Acute Myocardial Infarction and Associated Healthcare Resource Utilization and Costs Among U.S. Patients with Extreme High versus Low Lipoprotein(a)

EE467

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Introduction

- Elevated lipoprotein (a) [Lp(a)] is associated with increased cardiovascular risk, including acute myocardial infraction (AMI).[1,2]
- In the United States, there are no FDA-approved pharmaceutical treatments available to specifically target Lp(a).
- Currently, there is a lack of data examining cardiovascular-related healthcare resource utilization and cost burden of elevated Lp(a) in the real-world setting.

Objective

- To compare acute myocardial infarction (AMI)-related and all-cause healthcare resource utilization and costs (HRU&C) among patients with extremely high (XHI) vs low (LO) Lp(a) levels.

Methods

- This retrospective cohort study used NLP-enhanced data from the Veradigm Network EHR linked to closed claims from Komodo Health to identify adults with ≥1 Lp(a) lab result between January 1, 2016 and January 31, 2023.
- Patient demographics were described at baseline. Lab measures, lipid-lowering medications, and number of standard modifiable risk factors (SMuRFs) (0, 1, 2, 3, 4+) were captured in the baseline period. SMuRFs were defined as having hypertension, dyslipidemia, diabetes, chronic kidney disease, current or former smoker status, alcohol use disorder, and body mass index (BMI) <18.5 or ≥25.
- Individual SMuRFs and AMI, defined by ICD-10-CM diagnosis codes, were recorded in the variable-length follow-up period along with per patient per year (PPPY) AMI-related and all-cause healthcare utilization and costs.
- Patients were stratified by Lp(a) value into those with low (<50th percentile ["LO"]) and extremely high (>90th percentile ["XHI"]). Inverse probability treatment weighting (IPTW) was used to create a weighted study sample using the following variables: categorical age, sex, race, geographic region, # of baseline SMuRFs, and baseline statin and non-statin lipid-lowering medication use.
- Results are reported for the effective sample sizes of the LO and XHI cohorts following IPTW.

Figure 1: Patient Selection

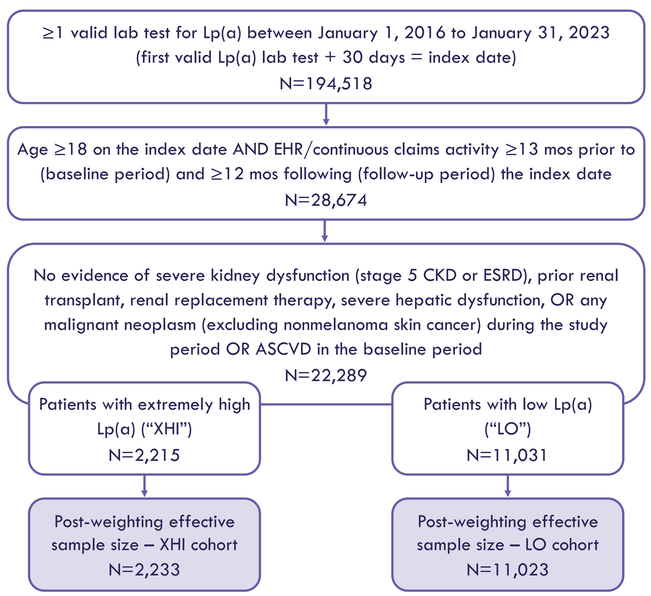


Table 1: Baseline Patient Demographics

	Extremely High Lp(a) N=2,233	Low Lp(a) N=11,023	*p*
Age, Mean (SD)	53.1 (12.7)	53.3 (13.0)	0.52
Age Group, N (%)			0.98
18-34	193 (8.7%)	943 (8.6%)	
35-44	346 (15.5%)	1,691 (15.3%)	
45-54	607 (27.2%)	2,954 (26.8%)	
55-64	739 (33.1%)	3,640 (33.0%)	
65-74	237 (10.6%)	1,223 (11.1%)	
75+	111 (5.0%)	572 (5.2%)	
Sex, N (%)			0.47
Male	996 (44.6%)	4,822 (43.7%)	
Female	1,238 (55.4%)	6,201 (56.3%)	
Race, N (%)			0.96
White	1,501 (67.2%)	7,347 (66.7%)	
Black	121 (5.4%)	601 (5.5%)	
Asian	120 (5.4%)	613 (5.6%)	
Other	202 (9.1%)	1,043 (9.5%)	
Unknown/Not Reported	290 (13.0%)	1,418 (12.9%)	
Geographic Region, N (%)			0.87
Northeast	335 (15.0%)	1,719 (15.6%)	
Midwest	336 (15.1%)	1,686 (15.3%)	
South	889 (39.8%)	4,314 (39.1%)	
West	673 (30.1%)	3,303 (30.0%)	

