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National Assessment of Statin Therapy in Patients Hospitalized with Acute Myocardial Infarction: Insight from China PEACE-Retrospective AMI Study, 2001, 2006, 2011

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National Assessment of Statin Therapy in Patients Hospitalized with Acute Myocardial Infarction: Insight from China PEACE-Retrospective AMI Study, 2001, 2006, 2011

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Abstract

Background- Statin therapy is among the most effective treatments to improve short- and long-term mortality after acute myocardial infarction. The use of statin, and the intensity of their use, has not been described in acute myocardial infarction patients in China, a country with a rapidly growing burden of cardiovascular disease.

Methods and Results- Using a nationally representative sample of patients with acute myocardial infarction admitted to 162 Chinese hospitals in 2001, 2006 and 2011, we identified 14,958 patients eligible for statin therapy to determine rates of statin use and the intensity of statin therapy, defined as those statin regimens with expected low-density lipoprotein cholesterol lowering of at least 40%, to identify factors associated with the use of statin therapy. Statin use among hospitalized patients with acute myocardial infarction increased from 27.9% in 2001 to 72.5% in 2006, and 88.8% in 2011 ($P<0.001$ for trend). Regional variation in statin use correspondingly decreased over time. Among treated patients, those receiving intensive statin therapy increased from 1.0% in 2001 to 24.2% in 2006 to 57.2% in 2011($P<0.001$ for trend). Patients without low-density lipoprotein cholesterol measured were less likely to be treated with statin or to receive intensive therapy.

Conclusions- The use of statin therapy has dramatically increased over the past decade in Chinese patients with acute myocardial infarction. However, half of patients still did not receive intensive statin therapy in 2011. Given that guidelines strongly endorse intensive statin therapy for acute myocardial infarction patients, initiatives promoting the use of statin therapy, with attention to treatment intensity, would support further improvements in practice.

