



Shaping Tomorrow's Nephrology: Insight-Driven Kidney Care

KSN SEOUL, KOREA
2026

The 46th Annual Meeting of the Korean Society of Nephrology



Jun 11 (Thu) – 14 (Sun), 2026

COEX, Seoul, Korea

Abstract Type : Oral presentation

Abstract Submission No.: A-0560

Abstract Topic : Non-dialysis CKD

Performance of the Predicting Risk of Cardiovascular Disease Events (PREVENT) Equation for Cardiovascular Risk Prediction in Chronic Kidney Disease: A Nationwide Cohort Study

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Objectives : Conventional cardiovascular disease (CVD) risk equations often underestimate cardiovascular risk in individuals with chronic kidney disease (CKD). The recently developed PREVENT equation incorporates kidney function parameters and may improve cardiovascular risk stratification. We aimed to evaluate the performance of the predicting risk of cardiovascular disease events (PREVENT) equation in a large nationwide cohort and compare its predictive performance with commonly used conventional CVD risk equations.

Methods : We conducted a nationwide cohort study using the Korean National Health Insurance Service (NHIS) database, including 4,244,861 adults who underwent standardized national health examinations between 2012 and 2015, with follow-up beginning in 2016. Participants were stratified into CKD (eGFR <60 mL/min/1.73 m²) and non-CKD (eGFR ≥60) groups by kidney function. The primary outcome was incident cardiovascular disease, defined as a composite of atherosclerotic CVD and heart failure. PREVENT equation predictive performance was compared with the Framingham Risk Score, SCORE2, and Pooled Cohort Equation. Associations were evaluated using Cox proportional hazards models, and discrimination was assessed using C-statistics and time-dependent area under the receiver operating characteristic curve (AUC).

Results : Mean age was 45.6 ± 11.5 years; 56.3% were male; 3.24% had CKD. Higher PREVENT scores were significantly associated with increased CVD risk (HR 2.14; 95% CI, 2.13–2.15) in the total population, with consistent associations across kidney function strata. In discrimination analyses, the PREVENT equation demonstrated superior predictive performance (C-statistic 0.7072; 95% CI, 0.7057–0.7087). For incident CVD, the PREVENT model showed 8-year AUC of 0.713, which was higher than conventional models (8-year AUCs 0.698–0.704). These findings were consistent across kidney function strata.

Conclusions : In this large nationwide cohort, the PREVENT equation demonstrated improved discrimination for predicting incident cardiovascular disease compared with conventional equations. Incorporation of kidney function parameters enhances cardiovascular risk stratification and supports PREVENT use in both CKD and non-CKD populations.