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Characteristics of risk-adjusted length of hospital stay for pneumonia based on administrative claim data in Japan

P281
Miscellaneous

Ryo ONISHI[1], Yosuke HATAKEYAMA[1], Koki HIRATA[1], Kunichika MATSUMOTO[1], Kanako SETO[1], Tomonori HASEGAWA[1]
[1] Department of Social Medicine, Toho University School of Medicine

TOHO UNIVERSITY NATURE LIFE MAN
東邦大学

INTRODUCTION

Long-term hospitalization places an increased burden on both patients and society.

Length of hospital stay (LOS) could be influenced by patient characteristics and quality of hospital care.

The following procedures were required to analyze the relative quality of care;

- Risk-adjustment (Standardization) of patient characteristics
- Use of quality indicators

AIM

1. To develop the standardized indicator to measure the quality of LOS management.

2. To reveal the characteristics of new risk-adjusted quality indicator for LOS management (1).

METHODS

Study design
Retrospective observational study using the Japanese medical claim data from 2014 to 2022.

Definition
Prolonged hospitalization (PH): LOS exceeding the average duration of pneumonia in Japan.
Pneumonia: A370, A378, A379, A481, B012, B052, B371, B59, J13-18 in ICD-10.

Analysis overview
This study had 3 steps for analysis.
1. Patients level data were risk-adjusted with the frequency of occurrence of PH using logistic regression analysis.
- Risk-adjustment variables:
sex, emergency admission, Charlson comorbidity index (CCI) score, A-DRPOP score*, and Barthel index score.

* The A-DROP score was developed by the Japanese Respiratory Society. It is a modified version of the CURB-65 scoring system.

Two risk-adjusted models were conducted:
- A model using data from the entire period (2014-2022)
- Models using data from each specific period (2014-2016, 2017-2019, 2020-2022)

2. The expected number of PH patients was aggregated of (1) in each hospital.
- The risk-adjusted PH (RPH) ratio each hospital was expressed by the following formula;

$$\text{RPH ratio} = \left(\frac{\text{Observed number of PH patients}}{\text{Expected number of PH patients}}\right) \times 100$$

3. The characteristics (trends) of RPH ratio in each hospital were calculated by Spearman's correlation coefficient.

RESULTS

A total of 36,417 patients with pneumonia from 39 hospitals were included.

The results of the logistic regression analysis showed that adjustment variables other than sex were correlated with the occurrence of PH (Table 1).

RPH ratios did not deviate significantly from 100. The mean RPH had been increasing, but the number of hospitals with high RPH is decreasing in this study period (Table 2).

Table 1. Variables in the logistic regression analysis

Variables	OR	(95%CI)	P values
Male sex	0.96	(0.92-1.00)	0.086
Emergency admission	0.79	(0.70-0.88)	<0.001
CCI score (reference: 0)			
Score 1-2	1.30	(1.25-1.37)	<0.001
Score 3-4	1.51	(1.41-1.62)	<0.001
Score 5+	1.50	(1.29-1.75)	<0.001
A-DROP score 0 (reference)			
Score 1-2	1.08	(1.01-1.16)	0.024
Score 3	1.83	(1.68-1.95)	<0.001
Score 4-5	2.07	(1.84-2.33)	<0.001
BI score 0-59			
Score 60-84	1.18	(1.09-1.28)	<0.001
Score 85+	2.05	(1.95-2.15)	<0.001

CCI = Charlson comorbidity index BI = Barthel Index
OR = Odds ratio P values = two-sided significance

Table 2. Mean and SD of RPH ratios

Period	Mean	SD	The number of RPH > 100 hospitals (%)
2014-2016	99.4	20.4	25 (64.1)
2017-2019	100.0	23.4	19 (48.7)
2020-2022	104.4	32.7	18 (46.2)
2014-2022	100.5	21.4	19 (48.7)

SD = standard deviation
RPH = Risk-adjusted Prolonged Hospitalization

The RPH ratio varied widely across hospitals. The relationship between the expected and observed numbers of PH patients is shown in Figure 1.

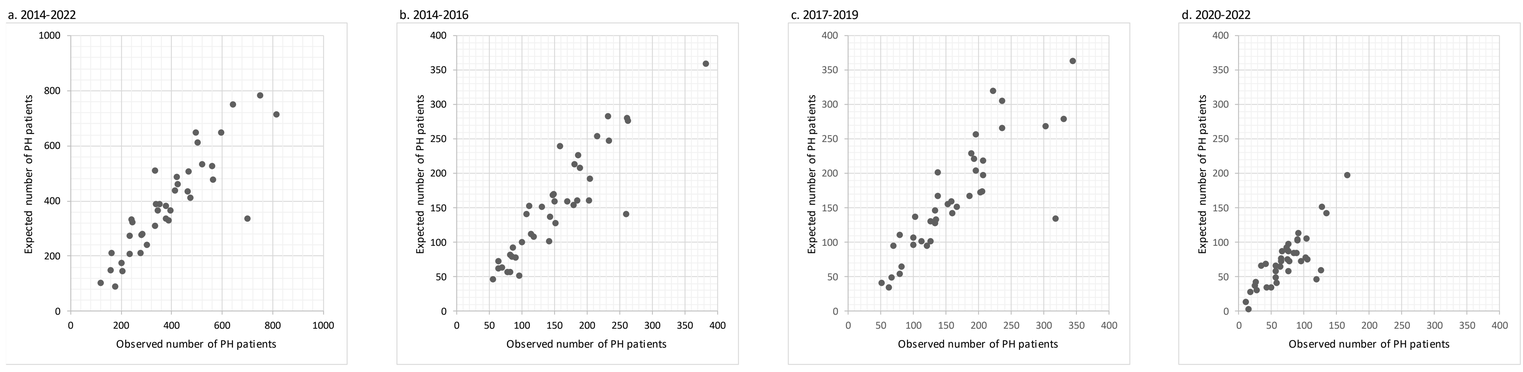

Figure 1. Variation of the expected number and observed number of PH patients
PH = Prolonged Hospitalization

Correlation analyses revealed a significant positive relationship between the RPH ratio in each consecutive period (Table 3). Hospitals with high or low RPH ratios tended to maintain their RPH ratios.

Table 3. Correlation of RPH ratio between each period

Period	2017-2019	2020-2022
2014-2016	ρ=0.77 (P<0.001)	ρ=0.54 (P<0.001)
2017-2019		ρ=0.60 (P<0.001)

RPH = Risk-adjusted Prolonged Hospitalization
ρ = correlation coefficient (Spearman's non-parametric correlation
P values = two-sided significance

CONCLUSIONS

With this new quality indicator, we could visualize the quality of LOS management with its trend.

These analyses identified hospitals with high/low RPH ratios, allowing the identification of targets for quality improvement interventions.

This methodology may be widely applied using similar dataset.

REFERENCE

・Onishi R, et al. Development and usability of a hospital standardized ADL ratio (HSAR) for elderly patients with cerebral infarction: a retrospective observational study using administrative claim data from 2012 to 2019 in Japan. BMC Geriatr. 2023;23(1):235.

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CONTACT INFORMATION

health@med.toho-u.ac.jp