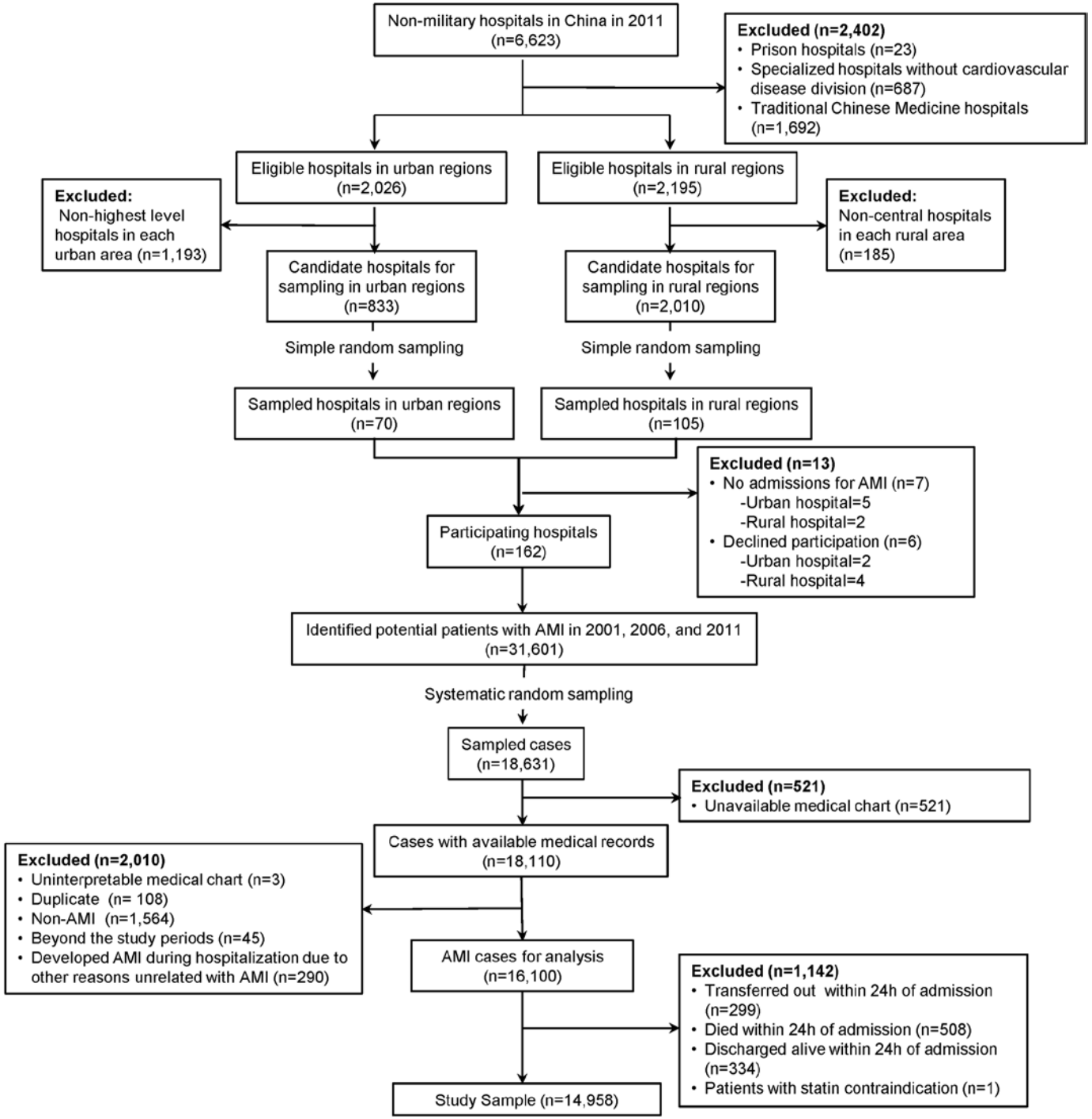

Figure 1. Flow Diagram of Study Sample.

Table 1. Baseline Characteristics of the Study Cohort Stratified by Statin Therapy.

Characteristics	Total NO (%)	Statin Therapy NO (%)	No Statin Therapy NO(%)	*P* value
All eligible patients	14,958	11,268(75.3)	3690(24.7)	<0.001
Demographic				
Age, years				0.092
<55	3346(22.4)	2563(22.7)	783(21.2)	
55–64	3562(23.8)	2710(24.1)	852(23.1)	
65–74	4471(29.8)	3258(28.9)	1213(32.9)	
≥75	3579(23.9)	2737(24.3)	842(22.8)	
Gender				
Female	4446(29.7)	3306(29.3)	1140(30.9)	0.073
CVD risk factors				
Prior hypertension	7430(49.7)	5908(52.4)	1522(41.2)	<0.001
Prior diabetes	2603(17.4)	2134(18.9)	469(12.7)	<0.001
Prior dyslipidemia	9050(60.5)	7410(65.8)	1640(44.4)	<0.001
Current smoker	5242(35.0)	4197(37.2)	1045(28.3)	<0.001
Medical histories				
Myocardial infarction	1615(10.8)	1267(11.2)	348(9.4)	0.002
Ischemic stroke	1534(10.3)	1159(10.3)	375(10.2)	0.831
Hemorrhagic stroke	184(1.2)	134(1.2)	50(1.4)	0.428
Clinical characteristics at admission				
Chest discomfort	13751(91.9)	10467(92.9)	3284(89.0)	<0.001
Cardiac arrest	176(1.2)	141(1.3)	35(0.9)	0.138
Cardiac shock	644(4.3)	462(4.1)	182(4.9)	0.031

Table 1. Continued.

Characteristics	Total NO (%)	Statin Therapy NO (%)	No Statin Therapy NO(%)	*P* value
AMI type				
STEMI	12806(85.6)	9569(84.9)	3237(87.7)	<0.001
Laboratory test				
LDL-C level, mmol/L				<0.001
< 1.81	1443(9.6)	1158(10.3)	285(7.7)	
1.81–2.59	3677(24.6)	3030(26.9)	647(17.5)	
2.60–3.37	3803(25.4)	3166(28.1)	637(17.3)	
>3.37	2707(18.1)	2291(20.3)	416(11.3)	
Unmeasured	3328(22.2)	1623(14.4)	1705(46.2)	
Economic-geographic region				<0.001
Eastern	8866(59.3)	6783(60.2)	2083(56.4)	
Central	3195(21.4)	2246(19.9)	949(25.7)	
Western	2897(19.4)	2239(19.9)	658(17.8)	
Urban/Rural				
Rural	5664(37.9)	3796(33.7)	1868(50.6)	<0.001
Urban	9294(62.1)	7472(66.3)	1822(49.4)	
Year				<0.001
2001	2198(14.7)	613(5.4)	1585(43.0)	
2006	4159(27.8)	3016(26.8)	1143(31.0)	
2011	8601(57.5)	7639(67.8)	962(26.1)	

AMI indicates acute myocardial infarction;

STEMI indicates ST-segment elevation myocardial infarction;

LDL-C indicates low density lipid cholesterol.

