Multimorbidity in Atherosclerotic Cardiovascular Disease and Its Associations with Adverse Cardiovascular Events and Healthcare Costs: A Real-World Evidence Study

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INTRODUCTION

- Atherosclerotic cardiovascular disease (ASCVD) remains the leading cause of morbidity and mortality in the United States and worldwide, accounting for substantial suffering and healthcare-related expenditures.[1,2]
- Multimorbidity increases the complexity of disease management and poses a significant clinical and public health challenge.[2-4]
- Real-world evidence on multimorbidity in ASCVD is lacking.

OBJECTIVES

- To evaluate the prevalence of multimorbidity among patients with ASCVD.
- Identify common comorbid condition combinations in ASCVD.
- To assess the associations of multimorbidity with adverse cardiovascular events (ACEs) and healthcare costs among patients with ASCVD.

METHODS

- This retrospective observational cohort study was conducted using Aetna administrative claims database.
- ASCVD was defined based on the AHA/ACC definition and identified using ICD-10-CM codes[1] during the study period (1/1/2018-10/31/2021).
- The earliest ASCVD diagnosis date was identified as index date.
- Minimal continuous health plan enrollment 12 months before and after index date.
- Patient socioeconomic and demographic characteristics and comorbid conditions were assessed using all data available within 12 months prior to and including the index date.[2]
- Association rule mining was applied to identify comorbid condition combinations.[4]
- ACEs and healthcare costs were assessed using all data within 12 months after the index date (follow-up period).
- Multivariable generalized linear models were performed to examine the associations between multimorbidity and ACEs and healthcare costs, adjusting for sociodemographic factors.

RESULTS

Of 223,923 patients with ASCVD (mean [SD] age, 73.6 [10.7]; 42.2% female), 98.5% had ≥2, and 89.1% had ≥5 comorbid conditions. The mean [SD] number of comorbid conditions was 7.1 [3.2], median [IQR] was 7 [5-9].

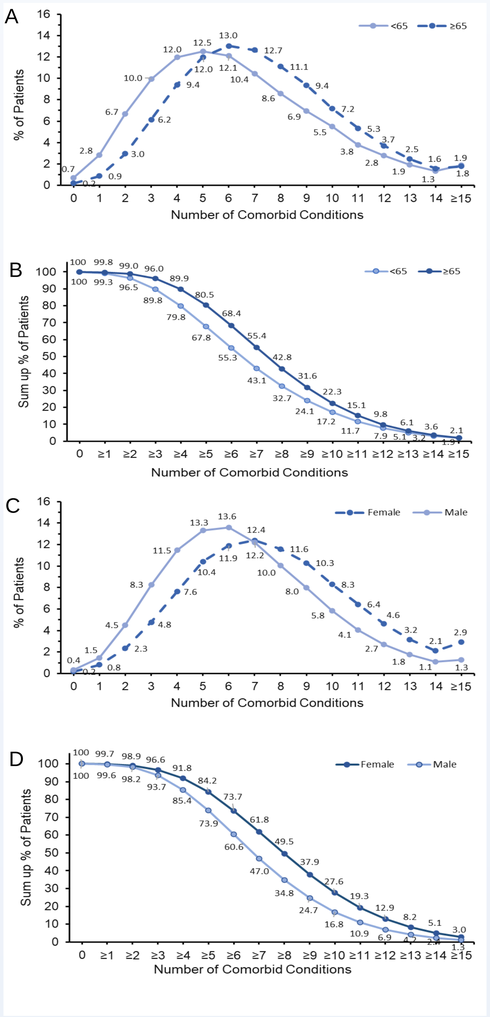

Figure 1. Proportion of ASCVD patients with the indicated number of comorbid conditions by age group (A). Summed proportions of multimorbidity with the indicated number of comorbid conditions by age group (B). Proportion of ASCVD patients with the indicated number of comorbid conditions by gender (C). Summed proportions of multimorbidity with the indicated number of comorbid conditions by gender (D).

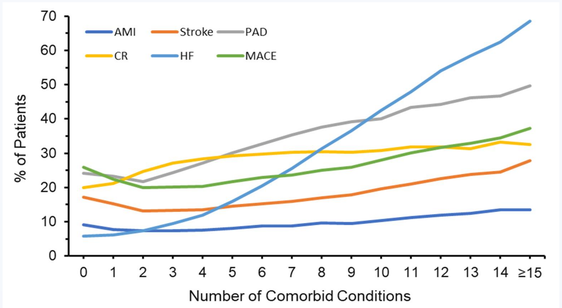

Figure 2. Prevalence of ACEs in ASCVD patients with different number of comorbid conditions

Table 1. Association of number of comorbid conditions with ACEs

ACEs	Abbreviation	Adjusted OR (95% CI)
Acute myocardial infarction	AMI	1.065 (1.061-1.070)
Ischemic stroke	Stroke	1.055 (1.050-1.061)
Peripheral artery disease	PAD	1.088 (1.085-1.092)
Coronary revasculation	CR	1.040 (1.037-1.043)
Heart failure	HF	1.282 (1.278-1.286)
Major ACEs	MACE	1.060 (1.057-1.063)

*adjusted by age, gender, geographic region, household incomes, and type of health insurance.

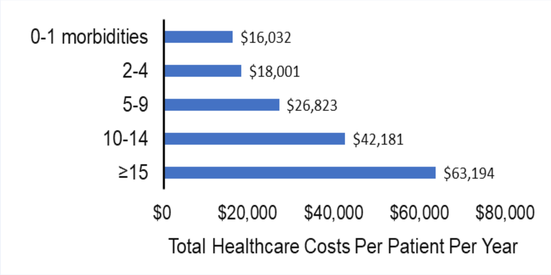

Figure 3. Bar chart of total All-cause Healthcare Cost by Number of Comorbid Conditions Group

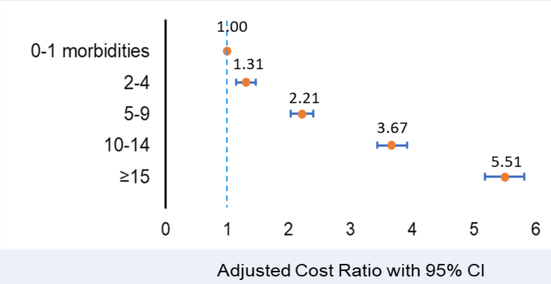

Figure 4. Forest plot of multivariable adjusted cost ratios (ACR) of number of comorbid conditions group for total all-cause healthcare cost. Adjusted variables included age, gender, geographic region, rural or urban residence, household income, social vulnerability index, and type of health insurance. The vertical dashed blue line represents a ACR of 1 as the reference line, which is associated with equal costs for all number of comorbid conditions groups. For each ACR displayed, the orange circle symbol depicts the ACR, and the horizontal blue line represents the 95% CI. Lines that do not cross the reference line are statistically significant.

CONCLUSION

- Multimorbidity was highly prevalent among patients with ASCVD.
- Multimorbidity patterns varied considerably across ASCVD patients and by age, gender, and social vulnerability status.
- Multimorbidity was strongly associated with ACEs.
- Multimorbidity was strongly associated with increased healthcare costs.
- Highly prevalent multimorbidity should be considered in the context of clinical decision-making to optimize secondary prevention of ASCVD.

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