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Time-Varying Association of Individual  
BP Components with eGFR in Late-Stage  
CKD

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## Abstract

**Background and objectives** The association of individual BP components with changes in eGFR in patients with late-stage CKD is unknown. The objectives of our study were to examine the associations of systolic BP, diastolic BP, and pulse pressure with continuous temporal changes in eGFR and an eGFR decline  $\geq 30\%$  in late-stage CKD.

**Design, setting, participants, & measurements** We performed a retrospective cohort study (2010–2015) of patients with CKD in a multidisciplinary CKD clinic with an eGFR  $\leq 30$ . The associations of repeat measures of BP (systolic BP, diastolic BP, and pulse pressure) with eGFR were examined using general linear mixed models. The associations of BP components and eGFR decline  $\geq 30\%$  were examined with time-varying Cox models.

**Results** In total, 1203 patients were followed for a median of 548 days (interquartile range, 292–913), with an average of 6.7 visits and BP measures per patient. Mean baseline systolic BP, diastolic BP, pulse pressure, and eGFR were 139.2 mmHg, 73.2 mmHg, 64.9 mmHg, and 16.8 ml/min, respectively. Systolic BP and diastolic BP measures over time were statistically significantly associated with changes in eGFR ( $P < 0.001$ ), whereas pulse pressure was not. Patients with extremes of systolic BP ( $< 105$  or  $> 170$ ) and high diastolic BP ( $> 90$ ) measures were at a higher risk of GFR decline  $\geq 30\%$  (systolic BP  $< 105$ : hazard ratio, 1.51; 95% confidence interval, 0.98 to 2.34; systolic BP  $> 170$ : hazard ratio, 1.62; 95% confidence interval, 1.05 to 2.49; referent systolic BP = 121–130; diastolic BP = 81–90: hazard ratio, 1.40; 95% confidence interval, 0.99 to 1.86; diastolic BP  $> 90$ : hazard ratio, 1.83; 95% confidence interval, 1.21 to 2.77; referent diastolic BP = 61–70). The findings were consistent after multiple sensitivity analyses. Pulse pressure was not significantly associated with risk of eGFR decline.

**Conclusions** In patients referred to a multidisciplinary care clinic with late-stage CKD, only extremes of systolic BP and elevations of diastolic BP were associated with eGFR decline.

eGFR CKD systolic blood pressure diastolic blood pressure  
pulse pressure linear mixed model repeat measures  
time-varying Cox proportional hazards model blood pressure  
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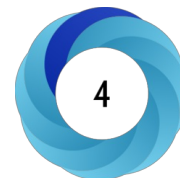
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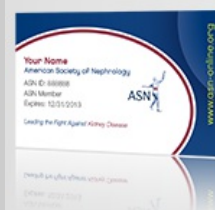
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