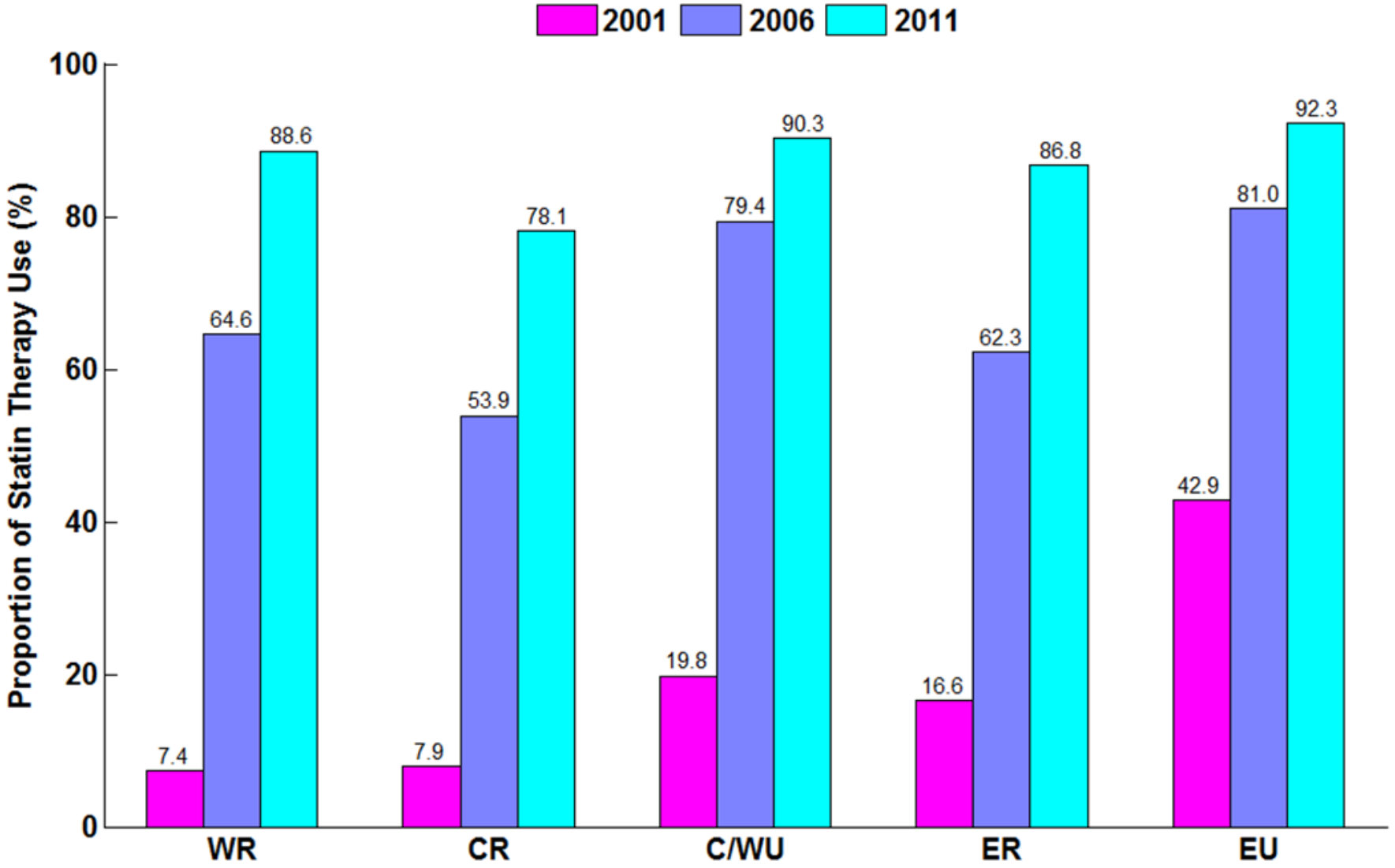

Figure 2. Proportion of Patients Receiving Statin therapy Stratified by Region.
P for trend <0.001 for the proportion of statin therapy in 2001, 2006 and 2011.P for trend <0.001 for the proportion of statin therapy in different regions.WR indicates Western rural; CR indicates Central rural; ER indicates Eastern rural; C/WU indicates Central/Western urban; EU indicates Eastern urban.

