



The Impact of Present on Admission in the Estimation of Hospital Mortality from Claims Data

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isqua2023.16d0277

INTRODUCTION AND AIM

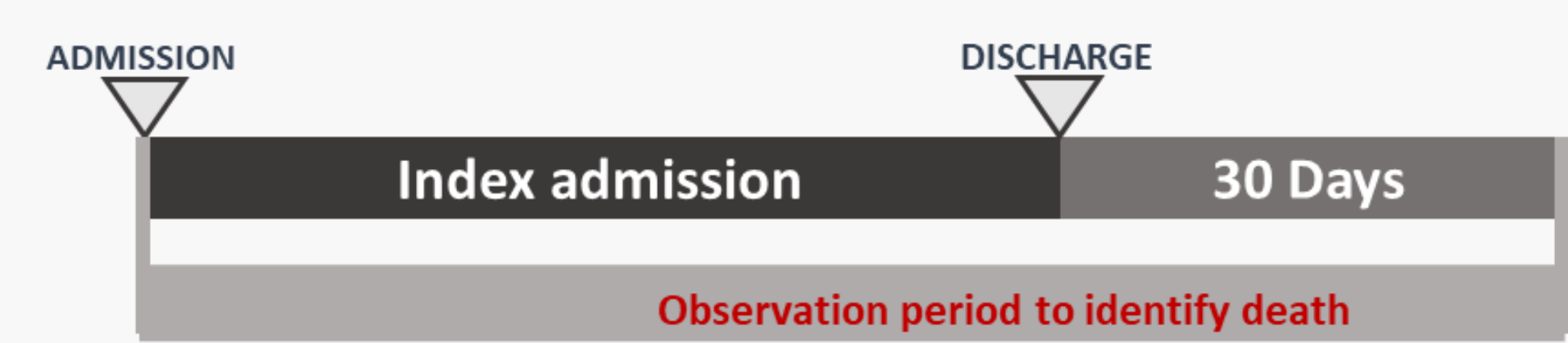
Present on Admission (POA) was introduced to overcome the limitation of claims data for quality indicators. POA indicators tag whether a condition existed before the current admission.¹ We aimed to evaluate the impact of adding POA indicators in estimating the Summary of Hospital Mortality Index (SHMI), considering the recent discussion about the use of POA in Korea.

METHOD

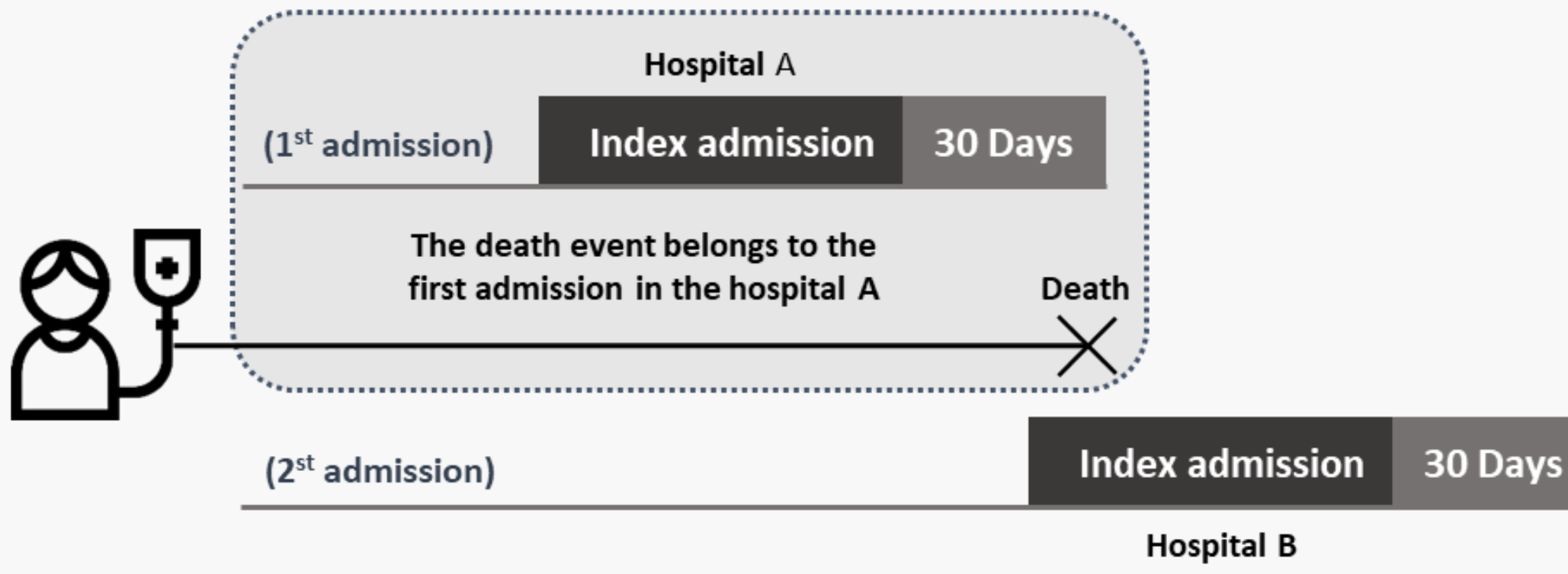
We used the claims data of the new Diagnostic-Related Group (DRG) payment system in South Korea in 2019. The process of yielding SHMI and comparing models depending on adding POA indicators was as follows. (1) We constructed episode units from the claims data. We identified each beneficiary's death status (dependent variable) during the observation periods from admission to post-30 days of discharge, as seen in Fig 1 (A).

