

Presenter Disclosure Information

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Topic: Stroke Treatment Disparities and Secondary Prevention

FINANCIAL DISCLOSURE:

None

UNLABELED/UNAPPROVED USES DISCLOSURE:

None

Stroke Treatment Disparities and Secondary Prevention

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Background

- **Deficiencies in the quality of medical care are common in the U.S. and elsewhere and remain a vexing problem. For example:**
 - **Patients fail to receive up to half of the care opportunities they are eligible for.**
 - **Widespread geographic variability in care.**
 - **Widespread evidence of over-use and under-use.**
 - **Deficiencies have been shown to be greater in minority groups and in women (for some conditions).**

Background

- **Comprehensive data on the quality of acute stroke care have become available over recent years.**
- **For example: Data from 4 prototype Coverdell registries (GA, MA, MI, OH) in 2005:**
 - **Screening dysphagia = 45% (range 39-51%)**
 - **Lipid checked = 34% (range 28-39%)**
 - **Smoking cessation = 21% (range 17-34%)**
 - **Anti-throm at D/C = 92% (range 88-98%)**
 - **Anti-coag for AFib at D/C = 74% (range 64-90%)**

Questions

- What is the evidence that the quality of stroke care varies substantially by:
 - Race/ethnicity?
 - Gender?
 - Age?
- How much progress has been made in terms of treating eligible patients with secondary prevention measures?

Racial Differences in Stroke: Key Learning Points

- 1) Stroke incidence and mortality rates in African-Americans are up to twice that in whites, with greater disparities seen in younger age groups.
- 2) There are strong racial differences in stroke characteristics:
 - Greater prevalence of HTN and DM in minorities (but less Afib).
 - Increased incidence of hem stroke and lacunar stroke in minorities
 - Severity of ischemic stroke may be lower in minorities
 - Few differences in case fatality rates (after age adjustment)

Racial Differences in Stroke: Key Learning Points

- 3) Racial differences in health outcomes represent the complex interactions between biology, hereditary, social and physical environment, culture, access, discrimination, physician-patient communication, patient preferences, and possibly quality of care.
- 4) There has been little data to date examining racial differences in the quality of stroke care using a broad range of quality measures.

Racial Differences in Quality of Stroke Care: Previous Studies

- 1). Johnson, Stroke, 2001
 - Data from 42 academic medical centers, found blacks were one-fifth (OR= 0.21) as likely to be administered tPA as whites, after adjustment for gender, severity, and insurance status.
- 2). Reed, Stroke, 2001
 - Data from 137 community hospitals, found blacks were half as likely (OR= 0.54) to be administered tPA compared to whites, after adjustment for severity, physician specialty, and location.
- 3). Escarce (1993), Mitchell (2000), Oddone (1999),
 - Several studies have shown that blacks were less likely to receive CEA, although fewer blacks may be appropriate candidates because of lower prevalence of carotid disease.

Quality of hospital care in African
American and white patients with
Ischemic Stroke and TIA
Results from the MASCOTS
Statewide Stroke Registry

Bradley Jacobs MD, Mathew Reeves PhD for the
MASCOTS Registry Investigators

MASCOTS Registry

- Michigan Acute Stroke Care Outcomes and Treatment Surveillance System
 - Prototype Paul Coverdell Acute Stroke Registry
 - Detailed chart-level information collected at 15 Michigan hospitals between May-November 2002
 - 2566 Acute Strokes (IS, ICH, SAH, TIA)

Methods: MASCOTS Race Differences in Stroke Care

- 1,837 IS and TIA admissions discharged alive
- 19% African American, 81% White.
- 10 Quality Indicators:
 - Door-to-doctor time
 - Door-to-brain imaging (CT) time
 - tPA , <2 hrs, no c/i
 - Cardiac monitor (Holter or telemetry)
 - Vascular imaging (e.g., carotid doppler, MRA)
 - Dysphagia screening (IS only)
 - Echocardiography
 - DVT prophylaxis by 48 hours
 - Anti-throm at D/C
 - Smoking cessation