Table 2. Baseline Characteristics of Statin-Treated Patients Stratified by Treatment Intensity.

Characteristics	Total NO (%)	Intensive Statin Therapy NO (%)	Less Intensive Statin Therapy NO (%)	*P* value
All patients	11,010*	5106 (46.4)	5904 (53.6)	0.002
Demographic				
Age, years				
<55	2491(22.6)	1216(23.8)	1275(21.6)	0.826
55–64	2647(24.0)	1252(24.5)	1395(23.6)	
65–74	3177(28.8)	1400(27.4)	1777(30.1)	
≥75	2695(24.5)	1238(24.2)	1457(24.7)	
Gender				
Female	3230(29.3)	1378(26.9)	1852(31.4)	<0.001
CVD risk factors				
Prior hypertension	5921(53.8)	2848(55.8)	3073(52.0)	<0.001
Prior diabetes	2446(22.2)	1272(24.9)	1174(19.9)	<0.001
Prior dyslipidemia	7229(65.7)	3619(70.9)	3610(61.1)	<0.001
Current smoker	4118(37.4)	2041(39.9)	2077(35.2)	<0.001
Medical histories				
Myocardial infarction	1239(11.3)	604(11.8)	635(10.8)	0.075
Ischemic stroke	1136(10.3)	511(10.1)	625(10.6)	0.319
Hemorrhagic stroke	132(1.2)	61(1.2)	71(1.2)	0.969
Clinical characteristics at admission				
Chest pain	10224(92.9)	4757(93.4)	5457(92.4)	0.058
Cardiac arrest	137(1.2)	68(1.3)	69(1.2)	0.441
Cardiac shock	450(4.1)	216(4.2)	234(3.9)	0.481

Table 2. Continued.

Characteristics	Total NO (%)	Intensive Statin Therapy NO (%)	Less Intensive Statin Therapy NO (%)	*P* value
AMI type				
STEMI	9344(84.9)	4223(82.7)	5121(86.7)	<0.001
Laboratory test				
LDL-C level, mmol/L				<0.001
< 1.81	1140(10.4)	529(10.4)	611(10.3)	
1.81–2.59	2952(26.8)	1405(27.5)	1547(26.2)	
2.60–3.37	3091(28.1)	1499(29.3)	1592(27.0)	
>3.37	2251(20.4)	1137(22.3)	1114(18.9)	
Unmeasured	1576(14.3)	536(10.5)	1040(17.6)	
Economic-geographic region				0.872
Eastern	6585(59.8)	3436(67.3)	3149(53.3)	
Central	2224(20.2)	843(16.5)	1381(23.4)	
Western	2201(20)	827(16.2)	1374(23.3)	
Urban/Rural				
Rural	3708(33.7)	1165(22.8)	2543(43.1)	<0.001
Urban	7302(66.3)	3941(77.2)	3361(56.9)	
Year				
2001	592(5.4)	6(0.1)	586(9.9)	<0.001
2006	2956(26.8)	729(14.3)	2227(37.7)	
2011	7462(67.8)	4371(85.6)	3091(52.4)	

*Note: 11,268 patients received statin therapy; however, the dose was not documented in the medical record of 258 patients and were excluded from this table, leaving11,010 patients whose statin dose was definitively recorded.

AMI indicates acute myocardial infarction;

STEMI indicates ST-segment elevation myocardial infarction;

LDL-C indicates low density lipid cholesterol.

