Certification of Primary Stroke Centers and Outcomes

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Do PSC Hospitals Have Better Outcomes?

What is the evidence in the US?

ORIGINAL CONTRIBUTION

Association Between Stroke Center Hospitalization for Acute Ischemic Stroke and Mortality

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Context Although stroke centers are widely accepted and supported, little is known about their effect on patient outcomes.

Objective To examine the association between admission to stroke centers for acute ischemic stroke and mortality.

Design, Setting, and Participants Observational study using data from the New York Statewide Planning and Research Cooperative System. We compared mortality for patients admitted with acute ischemic stroke (n=30947) between 2005 and 2006 at designated stroke centers and nondesignated hospitals using differential distance to hospitals as an instrumental variable to adjust for potential prehospital selection bias. Patients were followed up for mortality for 1 year after the index hospitalization through 2007. To assess whether our findings were specific to stroke, we also compared mortality for patients admitted with gastrointestinal hemorrhage (n=39409) or acute myocardial infarction (n=40024) at designated stroke centers and nondesignated hospitals.

Main Outcome Measure Thirty-day all-cause mortality.

Results Among 30947 patients with acute ischemic stroke, 15297 (49.4%) were admitted to designated stroke centers. Using the instrumental variable analysis, admission to designated stroke centers was associated with lower 30-day all-cause mortality (10.1% vs 12.5%; adjusted mortality difference, −2.5%; 95% confidence interval [CI], −3.6% to −1.4%; $P<.001$) and greater use of thrombolytic therapy (4.8% vs 1.7%; adjusted difference, 2.2%; 95% CI, 1.6% to 2.8%; $P<.001$). Differences in mortality also were observed at 1-day, 7-day, and 1-year follow-up. The outcome differences were specific for stroke, as stroke centers and nondesignated hospitals had similar 30-day all-cause mortality rates among those with gastrointestinal hemorrhage (5.0% vs 5.8%; adjusted mortality difference, +0.3%; 95% CI, −0.5% to 1.0%; $P=.50$) or acute myocardial infarction (10.5% vs 12.7%; adjusted mortality difference, +0.1%; 95% CI, −0.9% to 1.1%; $P=.83$).

Conclusion Among patients with acute ischemic stroke, admission to a designated stroke center was associated with modestly lower mortality and more frequent use of thrombolytic therapy.

JAMA. 2011;305(4):373-380 www.jama.com

STROKE IS THE LEADING CAUSE OF serious long-term disability and the third leading cause of mortality in the United States.[1] Responding to the need for improvements in acute stroke care, the Brain Attack Coalition (BAC) published recommendations for the establishment of primary stroke centers in 2000.[2] In December 2003, the Joint Commission began certifying stroke centers based on BAC criteria.[3] Now, nearly 700 of the 5000 acute care hospitals in the United States are Joint Commission–certified stroke centers.[4] Some states, such as New York, Massachusetts, and Florida, have established their own designation programs using the BAC core criteria.

- 30,947 in NY
- 18+ yrs
- 104 state-SCs

Xian, JAMA 2011; 305(4): 373

Table 3. Mortality at Designated Stroke Centers and Nondesignated Hospitals

	No. (%)			
	Designated Stroke Center (n = 15 297)	Nondesignated Hospital (n = 15 650)	Adjusted Mortality Difference (95% CI)[a]	*P* Value
1 d	90 (0.6)	134 (0.9)	–0.3 (–0.6 to –0.0)	.04
7 d	665 (4.3)	842 (5.4)	–1.3 (–2.1 to –0.6)	.001
30 d	1543 (10.1)	1951 (12.5)	–2.5 (–3.6 to –1.4)	<.001
1 y	3412 (22.3)	4067 (26.0)	–3.0 (–4.4 to –1.5)	<.001

Abbreviation: CI, confidence interval.
[a]Negative values indicate lower mortality at designated stroke center vs nondesignated hospital. Adjusted for age, sex, race, health insurance status, rural status, 13 Charlson comorbid conditions, atrial fibrillation, hospital teaching status, and total number of hospital beds by using the instrumental variable analysis.

