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Development of Risk Adjustment Models for Acute Stroke: Using a Self-Reported Database in Taiwan

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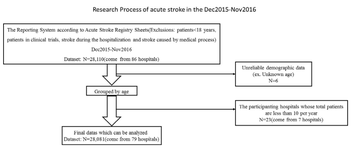
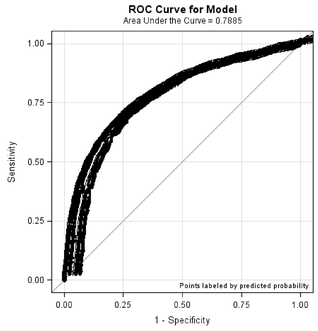
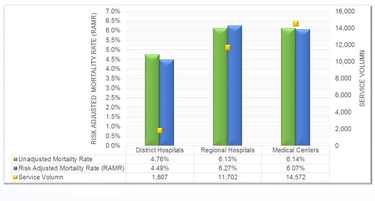
Introduction

In 2014, the Taiwan Ministry of Health and Welfare initiated The Reporting System for Measurement of Hospital Quality Performance and Improvement Programs (The Program) to evaluate hospital performance to improve health quality in Taiwan. Speak of hospital performance, it is widely used for comparing hospital performance by constructing outcome predictions models. Hence, the purpose of this study was to develop a more accurate risk-adjustment model for predicting in-hospital mortality after acute stroke to precise measurements of hospital performance.



Hospital Level	Service Volumn	Unadjusted Mortality Rate	O/E ratio	Risk Adjusted Mortality Rate(RAMR)
District Hospitals	1,807	4.76%	0.742969	4.49%
Regional Hospitals	11,702	6.13%	1.037424	6.27%
Medical Centers	14,572	6.14%	1.004267	6.07%





Methods

Patient-level data were obtained from The Programs in Taiwan. All participanting hospitals submit datas to The Reporting System according to Acute Stroke Registry Sheets, which is generated by Consensual Assessment Technique. The data that we analyzed was excluded from four conditions, including patients<18 years, patients in clinical trials, stroke during the hospitalization and stroke caused by medical process. There were 28,081 patients hospitalized for acute stroke who had been discharged between December 1, 2015 and November 30, 2016 from 79 hospitals in Taiwan. Hierarchical logistic regression was applied to analyze predictors of in-hospital mortality. Discrimination of the models was assessed using c-statistics. The predicted in-hospital mortality was analyzed to compare health quality among each participanting hospitals and three hospital levels.

Results

Unadjusted in-hospital mortality rate after acute stroke of low, moderate, and high hospital levels were district hospitals(4.76%), regional hospitals(6.13%), and medical centers(6.14%). Risk adjustment changed the estimates of in-hospital mortality for three hospital levels. We developed the models for predicting in-hospital mortality after acute stroke which risk factors included seventeen variables(sex, age, LDL, types of stroke(Iihara et al., 2014)(Andersen, Olsen, Dehlendorff, & Kammersgaard, 2009), Hypertension, DM, Previous CVA, Uremia, Dyslipidemia, Family History of stroke, cardiac arrhythmias, AF, RHD, Ischemic Heart, AMI, Smoking, length of stay) and showed C-statistics of 0.7885. After we validated the most comprehensive risk-adjusted model, risk standardized mortality rate after acute stroke of low, moderate, and high hospital levels were district hospitals(4.49%), medical centers(6.07%), and regional hospitals(6.27%).

Conclusion

In this study, we showed that our models were able to accurately predict in-hospital mortality in acute stroke using a self-reported database of The Programs in Taiwan. To be more precisely, the risk-adjusted models that we developed may have applications in evaluating hospital performance between participant hospitals, health quality of acute stroke among hospital levels. In addition, we could develop more appropriate payment systems in our programs in the future through inter-hospital comparisons. However, there are two problems in this study. First, we found that most participanting hospitals submitted incomplete data of hemorrhagic stroke through clinical auditing. Second, there was a shortage of illness severity in our Acute Stroke Registry Sheets. In conclusion, we should solve above-mentioned two problems to improve the accurate and integrity of our risk-adjusted in-hospital mortality predicting models.

References

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