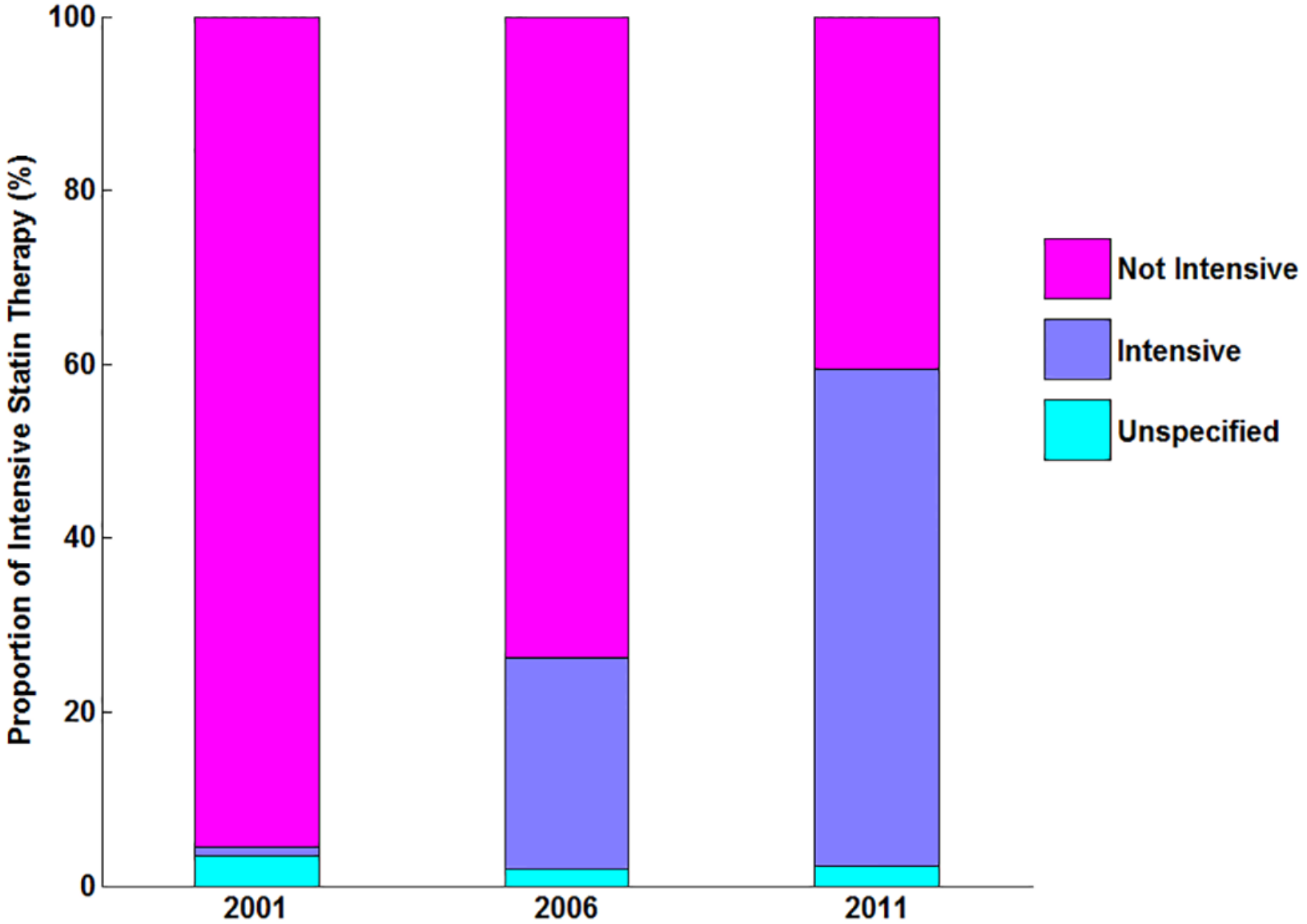

Figure 3. Statin Intensity Therapy among Patients with Statin Therapy in China.
P for trend <0.001 for the proportion of intensive statin therapy in 2001, 2006 and 2011. WR indicates Western rural; CR indicates Central rural; ER indicates Eastern rural; C/WU indicates Central/Western urban; EU indicates Eastern urban.