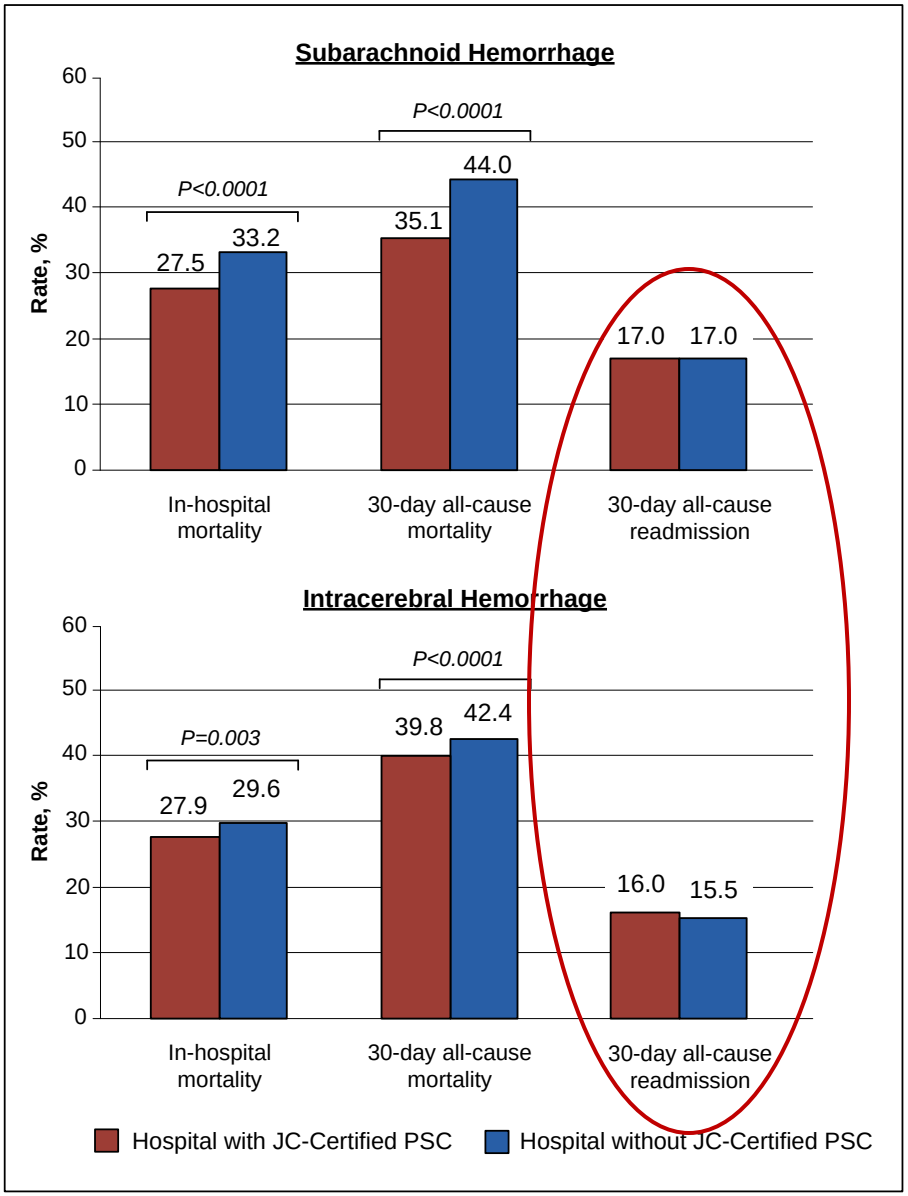
- SCs had significantly lower mortality, adjusted for patient and hospital characteristics
- Unable to adjust for stroke severity

Xian, JAMA 2011; 305(4): 373

What about hemorrhagic stroke?

- To determine whether hemorrhagic stroke patients treated at hospitals with a JC-certified PSC have better outcomes than patients treated at non-certified hospitals.
- Medicare FFS beneficiaries in 2006
- Primary discharge diagnosis of subarachnoid (ICD-9 430) or intracerebral (ICD-9 431) hemorrhage