Analysis

- Logistic regression (GEE)
 - Unadjusted and Adjusted Odds Ratios (AOR)
 - Adjusted for age, gender, insurance status, EMS arrival, onset-arrival time, functional status on presentation, mRS at D/C, stroke sub-type, neurologist involvement, stroke pathway use.
- African Americans vs. Whites
 - OR >1 means AA more likely to have that outcome
 - OR <1 means AA less likely to have that outcome

MASCOTS - Compliance with Quality Indicators: AA vs. Whites

	<u>AA</u>	<u>W</u>	<u>OR</u>	<u>AOR</u>
<u>ED-based care</u>				
Door-to-doc (< 10 mins)	20%	12%	1.94	2.36
Door-to-CT (< 25 mins)	0.6%	4.6%	0.12	0.13*
tPA, < 2 hr	9.5%	19%	0.46	0.42
<u>In-patient care</u>				
D/C anti-throm.	93%	89%	1.56	1.21
DVT proph.	75%	62%	1.81	0.87
Smoking cessation	11%	24%	0.42	0.27*

Adjusted for age, gender, insurance, EMS, functional status, D/C mRS, Stroke type (IS, TIA), neurologist involved, stroke pathway use.

* Comparisons P <0.05

MASCOTS - Compliance with Quality Indicators: AA vs. Whites

	<u>AA</u>	<u>W</u>	<u>OR</u>	<u>AOR</u>
<u>In-patient evaluation</u>				
Cardiac monitor	49%	66%	0.48*	0.54
Any vascular evaluation	82%	79%	1.21	0.82
Carotid doppler	69%	63%	1.29	1.24
MRA	34%	25%	1.57	1.05
Dysphagia screen	42%	54%	0.62	0.69*
Echocardiography	78%	70%	1.52	1.24

Adjusted for age, gender, insurance, EMS, functional status, D/C mRS, stroke type (IS, TIA), neurologist involved, stroke pathway use.

* Comparisons P <0.05

Conclusions – MASCOTS Race Differences Analysis

- Relatively few race differences in care observed.
- But AA were significantly less likely to be imaged within 25mins, receive smoking cessation, or undergo dysphagia screening.
- Results may reflect hospital-level practices as only 7 hospitals had >10% AA pts, and 55% of the AA pts. were treated at 2 inner-city teaching hospitals.
- Small study.

GWTG-Stroke Racial Differences in Stroke Care

- Will be 'out' SOON folks...!!!

Stroke in Women

Key Learning Points - I

- 1) Despite lower age-specific stroke rates, more stroke events occur in women than men, and this excess burden will increase in the future
- 2) There is evidence that presenting stroke symptoms are different in women compared to men, but the impact of this is probably not huge.
- 3) After surviving a stroke, women do worse than men on almost every outcome measure but we are not sure why.

Key Learning Points - II

- 4) Possible explanations for poorer outcomes include differences in age, stroke sub-type, co-morbidities, stroke severity, pre-stroke function, depression, social support, and possibly quality of care.
- 5) Previous studies have shown disparities in the care of women with cardiac disease, particularly in terms of diagnostic and therapeutic interventions:
- 6) Until recently there was relatively little data examining sex differences in the quality of acute stroke care using a broad set of measures.

Gender Disparities in Stroke Care: Previous Studies

- Question: Do similar gender based disparities exist in acute stroke care?
- Previous studies:
 - Canadian Registry: ↓ stroke team, lipids testing (Kapral, 2005)
 - Texas Study: ↓ echocardiography, carotid imaging (Smith, 2005).
 - Several studies in US, Canada and Europe show women less likely to receive CEA.

Do Men and Women Receive Similar Acute Stroke Care?

