0.001$). G2 centers exhibited the highest 30-day (G1, 48.8%; G2, 60.4%; G3, 33.7%; $P < 0.001$) and 90-day mortality rates (G1, 57%; G2, 65.8%; G3, 39.4%; $P < 0.001$). Paradoxically, G2 had the lowest proportion of high-severity patients at 24.5%, compared to G1 (67.1%) and G3 (43.5%) ($P < 0.001$). RRT dependence at discharge was highest in G2 (G1, 15.1%; G2, 20.4%; G3, 15%; $P = 0.006$).

Conclusions : Baseline hypernatremia is prevalent in nearly one-fifth of CRRT patients and is associated with substantial mortality. Marked inter-institutional variation in both hypernatremia burden and clinical outcomes exists across hospital scales in Korea, despite lower illness severity in higher-mortality centers. These findings highlight the need for standardized hypernatremia management protocols in CRRT practice.