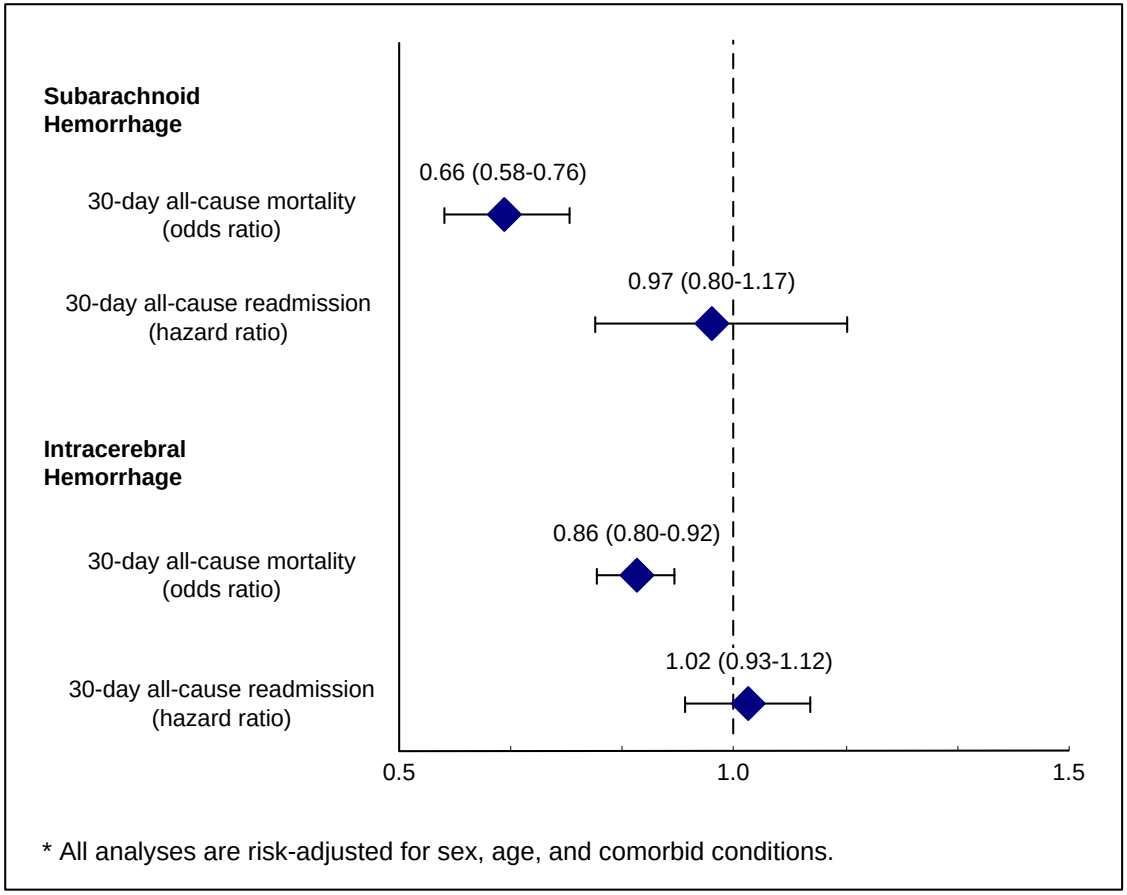
Hemorrhagic Stroke



- Unadjusted in-hospital and 30-day mortality were lower for ICH and SAH patients treated at JC-certified PSC hospitals
- 30-day readmission was similar

Lichtman et al, Stroke (in press)

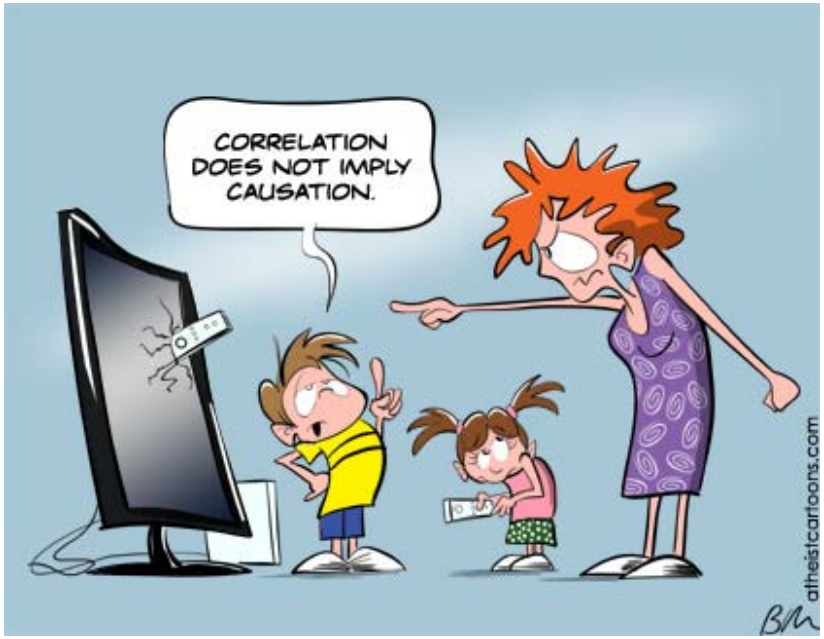
Hemorrhagic Stroke: Risk-adjusted results



- SAH and ICH patients treated at JC-PSCs had lower 30-day mortality
- No difference seen for 30-day readmission

Lichtman et al, Stroke (in press)

Causality: does certification lead to improved outcomes?

