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Patient Acuity and Cardiovascular outcome in Hemodialysis patients: A Korean Nationwide Cohort Study

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Objectives: Patients acuity has been reported to be associated with poor outcome in hospitals. However, the effect of the patient acuity of hemodialysis center on the prognosis of individual patients is not well known. In this study, the association between the severity of illness in hemodialysis facility and major adverse cardiac and cerebrovascular event (MACCE) in patients undergoing hemodialysis was investigated.

Methods: 15,633 participants receiving hemodialysis in the primary health care center who participated in the Periodic Hemodialysis Quality Assessment by Health Insurance Review & Assessment Service (HIRA) were examined. The main predictor was severity-to-nurse ratio, defined as a sum of Charlson comorbidity index of all patients divided by the number of nurses in each hemodialysis facility. The primary and secondary outcome were MACCE, and all-cause mortality, respectively.

Results: During a median follow-up of 5.5 years, MACCE and all-cause mortality occurred in 7,966 (51.0%) and 6,536 (41.8%) participants. Participants with higher severity-to-nurse ratio tended to have higher incidence rate of MACCE. The hazard ratios (HRs) of MACCE for the second, third, and highest quartiles compared with the lowest quartile of severity-to-nurse ratio were 1.05 (95% confidence intervals [CI], 0.98-1.11; *P*=0.151), 1.07 (95% CI, 1.00-1.14; *P*=0.053), and 1.08 (95% CI, 1.00-1.16; *P*=0.040). When treating severity-to-nurse ratio as a continuous variable, MACCE risk increased by 1% per 1 increase in severity-to-nurse ratio (HR, 1.01; 95% CI, 1.00 - 1.02; *P*=0.003). Compared to the lowest quartile group, the HRs of all-cause mortality for second, third and fourth quartile were 1.12 (95% CI, 1.04-1.19; *P*=0.002), 1.11 (95% CI, 1.03-1.19; *P*=0.005), and 1.16 (95% CI, 1.07-1.25; *P*<0.001), respectively.

Conclusions: As the part of the Joint Project on Quality Assessment Research by HIRA, the present study showed that the patient acuity was strongly associated with an increased risk of poor outcomes in hemodialysis patients.

Table 1. Incidence rate of outcomes according to quartiles of severity-to-nurse ratio.