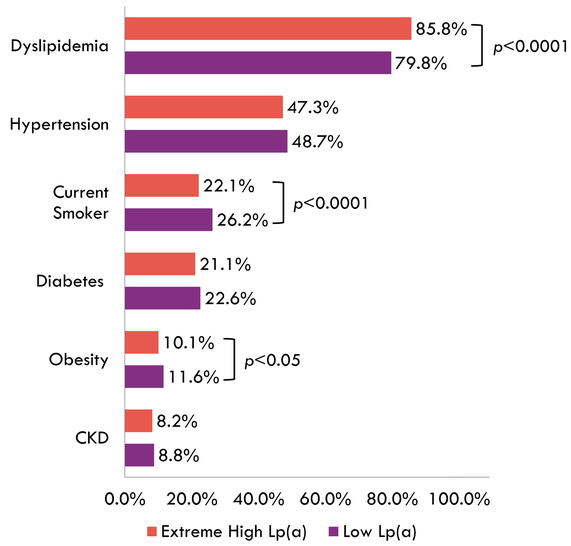
SD, standard deviation.

Table 2: Baseline Clinical Characteristics

	Extremely High Lp(a) N=2,233	Low Lp(a) N=11,023	*p*
Lipid Measures, Mean (SD)			
Lp(a), nmol/L	303.9 (78.0)	21.1 (10.6)	**<0.0001**
Total Cholesterol, mg/dL	212.2 (47.9)	195.0 (45.8)	**<0.0001**
HDL-C, mg/dL	59.7 (17.7)	56.2 (17.6)	**<0.0001**
LDL-C, mg/dL	127.0 (44.6)	114.5 (39.1)	**<0.0001**
Triglycerides, mg/dL	122.4 (74.6)	136.6 (114.5)	**<0.0001**
Total Number of SMuRFs, Mean (SD)	2.0 (1.2)	2.0 (1.2)	0.73
Medication Use, N (%)			
Statins	849 (38.0%)	4,271 (38.7%)	0.52
Non-statin Therapies*	965 (43.2%)	4,873 (44.2%)	0.38
Total All-Cause Healthcare Costs, Mean (SD)	$6,643 ($11,739)	$6,882 ($12,980)	0.42

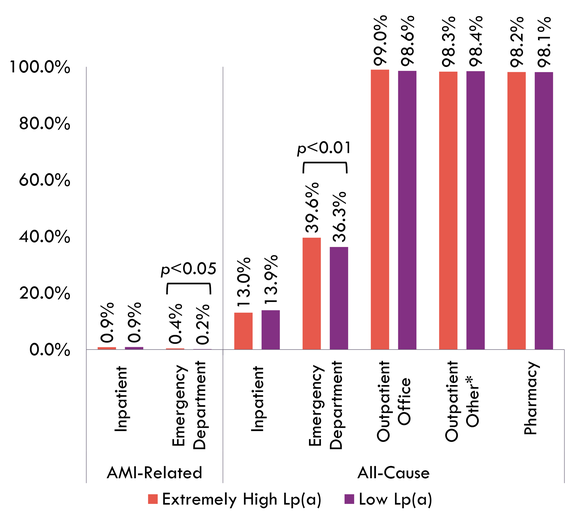
*Non-statin therapies include PCSK9 inhibitors, omega-3 fatty acid ethyl esters, niacin, fibrates, dietary sources/soluble fiber, ezetimibe, bile acid sequestrants, ANGPTL3 inhibitors, and ACLY inhibitors. HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; Lp(a), lipoprotein(a); SD, standard deviation; SMuRFs, standard modifiable risk factors.

Figure 2: Top Risk Factors in Variable Length Follow-Up by Lp(a) Cohort



CKD, chronic kidney disease; Lp(a), lipoprotein(a).