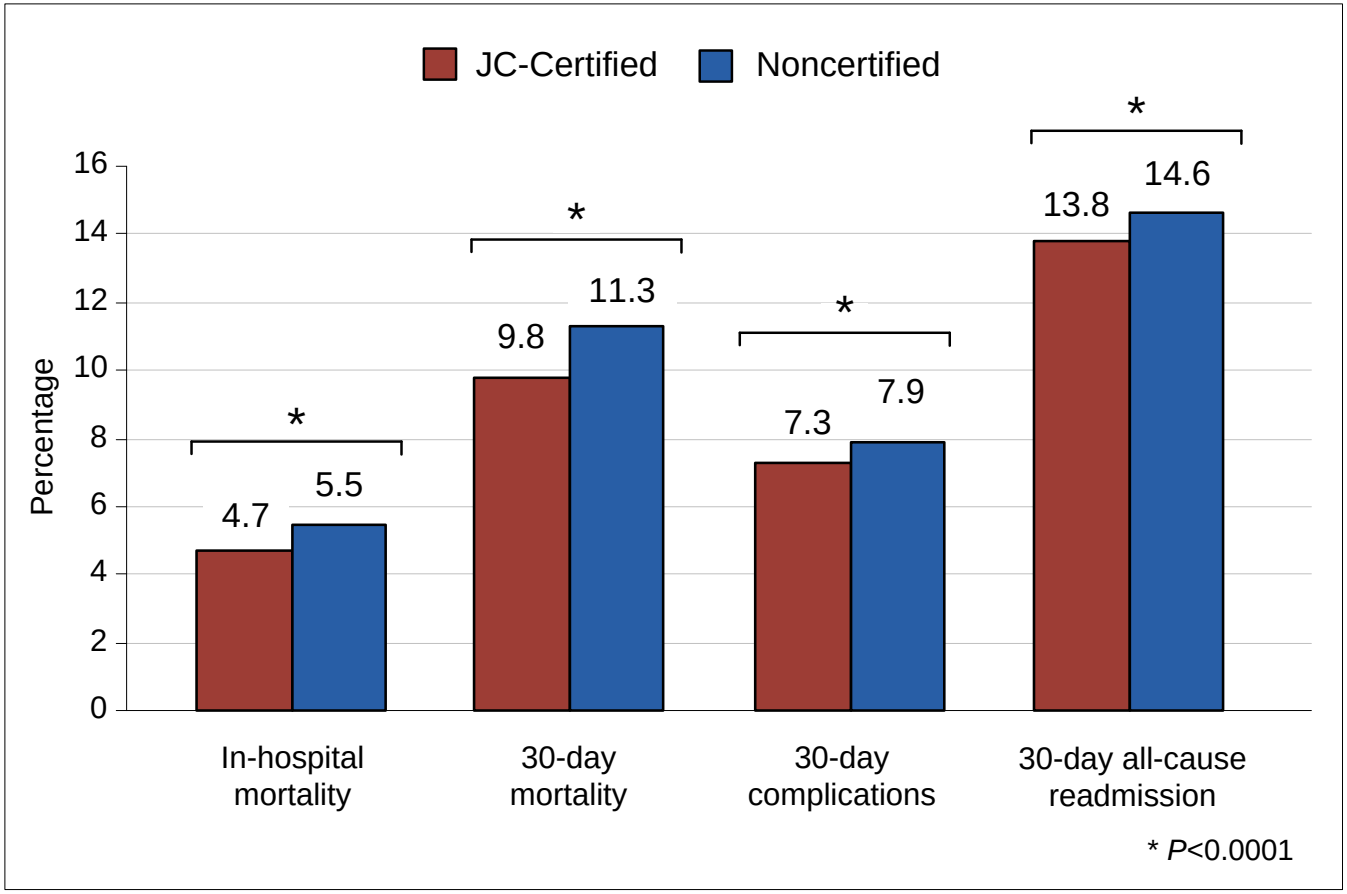


Cross-sectional studies assessing the impact of Primary Stroke Center certification on outcomes could be biased if these centers had relatively better outcomes prior to certification

Do JCAHO Primary Stroke Centers Have Better Outcomes Prior to Certification?

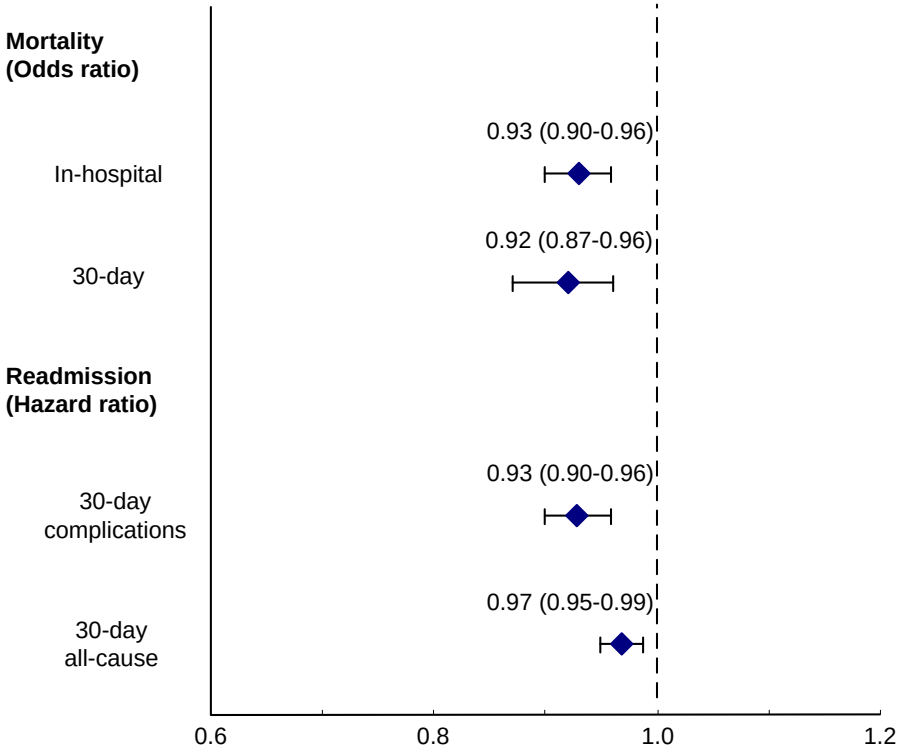
- Compare risk adjusted 30-day mortality and readmission rates for ischemic stroke patients treated at JC-PSC versus other hospitals at least 2 years before certification began
- Medicare FFS data in 2002
- 317 hospitals received JCAHO-certification within the first two years of the program

