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Impact of Chronic Kidney Disease on Adverse Event Topography and Economic Burden in CAR T-Cell Therapy for DLBCL: A National Analyses

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Abstract

Background

Chronic kidney disease (CKD) may potentiate toxicity and impair organ resilience in recipients of chimeric antigen receptor (CAR) T-cell therapy for diffuse large B-cell lymphoma (DLBCL). While immune-effector toxicities have been reported with CKD, the interplay with cardiac, infectious, and economic sequelae is insufficiently described. We evaluated these outcomes across CKD strata from a national database.

Methods

Using the National Inpatient Sample (2017–2022), we identified adult DLBCL hospitalizations receiving CAR T-cell therapy. ESRD patients were excluded. CKD was examined in two frameworks: CKD3a+ (eGFR <60 mL/min) versus no/CKD1–2, and CKD3b+ (eGFR <45 mL/min) versus no–CKD3a. Outcomes included in-hospital mortality, CRS (2021–2022), ICANS (2022), cardiac events, infections, acute kidney injury (AKI), renal replacement therapy and total hospitalization costs (calculated using the TOTCHG variable) and comparative analyses were done using chi-

square testing. Multivariable models adjusted for demographics, comorbidities, and hospital characteristics.

Results

In a cohort of 5,400 hospitalized DLBCL patients receiving CAR-T, those with CKD stage 3a or higher (CKD3a+; n=165; 3.1%) experienced higher rates of AKI (33.3% vs 11.6%; p<0.001) and renal replacement therapy (6.1% vs 1.4%; p=0.040) compared to CKD1–2 (n=5,235). Total hospitalization cost was higher (USD 456,198 vs 365,182; p=0.024) and grade 4 ICANS occurred more frequently (10.0% vs 1.4%; p=0.046). Mortality (6.1% vs 2.8%; p=0.259), pneumonia (12.1% vs 6.1%; p=0.246) and arrhythmias (33.3% vs 21.2%; p=0.094) were increased numerically. After multivariable adjustment, most differences diminished (mortality odds ratio [OR] 1.8, p=0.617; AKI OR 1.2, p=0.735). Among patients with CKD stage 3b or higher (CKD3b+; n=80; 1.5%), complications were more pronounced. In-hospital mortality was substantially higher (12.5% vs 2.7%; p=0.017), along with grade 4 CRS (7.7% vs 1.0%; p=0.011), acute myocardial infarction (6.3% vs 0.7%; p=0.007) and AKI (50.0% vs 11.7%; p<0.001). The cost of hospitalization (USD

446,074 vs 366,826; $p=0.197$) trended higher. Adjusted models confirmed markedly increased mortality (OR 10.2, 1.5–67.8; $p=0.016$). Other outcomes, including cost, did not reach significance after adjustment.

Conclusion

CKD3b+ is associated with substantially higher mortality, with a signal of augmented high-grade

CRS and cardiac events, whereas CKD3a+ exhibited worsening in renal outcomes and higher cost that was largely attenuated after adjustment. Collectively, these findings position pre-existing renal dysfunction, especially CKD3b+, as a clinically salient risk substrate warranting pre-emptive risk stratification and proactive organ-support pathways to mitigate downstream morbidity and mortality.

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