Including Stroke Severity in Risk Models is Critical for Accurate Hospital Performance Ranking


Adding stroke severity to a hospital 30-day mortality model based on claims data for Medicare beneficiaries with acute ischemic stroke was associated with improvement in predicting the risk of death at 30 days and changes in performance ranking regarding mortality for a considerable proportion of hospitals.

Key Points:

- National quality profiling efforts have begun to report hospital-level performance for Medicare beneficiaries, including 30-day mortality rates, for common medical conditions, including acute myocardial infarction, heart failure, and community-acquired pneumonia. Stroke is among the leading causes of death, disability, hospitalizations, and health care expenditures in the United States. There is increasing interest in reporting risk-standardized outcomes for Medicare beneficiaries hospitalized with acute ischemic stroke, but whether it is necessary to include adjustment for initial stroke severity has not been well studied.

- This study evaluated the degree to which hospital outcome ratings and the ability to predict 30-day mortality are altered after including initial stroke severity in a claims-based risk model for hospital 30-day mortality for acute ischemic stroke.

- Data were analyzed from 782 Get With The Guidelines-Stroke participating hospitals on 127,950 fee-for-service Medicare beneficiaries with ischemic stroke. The patients had a score documented for the National Institutes of Health Stroke Scale (NIHSS, a 15-item neurological examination scale with scores from 0 to 42, with higher scores indicating more severe stroke) between April 2003 and December 2009. Performance of claims-based hospital mortality risk models with and without inclusion of NIHSS scores for 30-day mortality was evaluated and hospital rankings from both models were compared. There were 18,186 deaths (14.5 percent) within the first 30 days, including 7,430 deaths during the index hospitalization (in-hospital mortality, 5.8 percent).

- This study demonstrated the hospital mortality model with NIHSS scores had significantly better discrimination than the model without. Also, other index scores demonstrated substantially more accurate classification of hospital 30-day mortality after the addition of NIHSS score to the claims model. The model with NIHSS exhibited better agreement between observed and predicted mortality rates. Analysis of data indicated that more than 40 percent of hospitals identified in the top or bottom 5 percent of hospital risk-adjusted mortality would have been reclassified into the middle mortality range using a model adjusting for NIHSS score compared with a model without NIHSS score adjustment. Similarly, when considering the top 20 percent and bottom 20 percent ranked hospitals, close to one-third of hospitals would have been reclassified.

- These findings highlight the importance of including a valid specific measure of stroke severity in hospital risk models for mortality after acute ischemic stroke for Medicare beneficiaries. Furthermore, this study suggests that inclusion of admission stroke severity may be essential for optimal ranking of hospital with respect to 30-day mortality.

- Without adjusting for stroke severity, the outcome measures may favor hospitals treating less severe...
strokes, regardless of whether these hospitals' approaches to patient management contributed to better or worse patient outcomes.

- As public reporting and value-based purchasing policies increase for outcome measures, it is important to recognize the effect that using models with less than ideal discrimination and calibration has on the ranking of hospitals and the lack of correlation among ranking by models that do and do not adjust for critical risk determinants.
- It is important to carefully consider that rewarding or punishing hospitals for acute stroke outcomes on the basis of a risk model that doesn't account for stroke severity may misalign incentives. As a result, hospitals may consider turning away patients with more severe strokes or transferring them to other hospitals after they've been assessed by the emergency department to avoid being misclassified as having a higher mortality risk.

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![Gregg C. Fonarow, MD, FACC, FAHA](image)

**Gregg C. Fonarow, MD, FACC, FAHA**
Dr Gregg C Fonarow is the Eliot Corday Professor of Cardiovascular Medicine and Science at UCLA. He serves as Director of the Ahmanson-UCLA Cardiomyopathy Center, Co-director of UCLA's Preventative Cardiology Program, and Co-Chief, UCLA Division of Cardiology. He attained the rank of Professor of Medicine, Geffen School of Medicine at UCLA in 2003. His research interests center on acute and chronic heart failure, acute coronary syndromes, preventative cardiology, stroke, quality of care, outcomes, and implementing systems to improve clinical outcome. Dr Fonarow has published over 500 research studies and clinical trials in heart failure, disease management, acute coronary syndromes, preventative cardiology, stroke, quality of care and outcomes research in leading journals like New England Journal of Medicine, Lancet, JAMA, and Circulation. New therapies and management strategies for heart failure and research into the pathophysiology of this disease are conducted at UCLA under his direction. He has also developed and successfully implemented a comprehensive atherosclerosis treatment program at the Ronald Reagan UCLA Medical Center (Cardiovascular Hospitalization Atherosclerosis Management Program: CHAMP) which served as the model for the American Heart Association's Get with the Guidelines program. Dr Fonarow is immediate past chair of the steering committee for the AHA's Get With The Guidelines Program. He is co-chair of IMPROVE-HF and chair of the steering committee for the ACC ACTION Registry-GWTG Program. He is on the steering committee and serves as an investigator for a number of ongoing randomized clinical trials. He serves as a reviewer and on the editorial boards of a number of cardiovascular journals. Dr. Fonarow received the outstanding UCLA Cardiology Faculty Teaching Award in 1997 and was honored by the American College of Cardiology with the W. Proctor Harvey Young Teacher Award in 1998. He received an AHA Award of Meritorious Achievement in 2004. He received the Raymond D. Barr Award of Excellence in 2009. He was awarded the Eliot Corday Chair in Cardiovascular Medicine and Science in 2003.
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MISSION: LIFELINE

HOSPITAL Accreditation & Certification
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