Results from the MASCOTS
Statewide Stroke Registry

Julia Gargano MS, Susan Wehner MSN, Mathew Reeves PhD
Department of Epidemiology, Michigan State University

Analysis

- Logistic regression (GEE)
 - Unadjusted and Adjusted Odds Ratios (AOR)
 - Adjusted for age, CAD/MI, dyslipidemia, smoking, hypertension, CHF, pre-stroke ambulatory status
- Female vs. male
 - OR >1 means females more likely to have outcome
 - OR <1 means females less likely to have outcome

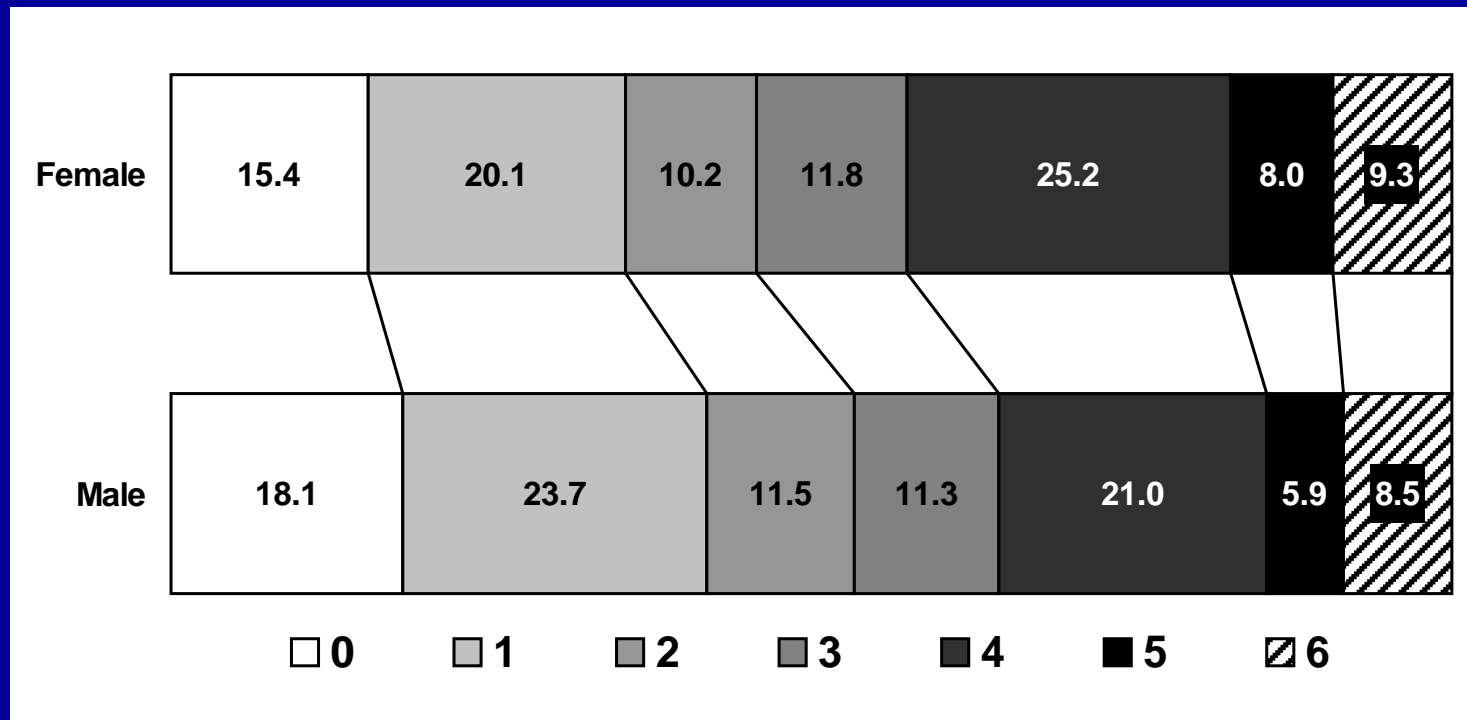
Results: Clinical features

- older than
 - mean 67 years 70 years
 - ≥80 years 20% 32%
- PMH - significant sex differences seen for:
 - ↓ CAD/MI, dyslipidemia, smoking
 - ↑ CHF, hypertension
 - ↓ ambulatory pre-stroke
- No significant sex differences in race, stroke subtype, prior stroke, AFib, DM

