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Healthcare Expenditure Associated with Polypharmacy in Older Adults with Cardiovascular Diseases

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Older adults with cardiovascular diseases (CVD) have a high prevalence of multimorbidity and associated polypharmacy (taking 5 medications), which contribute to higher healthcare expenditure.¹ However, there is a knowledge gap regarding the economic impact of

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Conflict of Interest Statement

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polypharmacy in this population. Understanding the amplitude of the healthcare expenditure increase related to polypharmacy will provide valuable insight for both the patients, physicians and healthcare administrators for resource allocation and more efficient healthcare system.

We conducted a cross-sectional study using the 2017 Medical Expenditure Panel Survey data² to estimate the association between polypharmacy and annual healthcare expenditure. We included participants 65 years with CVD (coronary heart disease, angina pectoris, myocardial infarction, or other heart diseases). The number of prescriptions was defined as the total number of distinct medications that the patient was prescribed during the survey year. Polypharmacy was defined as when the patient was prescribed ≥ 5 medications. Cognitive limitations and activity limitation were defined as being present if the participant answered “Yes” to the relevant questions from the survey. The healthcare expenditure data were collected from the Medical Expenditure Panel Survey Household Component and Medical Provider Components. We subtracted pharmacy-related expenditure from the total healthcare expenditure to obtain nonpharmacy-related expenditure. Comorbidities included high blood pressure, coronary heart disease, angina, heart attack and other heart diseases, stroke, emphysema, chronic bronchitis, high cholesterol, cancer, diabetes, arthritis, and asthma. Using Poisson regression, we evaluated the incidence rate ratio (IRR) for the increase in each healthcare expenditure associated with polypharmacy, adjusting age (65 to 74 years, and >74 years), gender, race/ethnicity, education level, poverty level, cognitive limitation, activity limitation, number of comorbidities (0 to 3, and ≥ 4), and prescription insurance.

A total of 1,610 (weighted total = 17,297,514 older adults) were included in the final analysis. Polypharmacy was associated with increased total healthcare expenditure (IRR 1.98, 95% confidence interval [CI] 1.43 to 2.74), increased total pharmacy-related expenditure (IRR 2.87, 95% CI 1.51 ~ 5.45), and increased non-pharmacy related expenditure (IRR 1.78, 95% CI 1.26 to 2.52) (Table 1). After adjusting covariates, the expected average total healthcare expenditure for patients with polypharmacy was \$19,068 (95% CI 18,249 to 19,887) and \$8,815 (95% CI 8,544 to 9,086) without polypharmacy. The expected average pharmacy-related expenditure in those with polypharmacy was \$1,286 (95% CI 1,221 to 1,351) and \$488 (95% CI 461 to 515) without polypharmacy. The expected average non-pharmacy related expenditure was \$13,987 (95% CI 13,413 to 14,562) for those with polypharmacy and \$7,178 (95% CI 6,903 to 7,454) for those without polypharmacy.

After adjusting patient demographic and clinical factors, we determined that polypharmacy was associated with almost twice the total healthcare expenditure (198%) and 3 times for pharmacy expenditure (287%). Previous studies that evaluated the overall cost of polypharmacy or the economic burden of medication use were mostly conducted outside of the United States. Furthermore, although CVD is a strong predictor of polypharmacy and CVD medications are some of the most commonly prescribed medications,³ the incremental impact of polypharmacy on healthcare expenditure in those with CVD has not been thoroughly evaluated. The strength of our study is that we quantified the extent of economic burden from polypharmacy in those with CVD using nationally representative data. Our

study has several limitations, including under-reporting or lack of sufficient follow-up of medication changes because of the survey and cross-sectional methods. However, our study is the first to evaluate the economic impact of polypharmacy and additional prescription in older adults with CVD using national data, becoming a foundation for future studies to promote efficiency in healthcare.

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Table.

Adjusted incidence rate ratio (IRR) of polypharmacy for healthcare expenditures and expected average expenditures among older adults with cardiovascular disease *

	No polypharmacy (<5 medications) 1,169 (72.7%)	Polypharmacy (≥ 5 medications) 424 (27.3%)
Incidence rate ratio (IRR) of polypharmacy for three outcomes (IRR (95% Confidence Interval))		
Total Expenditure	Reference	1.98 (1.43, 2.74)
Pharmacy related expenditure		2.87 (1.51, 5.45)
Non-pharmacy related expenditure		1.78 (1.26, 2.52)
Expected expenditure from the multivariable Poisson regression (\$ (95% Confidence Interval))		
Total Expenditure	8,815 (8,544 ~ 9,086)	19,068 (18,249 ~ 19,887)
Pharmacy related expenditure	488 (461 ~ 515)	1,286 (1,221 ~ 1,351)
Non-pharmacy related expenditure	7,178 (6,903 ~ 7,454)	13,987 (13,413 ~ 14,562)

* The results are from a multivariable Poisson regression adjusting age (65~74, and >74), gender, race/ethnicity, education level, poverty level, polypharmacy, cognitive limitation, activity limitation, number of comorbidities (0~3, and four or more), and prescription insurance.