

Associations of Comprehensive Stroke Center Scores with Medical and Long-Term Care Expenditures in Ischemic Stroke Patients after Hospital Discharge: J-ASPECT & LIFE Study

Ono Y¹, Fukuda H¹, Shimogawa T², Takegami M³, Yoshimoto K², Iihara K³

¹Kyushu University, Fukuoka, Japan, ²Kyushu University Hospital, Fukuoka, Japan, ³National Cerebral and Cardiovascular Center Hospital, Osaka, Japan

Introduction

- Comprehensive stroke centers (CSCs) are facilities that can diagnose and treat stroke patients with intensive and advanced care.
- CSC capabilities of a hospital can be assessed using CSC scores that are calculated based on the hospital’s fulfillment of 25 recommended items.
- Associations between hospitals’ CSC scores and aspects of stroke treatment, such as in-hospital mortality and patient outcomes, were explored [1,2].
- So far associations between CSC scores and medical and long-term care (LTC) expenditures after the discharge of patients were not known.
- The aim of this study is to shed light on this topic.

Methods

Data

- The data source was Longevity Improvement and Fair Evidence (LIFE) Study database, a multi-region community-based public insurance database project.
- Claims data from April 1, 2017 to March 31, 2020 were utilized.

Cases

- The subjects of the analysis were patients both admitted and discharged in 2018 fiscal year to the hospital which had both CSC score and Diagnosis Procedure Combination (DPC) payment system.
- Claims for the subjects were required to first appear on the LIFE Study database at least a year before the first DPC admission for ischemic stroke in 2018 fiscal year, and for the subjects no prior stroke DPC admission was present for a year.
- Cases in which patients received welfare, and patients transferred to another hospital in the first admission episode were excluded.
- Observations started the next month the patient was discharged and were continued for up to 12 months.

Medical and LTC Expenditures

- Medical and LTC expenditures were calculated for each observational month.

Statistical Analysis

- Subjects were divided into high/low-CSC groups.
- Inverse probability weighting (IPW) method was applied to balance baseline characteristics.
- Monthly medical and LTC expenditures were analyzed using a weighted Gamma regression model.
- The analysis of LTC expenditures were combined with a hurdle model.

Results

1. Patients’ baseline characteristics and stroke risk factors

- After IPW method was applied, all the SMDs were smaller than 0.1, so all baseline characteristics considered in this study were balanced.

	Original			IPW		
	low-CSC	high-CSC	SMD	low-CSC	high-CSC	SMD
N	168	204		371.86	370.47	
Age, mean ± SD	80.06 ± 9.33	78.44 ± 9.47	0.173	79.04 ± 9.68	79.08 ± 9.24	0.004
Female, N(%)	88 (52.4%)	120 (58.8%)	0.13	209.4 (56.3%)	206.7 (56.6%)	0.006
Medical Expenditure before admission, mean in yen	81264	100901	0.132	92500	92834	0.002
Receiving LTC, N(%)	41 (24.4%)	44 (21.6%)	0.067	81.1 (21.8%)	82.7 (22.3%)	0.012
LTC Expenditure before admission, mean in yen	43366	38706	0.053	39311	40033	0.008
Arrhythmia, N(%)	46 (27.4%)	65 (31.9%)	0.098	107.8 (29.0%)	110.4 (29.8%)	0.018
HT, N(%)	112 (66.7%)	142 (69.6%)	0.063	252.6 (67.9%)	252.6 (68.2%)	0.005
DM, N(%)	47 (28.0%)	57 (27.9%)	0.001	109.3 (29.4%)	104.9 (28.3%)	0.024