Early Certified vs Noncertified



Lichtman, Stroke 2009; 40:3574-3579

Risk-adjusted results

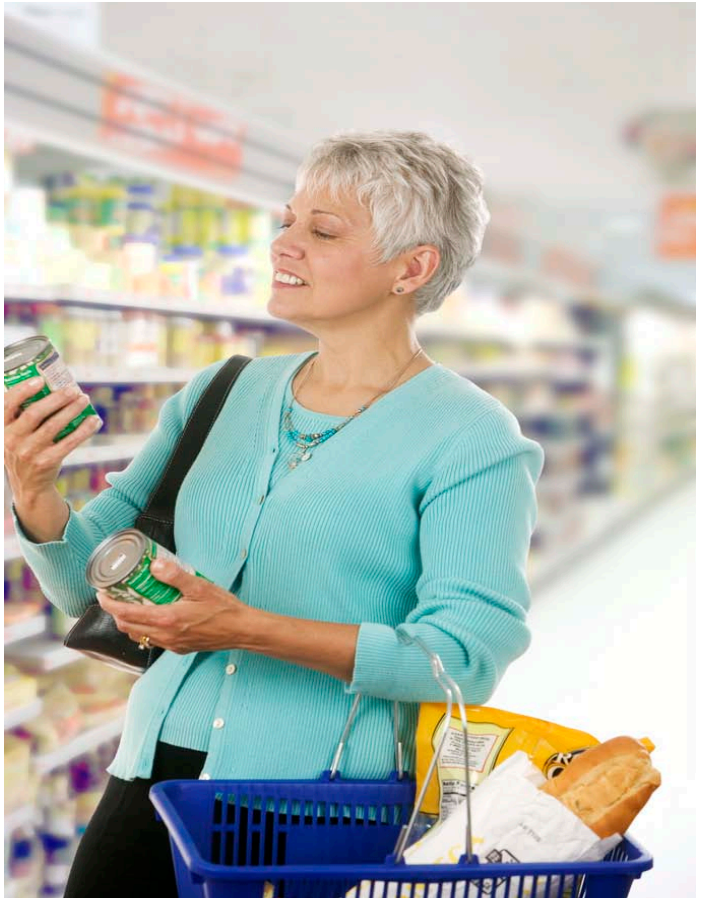


All analyses are risk-adjusted for sex, age (75-84, 85+ years versus 65-74 years), race (black, other versus white), admission source (emergency department versus other), Deyo comorbidity score (≥3 versus <3), number of hospitalizations in prior year (≥2 versus <2), and medical history (yes versus no; stroke, myocardial infarction, congestive heart failure, atrial fibrillation, chronic obstructive pulmonary disease, dementia, diabetes, coronary artery bypass graft surgery, percutaneous transluminal coronary angioplasty, smoking and hypertension).

- Patients treated at hospitals that became JC-PSCs had better outcomes before the certification began

- It is unclear whether better outcomes for stroke patients treated at PSC hospitals is due to the certification program per se, or if other factors, such as self selection to become a PSC, may play a role.
- Future studies examining the effects of JC-PSC certification should adjust for differences in patient outcomes that may have existed prior to certification.

Does certification identify hospitals already organized to provide better care?



Does certification “guarantee” better outcomes?

Outcomes after ischemic stroke for hospitals with and without Joint Commission–certified primary stroke centers

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ABSTRACT

Background: The Joint Commission (JC) began certifying primary stroke centers (PSCs) in the United States in 2003. We assessed whether 30-day risk-standardized mortality (RSMR) and readmission (RSRR) rates differed between hospitals with and without JC-certified PSCs in 2006.

Methods: The study cohort included all fee-for-service Medicare beneficiaries ≥65 years old discharged with a primary diagnosis of ischemic stroke (International Classification of Diseases, ninth revision, Clinical Modification 433, 434, 436) in 2006. Hierarchical linear regression models calculated hospital-level RSMRs and RSRRs, adjusting for patient demographics, comorbid conditions, and hospital referral region. Hospitals were categorized as being higher than, no different from, or lower than the national average.