In-hospital mortality/discharge

- In-hospital Mortality
 - 8.5% 9.3%
 - UOR 1.10 (0.85, 1.43)
 - AOR 1.00 (0.74, 1.33)
- Discharge Home
 - 59.4% 52.8%
 - UOR 0.76 (0.61, 0.95)
 - AOR 0.86 (0.69, 1.08)

Modified Rankin Scale at Discharge



- MRS 0-5 (among survivors)
 - UPOR 1.29 (1.12, 1.49)
 - APOR 1.17 (1.01, 1.35)**

In-hospital treatments/procedures

Warfarin (AF, no CI)

57.3%

60.8%

Cardiac monitor

61.2%

57.1%

– UOR 0.85 (0.72, 0.99)

– AOR 0.89 (0.75, 1.05)

Angiography (CA, MRA, CTA)

43.8%

39.3%

– UOR 0.83 (0.72, 0.96)

– AOR 0.94 (0.82, 1.07)

Blood Lipids

PMH dyslipidemia

31.3%

26.9%

Lipids investigated in hospital (IS/TIA)

51.2%

41.6%

– UOR 0.68 (0.57, 0.83)

– AOR 0.76 (0.61, 0.94)**

Lipid-lowering therapy at discharge (IS/TIA)

35.9%

31.7%

– UOR 0.84 (0.69, 1.02)

– AOR 0.96 (0.75, 1.23)

Complications

- DVT/PE

1.3%

1.5%

- Pneumonia

5.7%

5.7%

- Urinary tract infection (UTI)

4.3%

11.1%

– UOR 2.78 (2.05, 3.76)

– AOR 2.57 (1.87, 3.54)**

IV t-PA

Among all IS (751 , 834)

4.4%

2.2%

– UOR 0.52 (0.35, 0.77)

– AOR 0.56 (0.37, 0.86)

Among IS, arrived <2hr, no CI (99 , 81)

28.3%

18.5%

– UOR 0.53 (0.36, 0.78)

– AOR 0.54 (0.34, 0.86)

t-PA disparity was not explained by age, comorbidities, delayed presentation or contraindications

Conclusions – MASCOTS Sex Differences Analysis

- Few sex differences in care observed; most apparent sex differences were really age-related differences in care
- UTI: affected 11% of
Has been associated with poorer outcomes.
- t-PA: received by only a small minority of stroke patients, with women less likely to receive it

Quality of Care in Women With Ischemic Stroke in the GWTG Program

Mathew J. Reeves, PhD; Gregg C. Fonarow, MD; Xin Zhao, PhD; Eric E. Smith, MD, MPH; Lee H. Schwamm, MD; on behalf of the GWTG-Stroke Steering Committee & Investigators

Background and Purpose—Prior studies have suggested worse poststroke outcomes in women. We sought to examine sex differences in quality of care (QOC) in the Get With The Guidelines-Stroke (GWTG-Stroke) program.

Methods—We analyzed the relationships between sex and QOC as well as outcomes (in-hospital mortality and discharge home) using multivariable logistic regression models in 383 318 acute ischemic stroke admissions from 1139 hospitals that participated in the GWTG-Stroke program between 2003 to 2008. QOC was measured using 7 predefined performance measures and a defect-free care summary measure (defined as the proportion of patients who received all eligible interventions).

Results—Compared to men, women were older and more likely to present by ambulance. They were also more likely to have a past medical history of atrial fibrillation or hypertension, and less likely to have a history of heart disease, dyslipidemia, or smoking. Although sex differences in individual performance measures were relatively modest they consistently identified women as being less likely to receive care compared to men. Overall, women received less defect-free care than men (66.3% versus 71.1%, adjusted odds ratio [aOR]=0.86; 95% confidence interval [CI] 0.85 to 0.87) and were less likely to be discharged home (41.0% versus 49.5%, aOR=0.84, 95% CI 0.83 to 0.85). Although crude mortality was higher in women (6.0% versus 5.2%), this difference was eliminated after risk adjustment (aOR=1.03, 95% CI 0.99 to 1.06).