Figure 3: Proportion of Patients with AMI-related and All-Cause Healthcare Utilization in Variable-Length Follow-Up by Lp(a) Cohort

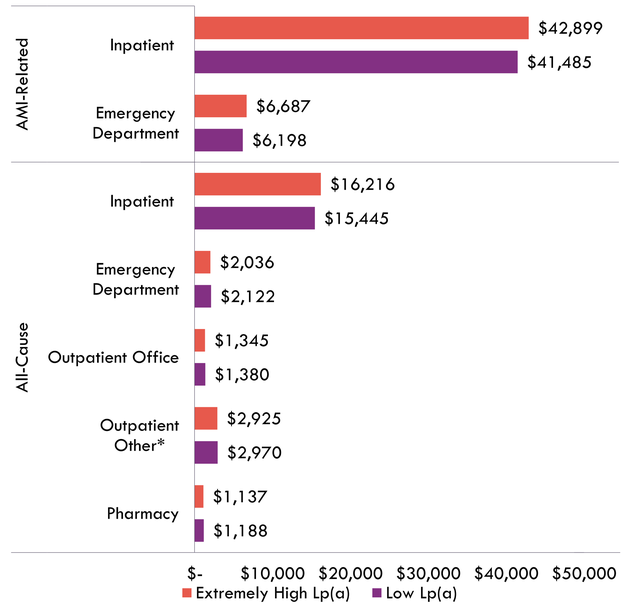


*Outpatient other services includes labs, radiology, E&M/observation, other. AMI, acute myocardial infarction; Lp(a), lipoprotein(a).

Results

- Mean age was 53 years across the Lp(a) cohorts and majority were female (XHI: 55.4 vs LO: 56.3%) and White (67.2% vs 66.7%) **(Table 1)**.
- Mean (SD) Lp(a) (nmol/L) in the XHI cohort was 303.9 (78.0) nmol/L vs 21.1 (10.6) nmol/L in the LO cohort (p<0.0001) **(Table 2)**. Compared to patients with LO Lp(a), patients with XHI Lp(a) had higher total cholesterol and LDL-C levels, both above optimal clinical ranges (all p<0.0001).
- Similarly, in both cohorts, patients had a mean (SD) total number of 2.0 (1.2) SMuRFs at baseline; more than a third of study patients had evidence of statin use (38%).
- After weighting for baseline number of SMuRFs, dyslipidemia was more commonly observed among XHI vs LO patients in both baseline (79.6% vs 76.0%) and follow-up (85.8% vs 79.8%; both p<0.0001) **(Figure 2)**.

Figure 4: AMI-related and All-Cause Healthcare Costs, PPPY, in Variable-Length Follow-Up by Lp(a) Cohort



*Outpatient other services includes labs, radiology, E&M/observation, other. AMI, acute myocardial infarction; Lp(a), lipoprotein(a).

Results (cont'd)

- Mean (SD) follow-up length was similar across cohorts (1,239.0 [641.7] days). AMI was rare and did not vary by XHI vs LO cohort (1.6% vs 1.5%).
- There was no significant difference in all-cause inpatient admissions (IP) (13.0% vs 13.9%), though emergency department (ED) visits (39.6% vs 36.3%) differed significantly by cohort (p<0.01); mean PPPY IP ($16,215 vs $15,445) and ED ($2,036 vs $2,122) costs did not differ by cohort **(Figures 3 and 4)**.
- Mean total all-cause healthcare costs did not significantly differ by cohort in baseline ($6,643 vs $6,882) or variable-length follow-up ($8,242 vs $8,381).
- For AMI-related utilization and costs, only ED visits (0.41% vs 0.16%) differed significantly (p<0.05), while IP admissions (0.85% vs 0.90%) and PPPY costs for IP ($42,899 vs $41,485) and ED ($6,687 vs $6,198) did not **(Figures 3 and 4)**.

Conclusions

- After weighting, patients with extremely high Lp(a) did not have a greater risk of AMI than the patients with low Lp(a).
- The similarity in all-cause and AMI-related PPPY HRU&C suggests acute events, such as AMI, may not have the sustained burden of chronic conditions.
- Future work should examine the impact of Lp(a) on AMI over a longer time period; the mean 3.4 years of follow-up time may not be sufficient to observe the long-term health and economic burden among patients with elevated Lp(a).

References

1. Ciffone N, et al. *Am Heart J Plus.* 2023;38:100350. doi:10.1016/j.ahjo.2023.100350
2. Cai G, et al. *Biosci Rep.* 2019;39(4):BSR20182096. doi:10.1042/BSR201820960

Disclosures

J Tome was an employee of Veradigm at the time of this study. All other authors are current employees of Veradigm which funded and provided the data used in this study.