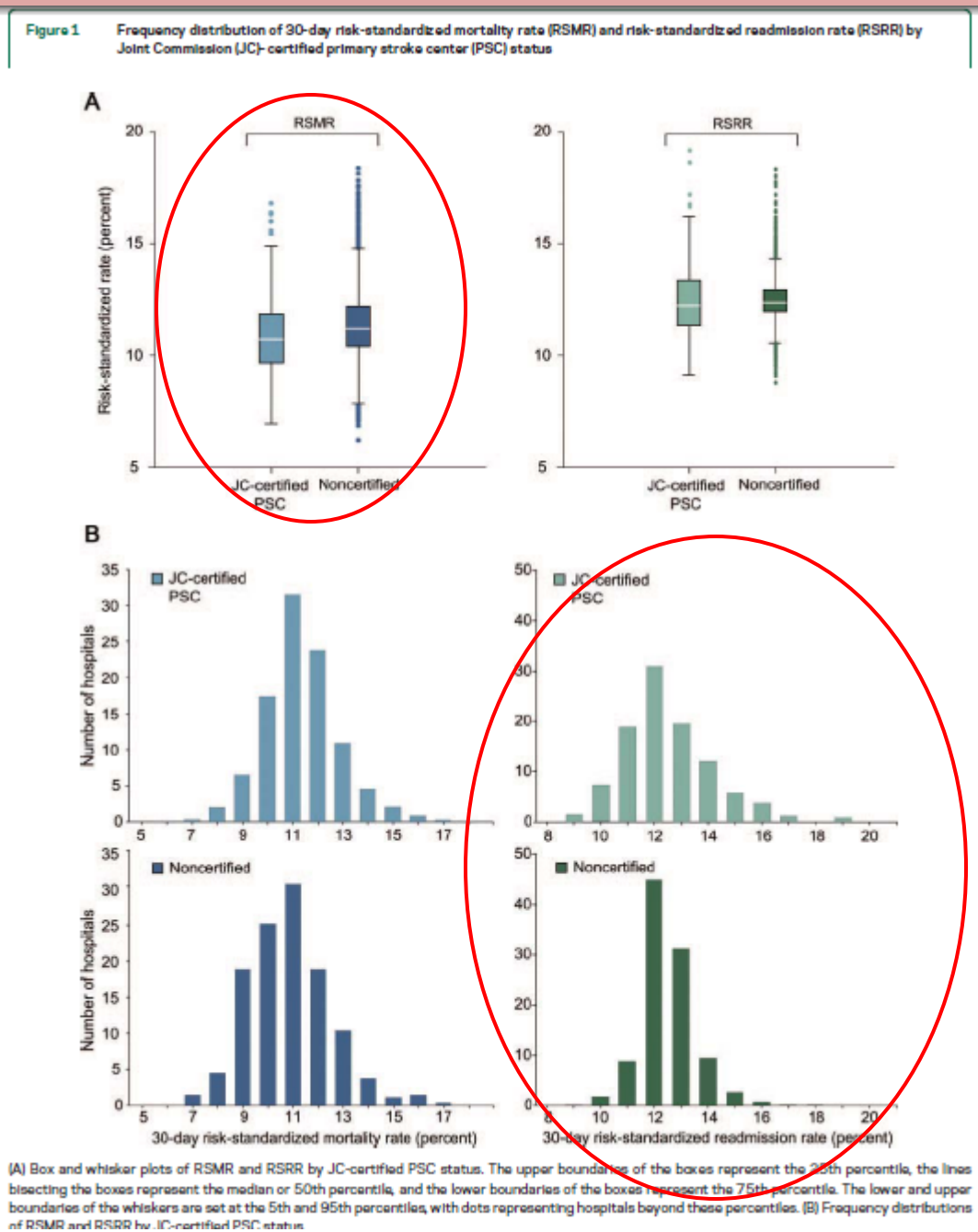
Results: There were 310,381 ischemic stroke discharges from 315 JC-certified PSC and 4,231 noncertified hospitals. Mean overall 30-day RSMR and RSRR were 10.9% ± 1.7% and 12.5% ± 1.4%, respectively. The RSMRs of hospitals with JC-certified PSCs were lower than in noncertified hospitals (10.7% ± 1.7% vs 11.0% ± 1.7%), but the RSRRs were comparable (12.5% ± 1.3% vs 12.4% ± 1.7%). Almost half of JC-certified PSC hospitals had RSMRs lower than the national average compared with 19% of noncertified hospitals, but 13% of JC-certified PSC hospitals had lower RSRRs vs 15% of noncertified hospitals.

Conclusions: Hospitals with JC-certified PSCs had lower RSMRs compared with noncertified hospitals in 2006; however, differences were small. Readmission rates were similar between the 2 groups. PSC certification generally identified better-performing hospitals for mortality outcomes, but some hospitals with certified PSCs may have high RSMRs and RSRRs whereas some hospitals without PSCs have low rates. Unmeasured factors may contribute to this heterogeneity.