Conclusions—Quality of care for women with ischemic stroke was lower than that for men, and women were less likely to be discharged home. Further study is warranted to identify the causes and consequences of these sex-based differences in care. (*Stroke*. 2009;40:00-00.)

Methods: GWTG-Stroke Sex Differences in Stroke Care

- 383,000 IS admissions from 1139 GWTG-Stroke hospitals, 2003 – 2008
- 7 Performance Measures:
 - tPA , 2 hrs, no c/i
 - Anti-throm within 48 hours
 - DVT prophylaxis
 - Anti-throm at D/C
 - Anti-coag for AFib at D/C
 - Smoking cessation
 - Cholesterol treatment at D/C
- Calculated summary defect free measure

GWTG-S Compliance with Performance Measures: Female vs. Male

	<u>Female</u>	<u>Male</u>	<u>OR</u>	<u>AOR*</u>
tPA, < 2 hr	56%	59%	0.88	0.91
Anti-throm 48h	94%	95%	0.84	0.87
DVT proph.	88%	89%	0.91	0.95
D/C anti-throm	94%	95%	0.86	0.91
D/C anti-coag	88%	90%	0.86	0.93
Smoking	86%	86%	0.94	0.95
D/C Chol	69%	76%	0.74	0.82
Defect free (%)	66%	71%	0.82	0.86

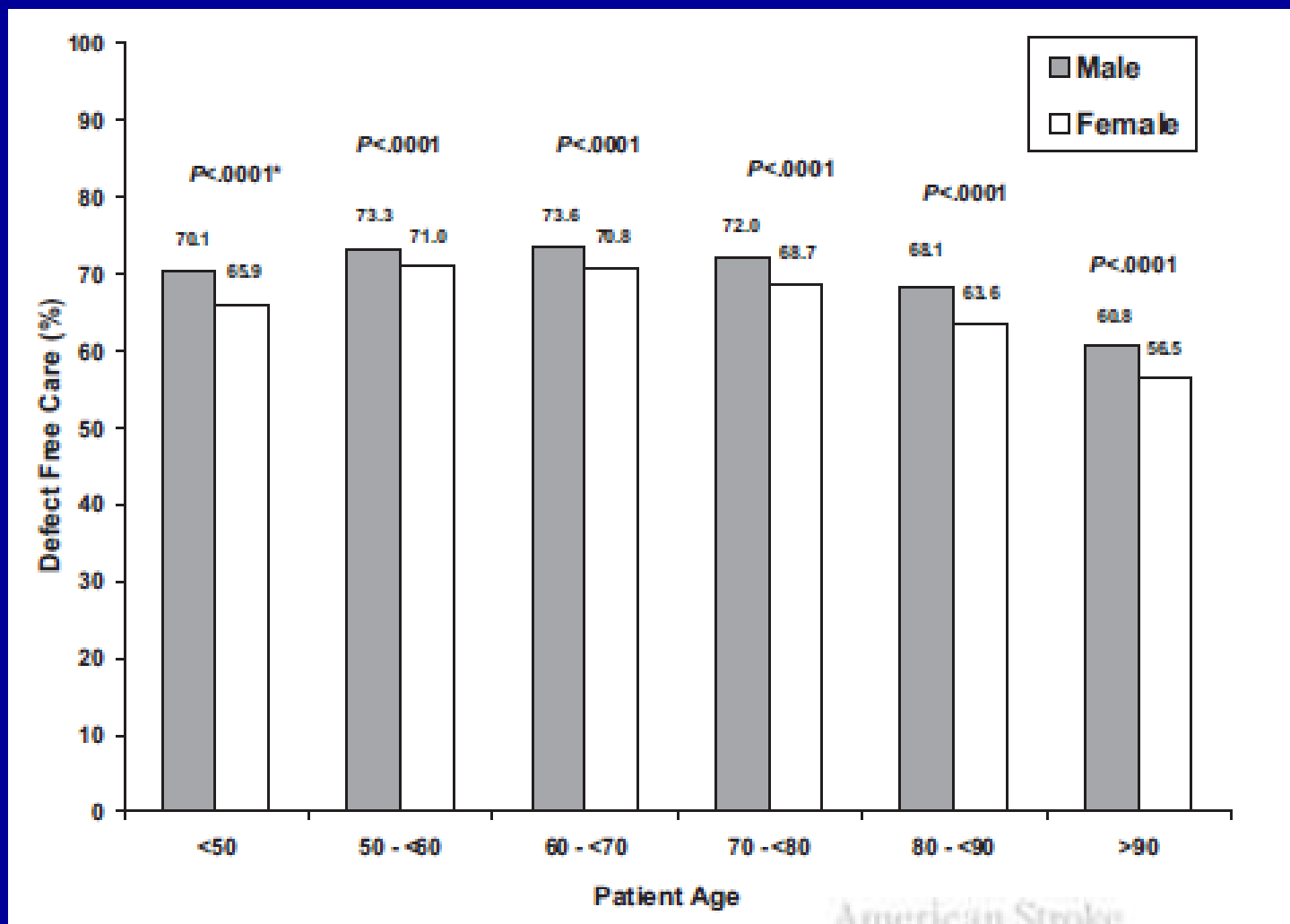
* Adjusted for age, race, PMH, hospital characteristics.
 All comparisons P <0.001

