Different Angiotensin-Converting Enzyme Inhibitors and the Associations With Overall and Cause-Specific Mortalities in Patients With Hypertension

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BACKGROUND
Angiotensin-converting enzyme (ACE) inhibitors have been widely used in the treatment of hypertension, but the comparative effectiveness in reducing mortality among different drugs is seldom reported.

METHODS
We identified hypertensive patients who started captopril, enalapril, lisinopril, fosinopril, perindopril, ramipril, or imidapril therapy from Taiwan's National Health Insurance database between 1 January 2004 and 31 December 2009. Overall and cause-specific mortalities were ascertained through a linkage to Taiwan's National Death Registry. Patients were followed from the initiation of ACE inhibitors to death, disenrollment, or study termination (31 December 2010). A Cox proportional hazard regression model was used to calculate the hazard ratio (HR) and 95% confidence interval (CI), using ramipril as the reference group.

RESULTS
A total of 989,489 hypertensive patients were included, with a mean follow-up ranging from 3.5 years for imidapril to 4.5 years for enalapril. Captopril initiators had the highest overall mortality rate (117.8 per 1,000,000 person–days) as compared to other ACE inhibitors (54.3–79.4 per 1,000,000 person–days). Patients who started captopril therapy had a significantly increased risk of overall mortality (HR: 1.28, 95% CI: 1.24–1.31) when compared with ramipril. Enalapril (HR: 1.08, 95% CI: 1.05–1.11) and fosinopril (HR: 1.08, 95% CI: 1.05–1.12) were also associated with a modestly increased risk. No difference in mortality was found for lisinopril, perindopril, and imidapril, as compared with ramipril.

CONCLUSIONS
There are differences in the mortality risk associated with different ACE inhibitors. However, potential residual confounding effects might still exist.

Keywords: angiotensin-converting enzyme inhibitors; blood pressure; cohort studies; comparative effectiveness research; hypertension; mortality.

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