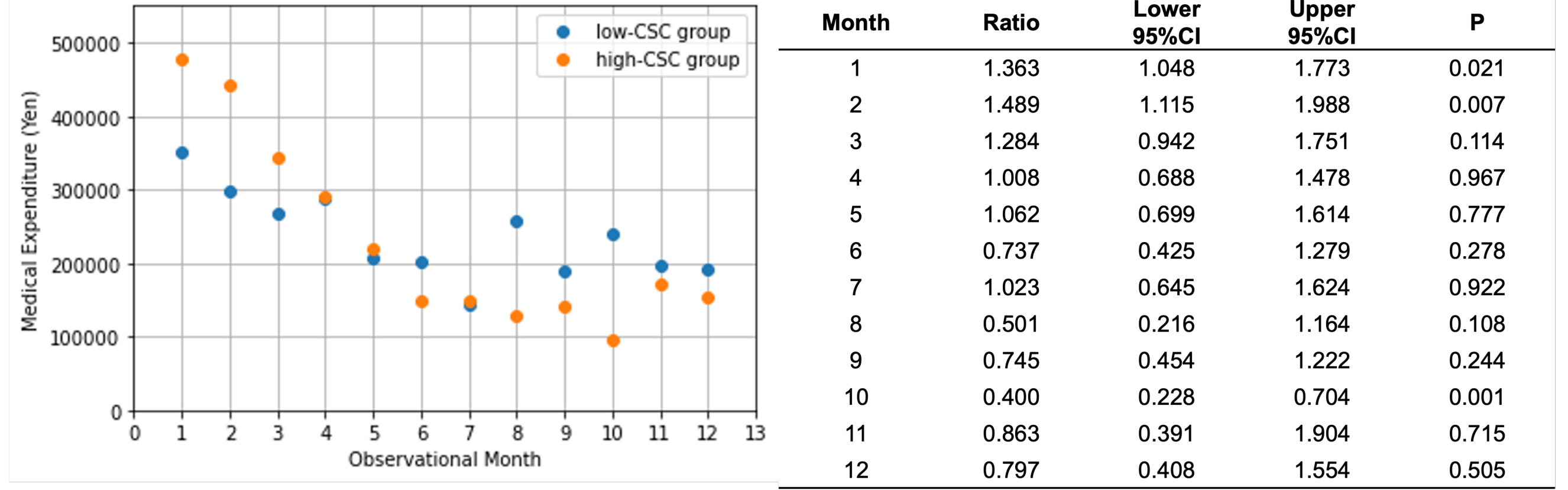
continued

	Original			IPW		
	low-CSC	high-CSC	SMD	low-CSC	high-CSC	SMD
Severity information from DPC code, N(%)						
≤ 3 days, JCS < 10, mRS ≤ 2	120 (71.4%)	125 (61.3%)	0.216	244.7 (65.8%)	243.0 (65.6%)	0.004
≤ 3 days, JCS < 10, mRS ≥ 3	25 (14.9%)	31 (15.2%)	0.009	55.5 (14.9%)	54.9 (14.8%)	0.003
≤ 3 days, JCS ≥ 10, mRS ≤ 2	8 (4.8%)	19 (9.3%)	0.179	28.3 (7.6%)	27.8 (7.5%)	0.003
≤ 3 days, JCS ≥ 10, mRS ≥ 3	4 (2.4%)	5 (2.5%)	0.005	8.4 (2.3%)	8.5 (2.3%)	0.002
≥ 4 days, JCS < 10, mRS ≤ 2	8 (4.8%)	21 (10.3%)	0.211	28.4 (7.6%)	29.8 (8.0%)	0.015
≥ 4 days, JCS < 10, mRS ≥ 3	3 (1.8%)	2 (1.0%)	0.069	6.6 (1.8%)	4.8 (1.3%)	0.039
≥ 4 days, JCS ≥ 10, mRS ≤ 2	0 (0.0%)	1 (0.5%)	0.099	0.0 (0.0%)	1.6 (0.4%)	0.094

Abbreviations: IPW, inverse probability weighting; CSC, comprehensive stroke center; SMD, standardized mean difference; LTC, long-term care; HT, hypertension; DM, DPC, Diagnosis Procedure Combination; diabetes mellitus; JCS, Japan Coma Scale; mRS, modified Rankin Scale. In the severity information part, ≤ 3 days means that the patient were hospitalized within 3 days after the stroke onset day. Likewise, ≥ 4 days means that the patient were hospitalized at least 4 days after the patient had stroke. There is also ‘≥ 4 days, JCS ≥ 10, mRS ≥ 3’ category in the DPC system, but target of analysis in this study did not have patients of this category.

2. Medical Expenditures

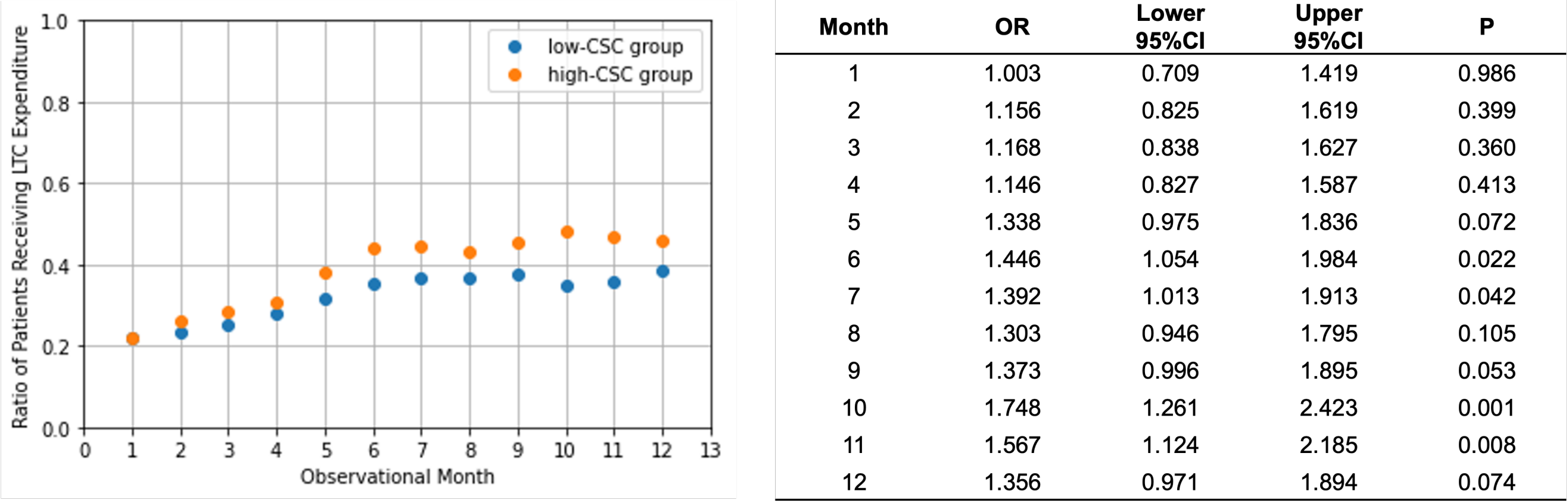
- Soon after discharge significantly higher medical expenditure was incurred for high-CSC group.