GWTG-S Outcomes: Female vs. Male

	<u>Female</u>	<u>Male</u>	<u>OR</u>	<u>AOR*</u>
In-hospital death	6.0%	5.2%	1.18	1.03
D/C home	41%	50%	0.71	0.84
LOS (median)	4 d	4 d	1.13	1.09
D/C SNF	24%	16%	1.62	-
D/C rehab	21%	21%	0.95	-

* Adjusted for age, race, PMH, hospital characteristics.
 All comparisons P <0.001

Sex differences in defect-free care were small but consistent across age groups



Question

- Are the disparities in the tPA treatment rates observed in the MASCOTS and GWTG-Stroke observed elsewhere?

Sex Differences in the Use of Intravenous rt-PA Thrombolysis Treatment for Acute Ischemic Stroke

A Meta-Analysis

Mathew Reeves, PhD; Archit Bhatt, MD; Peter Jajou, BS; Michael Brown, MD; Lynda Lisabeth, PhD

Background and Purpose—Some studies report that women are less likely to receive IV rt-PA treatment for stroke than men. We undertook a meta-analysis to determine whether a sex disparity existed.

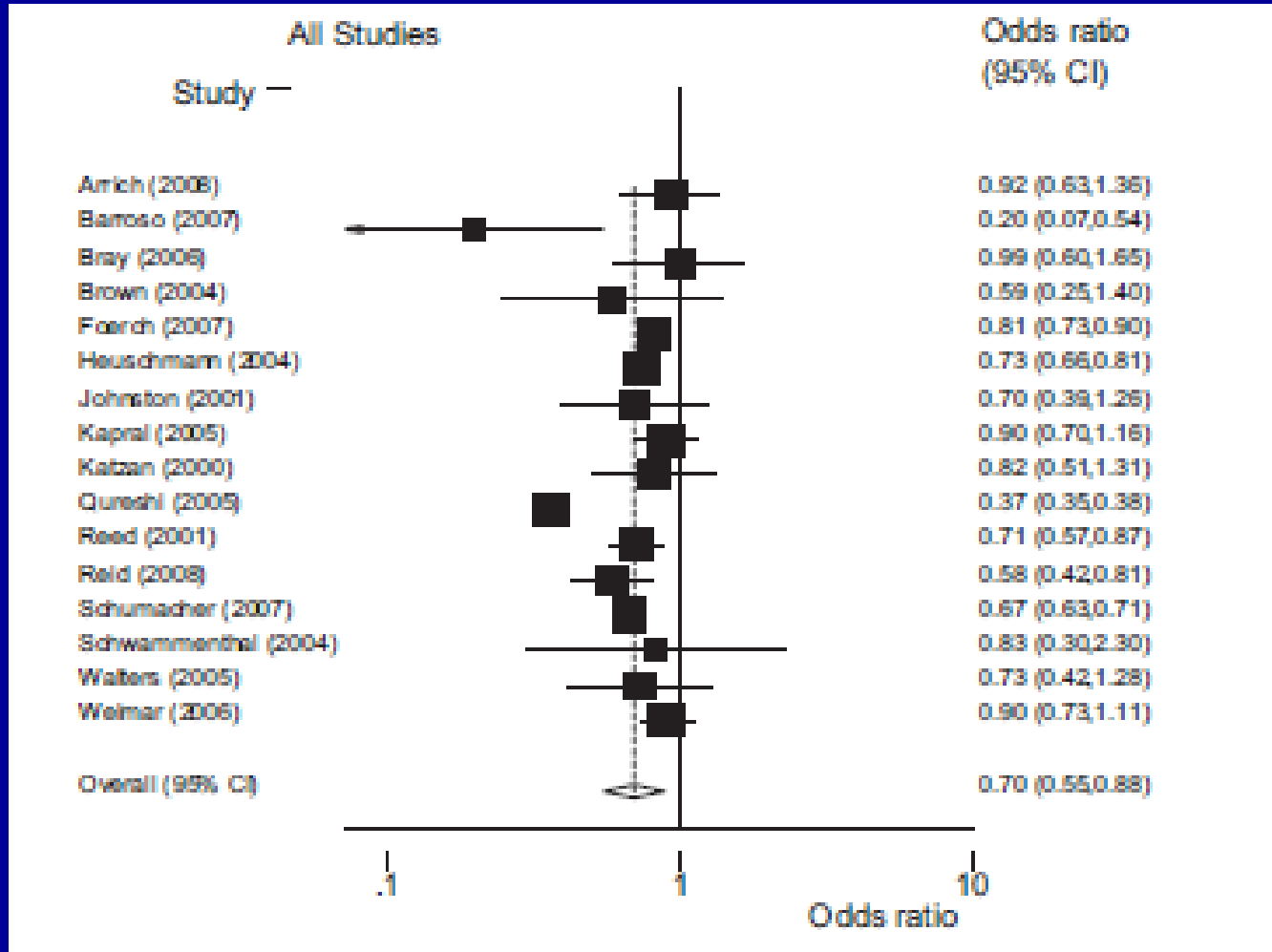
Methods—We identified studies that reported sex-specific IV rt-PA treatment rates for acute stroke. Eligible studies included acute stroke admissions from single or multiple hospitals, registries, or administrative databases. Random effects odds ratios (OR) and 95% confidence intervals (CI) were generated to quantify sex differences (females versus males) among all ischemic stroke admissions and among the eligible subgroup who arrived within 3 hours without contraindications. Study design and geographic location were explored as sources of heterogeneity.

Results—Eighteen studies were included. Study designs included single hospitals (n=5), multiple hospitals (n=6), registries (n=4), and administrative databases (n=3). The summary OR was 0.70 (95% CI=0.55 to 0.88) indicating that women had a 30% lower odds of receiving rt-PA treatment than men. However, substantial between-study variability existed. Among 13 hospital-based studies, the summary OR was 0.78 (95% CI=0.71 to 0.86) with no significant heterogeneity. Among the 3 administrative studies, the OR was 0.55 (95% CI=0.34 to 0.90) but with significant heterogeneity. Among 4 studies that included data on the eligible subgroup, women had a nonsignificant lower odds of treatment (OR=0.81, 95% CI=0.58 to 1.13).