Fig 1. Operational definitions

(A) Observation period for death



(B) Death identification between overlapped episodes



(2) The episode dataset was split into modified SHMI diagnostic groups (N=128),² then logistic regression analysis was conducted in each SHMI diagnostic group. (3) The basic logistic regression model (basic model without POA) included age, sex, income, admission through the emergency department, health service type (surgery/procedure vs. medical treatment), and comorbidities (17 categories in the Charlson comorbidity index),³ not adding POA information. (4) We also conducted the logistic analysis with applied POA (model with POA) to exclude preconditions from the comorbidities. The Hosmer-Lemeshow test was used to determine the goodness of fit; We compared the area under the curve (AUC) to compare the model's performance. (5) Finally, we compared each institutional SHMI between the two models to investigate the impact of adding POA information in hospital mortality models. We also identified hospitals with changes in SHMI based on SHMI=1, which means that the actual mortality rate was the same as expected.

RESULTS

The dataset included 570,039 beneficiaries, 746, 418 episodes, and 98 institutions. The average age (standard deviation, SD) was 56.1 (2.4) (Table 1). Of the total episodes, 52% and 11.3% were women and Medicaid, respectively. Regarding admission characteristics, 28.6% were through the emergency room, and 36.9% were for surgery or medical procedure. While comorbidities were identified in 57.8% of episodes (n=431,465) in the basic model (not adding POA indicators), the proportion slightly dropped to 56.4% (n=421,013) after applying POA.