Abbreviation: CI, confidence interval. In the table, Month stands for observational month and Ratio for that of medical expenditure (high-CSC group / low-CSC group).

3. Odds Ratio of Receiving LTC

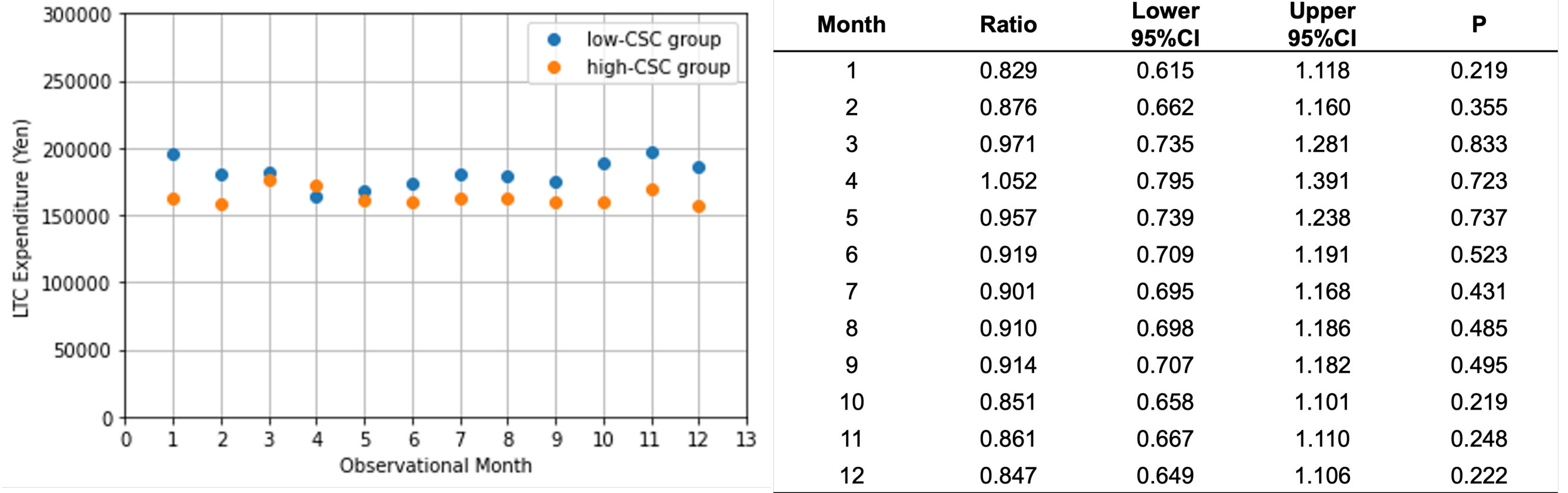
- In the later period high-CSC group had higher tendency to receive LTC.



Abbreviations: OR, odds ratio; CI, confidence interval. In the table Month stands for observational month and OR for that of receiving LTC (high-CSC group / low-CSC group).

4. LTC Expenditures

- Once receiving LTC, no significant difference in the ratio of LTC expenditure was observed.



Abbreviation: CI, confidence interval. In the table Month stands for observational month and Ratio for that of LTC expenditure (high-CSC group / low-CSC group).

Conclusions

- In the current study, patients in high-CSC hospitals incurred higher medical expenditures soon after discharge and higher odds ratio of receiving LTC at a later period.
- Further considerations into the underlying mechanisms that created these differences may help to facilitate measures to reduce medical and LTC expenditures.

References

- Iihara K, Nishimura K, Kada A, Nakagawara J, Ogasawara K, Ono J, et al. Effects of comprehensive stroke care capabilities on in-hospital mortality of patients with ischemic and hemorrhagic stroke: J-ASPECT study. PLoS One. 2014;9(5):e96819.
- Kurogi R, Kada A, Nishimura K, Kamitani S, Nishimura A, Sayama T, et al. Effect of treatment modality on in-hospital outcome in patients with subarachnoid hemorrhage: a nationwide study in Japan (J-ASPECT Study). J Neurosurg. 2018;128(5):1318-26.