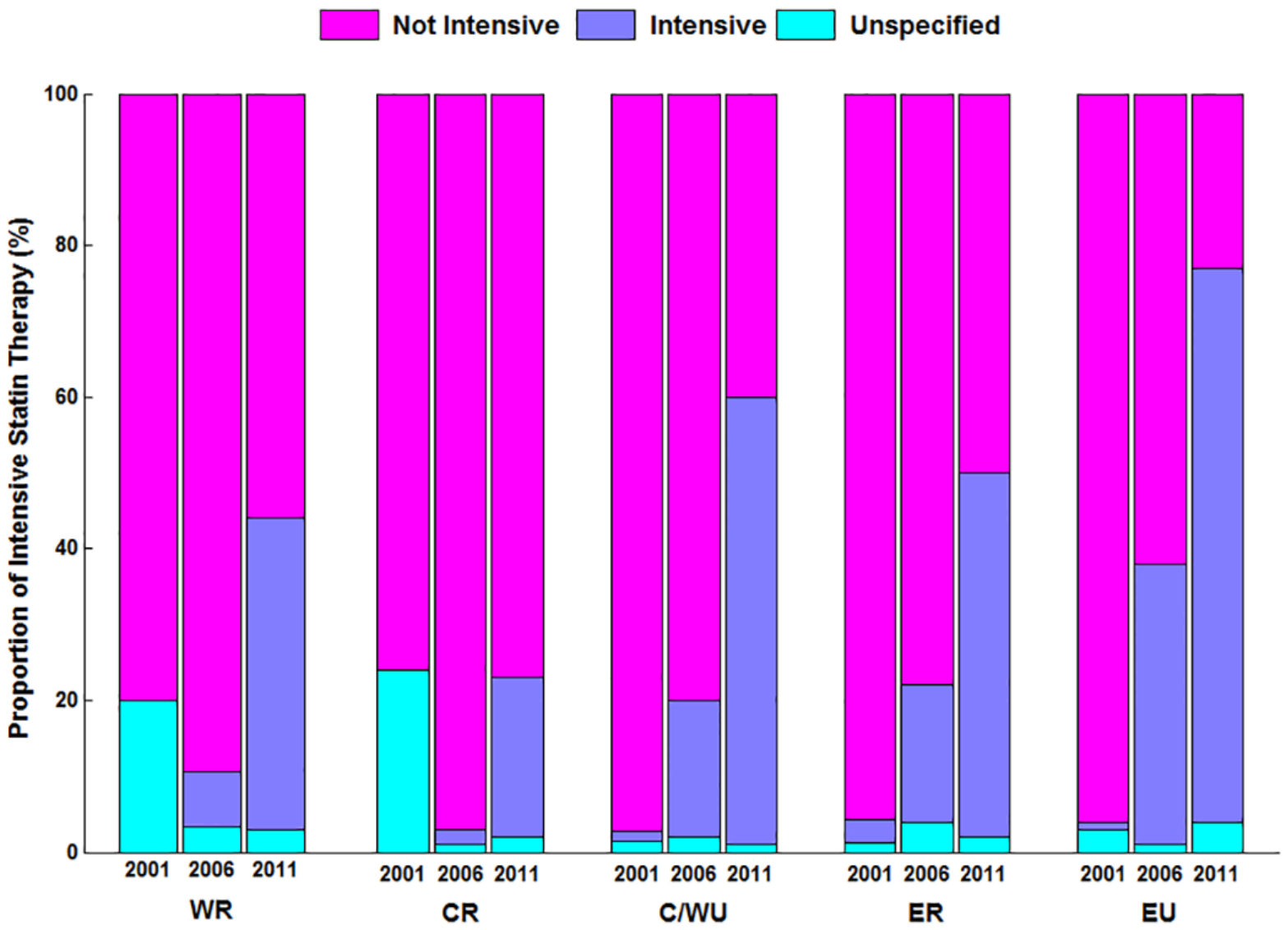

Figure 4. Statin Intensity Therapy among Patients with Statin Therapy Stratified by Region.

P for trend <0.001 for the proportion of intensive statin therapy in different regions. WR indicates Western rural; CR indicates Central rural; ER indicates Eastern rural; C/WU indicates Central/Western urban; EU indicates Eastern urban.