Neurology© 2011;76:1-1

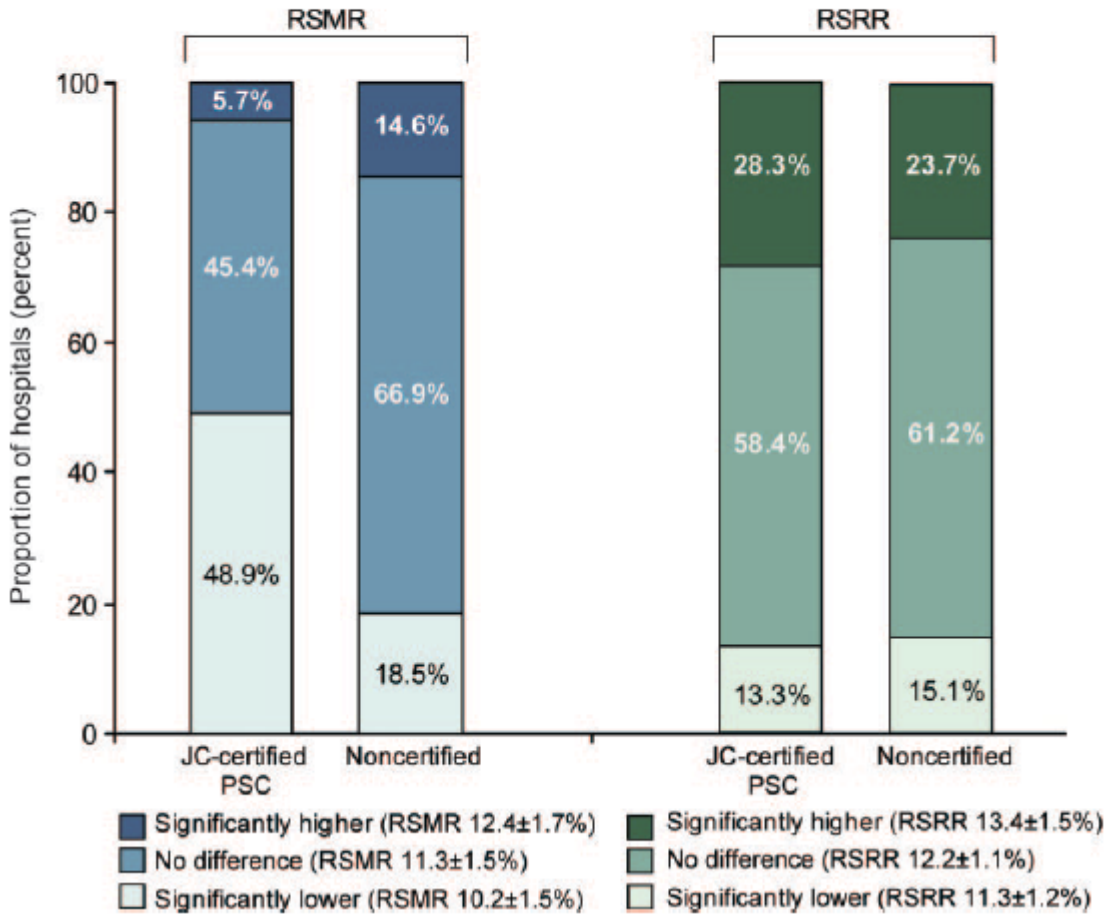
- Medicare beneficiaries with ischemic stroke in 2006
- Assessed hospital-level risk adjusted 30-day outcomes
- JC-PSCs versus non-certified hospitals

Lichtman, Neurology 2011; 76(23):1976



- Risk-standardized mortality slightly lower for JC-PSCs compared with non-certified hospitals
- Readmission was similar
- Greater hospital-level variation in readmission for JC-PSCs

Figure 2 Categorization of hospital-level risk-standardized mortality rate (RSMR) and risk-standardized readmission rate (RSRR) relative to the national average by Joint Commission (JC)–certified primary stroke center (PSC) status



- Categorize hospital performance relative to the national average
- Certification identified more high performing hospitals, ***but*** considerable overlap……. particularly for 30-day readmission

Lichtman, Neurology 2011; 76(23):1976

Editorial: Stroke Centers
Proof of Concept and the Concept of Proof

"Even hospital that do not become stroke centers are adopting some of the best practices shown to be beneficial"

"With the gradual change in the level of care in many hospitals, it might be a challenge to further prove some of the benefits of stroke centers."

Alberts, Stroke. 2010; 41:1100-1101

Next Steps…….

Next Steps…….

- Identify factors contributing to improved outcomes
- Examine differences in case mix/stroke severity
- Does certification benefit all patients?

Difference by Patient Factors?

Escalating Levels of Access to In-Hospital Care and Stroke Mortality
Saposnik, *Stroke 2008*; 39:2522-30

Do All age Groups Benefit From Organized Inpatient Stroke Care?
Saposnik, Stroke 2009; 40:3321-27

Do all ischemic stroke subtypes benefit from organized inpatient stroke care?
Smith, Neurology 2010; 75:456-62

AHA Presidential Advisory:

Hospital Certification for Optimizing Cardiovascular Disease and Stroke Quality of Care and Outcomes

- Quality of stroke care varies, missed opportunities to implement evidence-based care
- Hospital certification programs have the potential to ensure quality patient care, patient safety, and favorable outcomes
- Provide highly visible distinction for hospitals that achieve high standards of performance in care.

