

Validating Chronic Kidney Disease-Specific Risk Factors for Cardiovascular Events Using National Data: A Retrospective Cohort Study of the Nationwide Inpatient Sample

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Abstract : Several risk factors associated with cardiovascular events have been identified as specific to Chronic Kidney Disease (CKD). This study endeavors to validate these CKD-specific risk factors using up-to-date national-level data, thereby highlighting the crucial significance of confirming the validity and generalizability of findings obtained from previous studies conducted on smaller patient populations. The study utilized the nationwide inpatient sample database to identify adult hospitalizations for CKD from 2016 to 2020, employing validated ICD-10-CM/PCS codes. A comprehensive literature review was conducted to identify both traditional and CKD-specific risk factors associated with cardiovascular events. Risk factors and cardiovascular events were defined using a combination of ICD-10-CM/PCS codes and statistical commands. Only risk factors with specific ICD-10 codes and hospitalizations with complete data were included in the study. Cardiovascular events of interest included cardiac arrhythmias, sudden cardiac death, acute heart failure, and acute coronary syndromes. Univariate and multivariate regression models were employed to evaluate the association between chronic kidney disease-specific risk factors and cardiovascular events while adjusting for the impact of traditional CV risk factors such as old age, hypertension, diabetes, hypercholesterolemia, inactivity, and smoking. A total of 690,375 hospitalizations for CKD were included in the analysis. The study population was predominantly male (375,564, 54.4%) and primarily received care at urban teaching hospitals (512,258, 74.2%). The mean age of the study population was 61 years (SD 0.1), and 86.7% (598,555) had a CCI of 3 or more. At least one traditional risk factor for CV events was present in 84.1% of all hospitalizations (580,605), while 65.4% (451,505) included at least one CKD-specific risk factor for CV events. The incidence of CV events in the study was as follows: acute coronary syndromes (41,422; 6%), sudden cardiac death (13,807; 2%), heart failure (404,560; 58.6%), and cardiac arrhythmias (124,267; 18%). 91.7% (113,912) of all cardiac arrhythmias were atrial fibrillations. Significant odds of cardiovascular events on multivariate analyses included: malnutrition (aOR: 1.09; 95% CI: 1.06-1.13; $p < 0.001$), post-dialytic hypotension (aOR: 1.34; 95% CI: 1.26-1.42; $p < 0.001$), thrombophilia (aOR: 1.46; 95% CI: 1.29-1.65; $p < 0.001$), sleep disorder (aOR: 1.17; 95% CI: 1.09-1.25; $p < 0.001$), and post-renal transplant immunosuppressive therapy (aOR: 1.39; 95% CI: 1.26-1.53; $p < 0.001$). The study validated malnutrition, post-dialytic hypotension, thrombophilia, sleep disorders, and post-renal transplant immunosuppressive therapy, highlighting their association with increased risk for cardiovascular events in CKD patients. No significant association was observed between uremic syndrome, hyperhomocysteinemia, hyperuricemia, hypertriglyceridemia, leptin levels, carnitine deficiency, anemia, and the odds of experiencing cardiovascular events.

Keywords : cardiovascular events, cardiovascular risk factors in CKD, chronic kidney disease, nationwide inpatient sample

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