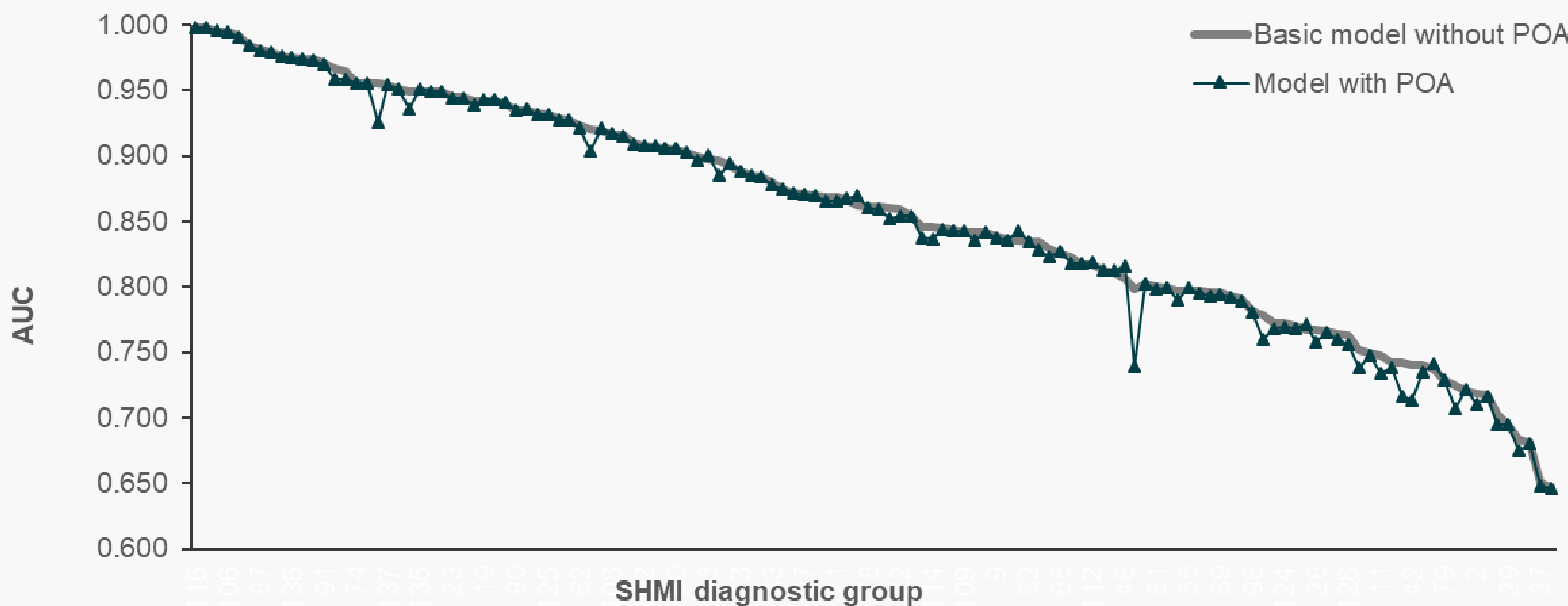
Table 1. General characteristics of episodes

Episode, N (%)	746,418 (100%)	Age, Mean (SD)	56.1 (23.4)
Female, n (%)	388,120 (52.0%)	Through ER, n (%)	213,902 (28.6%)
Medicaid, n (%)	84,016 (11.3%)	Surgery / Procedure, n (%)	471,003 (63.1%)

SD, Standard Deviation.

While the AUCs of the basic models ranged from 0.648 to 0.998, the values were between 0.647 and 0.998 in the models with POA (Fig 2). The AUCs dropped in 83 SHMI diagnostic groups (64.8%) after applying POA in the models, whereas 31 diagnostic groups showed increased performance. There was no change in the performance in the 14 diagnostic groups (10.9%).

Fig 2. AUCs of SHMI diagnostic groups



AUC, Area Under the Curve; SHMI, Summary Hospital Mortality Index.

The SHMIs increased in 73 hospitals (74.5%), implying overestimated expected mortalities without POA. On the Other hand, 21 institutions (21.4%) showed a decrease in SHMI after adding POA for comorbidity identification. Only four hospitals did not show a change in SHMIs, and these institutions had no death. Among 98 institutions, four hospitals (4.1%) showed a meaningful change in SHMIs (Table 2). The quality of care in these institutions changed from positive to negative after adding POA information, implying false positive quality outcomes before utilizing POA indicators.

Table 2. Changes in the SHMIs after adding POA information in the model

		Model with POA		
		SHMI ≤ 1	SHMI > 1	Total
Basic model without POA	SHMI ≤ 1	61 (62.2%)	4 (4.1%)	65 (66.3%)
	SHMI > 1	0 (0.0%)	33 (33.7%)	33 (33.7%)
	Total	61 (62.2%)	37 (37.8%)	98 (100.0%)

POA, Present on Admission; SHMI, Summary Hospital Mortality Index.

CONCLUSIONS

We found the value of adding POA information in measuring the quality outcome index, observing the underestimation of the SHMIs before applying POA indicators for comorbidities.

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ACKNOWLEDGEMENT

This work was funded by the Health Insurance Review and Assessment Service, Republic of Korea.

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