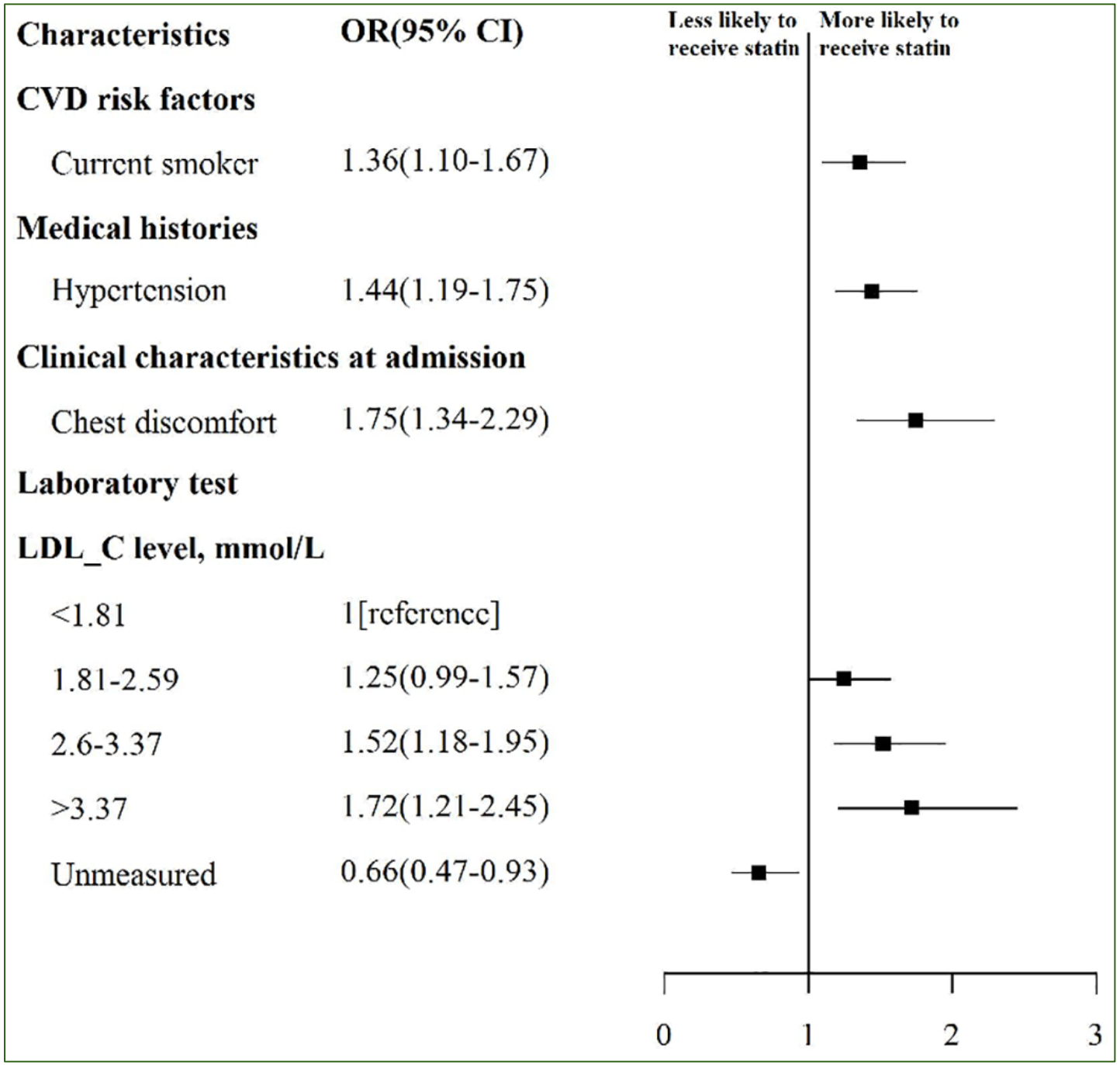

Figure 5. Factors Independently Associated with Statin Use in 2011.

Variables with significant association with any usage of statin are shown along the vertical axis. The strength of effect is shown along the horizontal axis with the vertical dotted line demarking an odds ratio of 1 (that is, no association); estimates to the right (that is, > 1) are associated with greater likelihood of early statin use, while those to the left (that is, < 1) indicate association with reduced likelihood of early statin use. Each square and line represents the point estimate of the effect of that variable in the model, while the line shows the 95% confidence interval. CVD indicates cardiovascular disease.