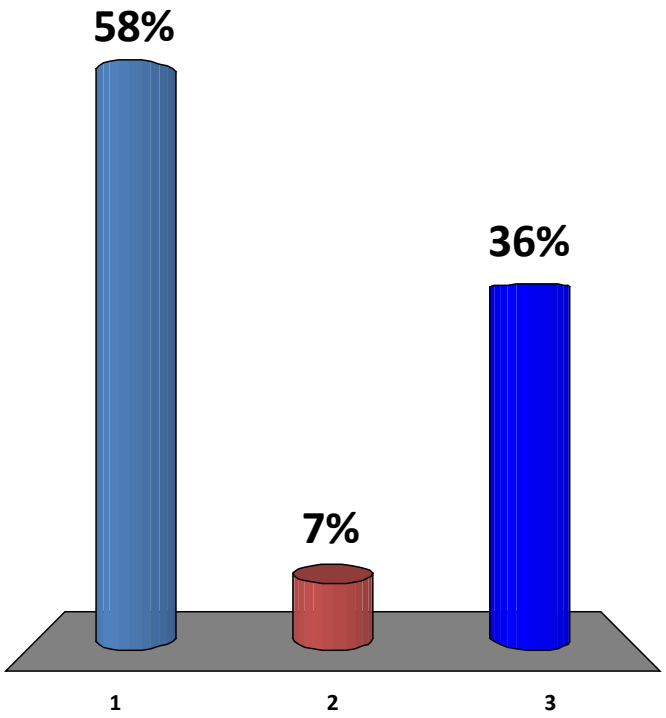
Circulation. 2010; 122:2459-69

Advisory Recommendations:

- Standardize objective, unbiased assessment of hospital structural, process, and outcomes performance
- Establish transparent evidence-based indicators and criteria
- Form benchmarked thresholds for performance
- Give highly visible distinction to high performers
- Provide QI programs to assist hospitals
- Further research to identify best strategies

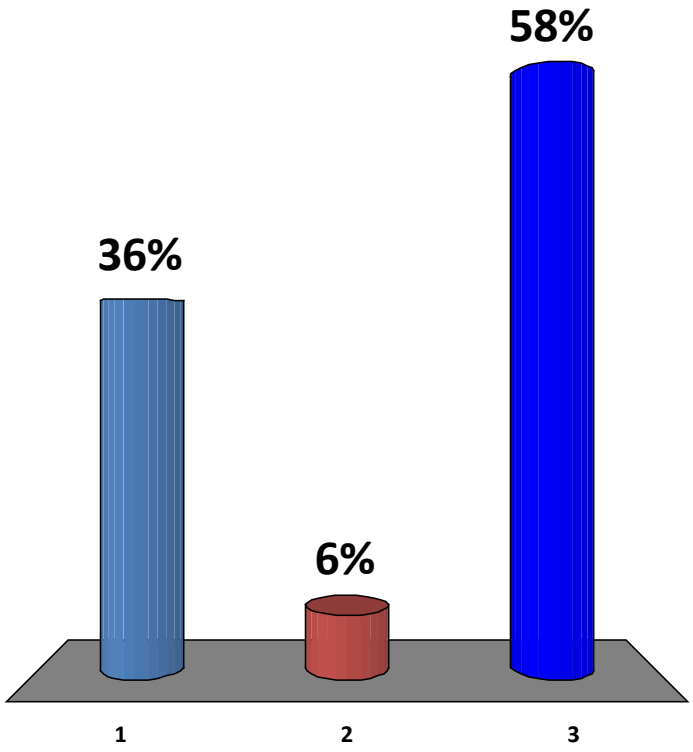
Pop Quiz!
On average, do stroke patients treated at PSCs have better outcomes than patients treated at non-certified centers?

1. A: Yes
2. B: No
3. C: Unclear from current evidence



Have we determined that PSC certification leads to improved outcomes?

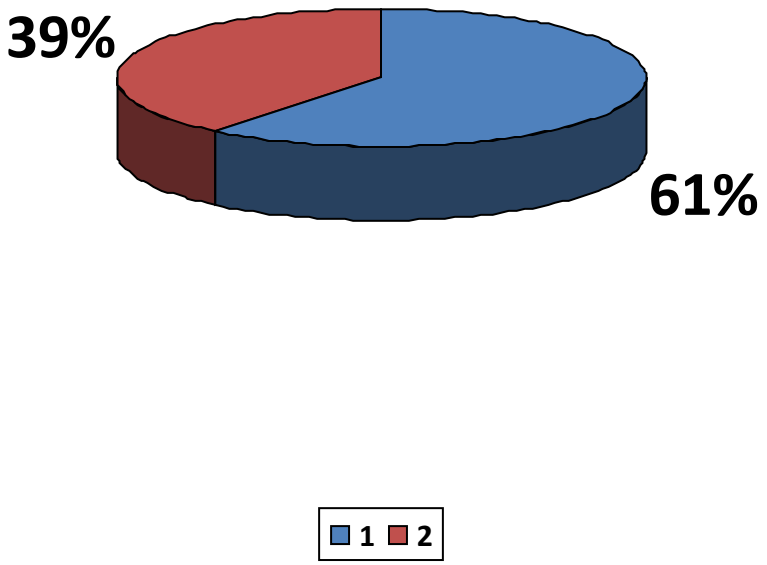
1. A: Yes
2. B: No
3. C: Jury is still out



Final Question!

The factors contributing to improved outcomes have been identified and can be replicated across institutions.

1. True
2. False



Thank You!