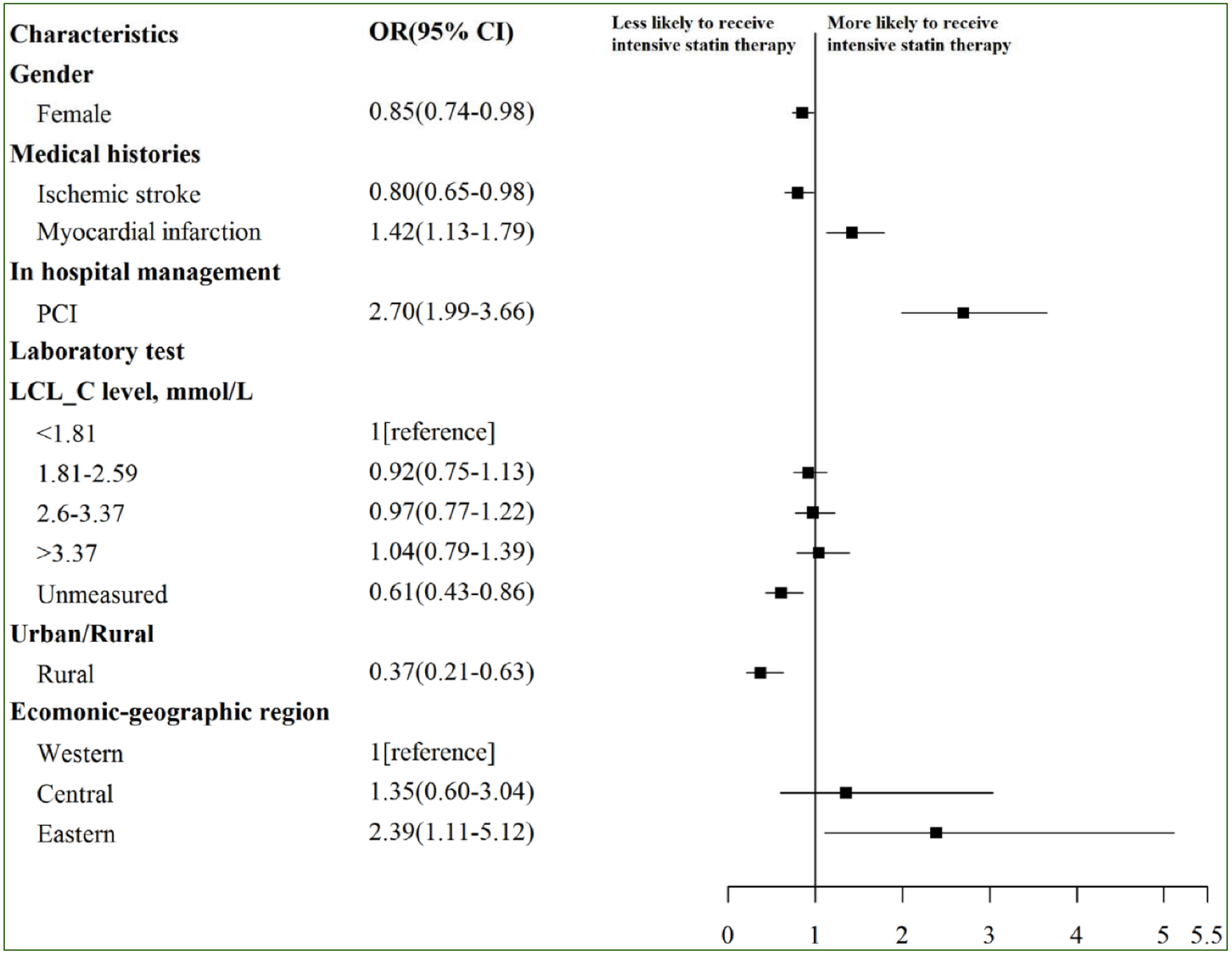

Figure 6. Factors Independently Associated with Intensive Statin Therapy in 2011.

Variables with significant association with usage of intensive statin therapy are shown along the vertical axis. The strength of effect is shown along the horizontal axis with the vertical dotted line demarking an odds ratio of 1 (that is, no association); estimates to the right (that is, >1) are associated with greater likelihood of early statin use, while those to the left (that is, <1) indicate association with reduced likelihood of early statin use. Each square and line represents the point estimate of the effect of that variable in the model, while the line shows the 95% confidence interval.

Conclusion

- This national quality assessment found that the use of statin among patients with AMI in China increased sharply over the past decade; however, several opportunities to improve care persist, particularly with regards to the use of intensive statin therapy.
- Given that guidelines strongly endorse intensive statin therapy for acute myocardial infarction patients, initiatives promoting the use of statin therapy, with attention to treatment intensity, would support further improvements in practice.
- Our findings highlight an opportunity for better translation of evidence into clinical practice with a focus on more consistent care throughout China.