Conclusions—Despite the presence of significant between-study variation, women with acute stroke were consistently less likely to receive thrombolysis treatment compared with men. Further studies to explore the origins of this sex disparity are warranted. (*Stroke*. 2009;40:1743-1749.)

tPA use in women vs. men

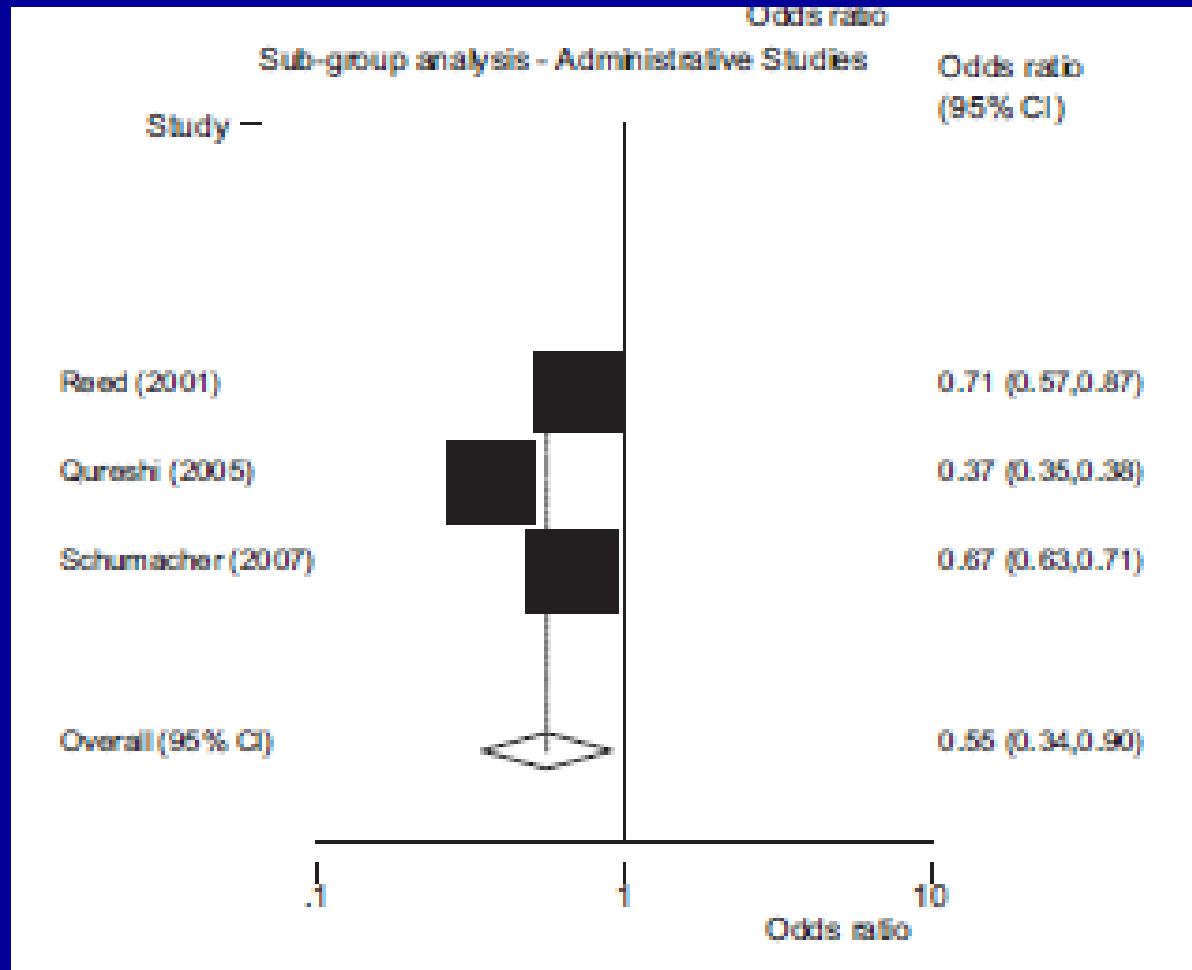
Meta-analysis of 18 Observational Studies



Summary OR = 0.70, 95% CI 0.55-0.88

tPA use in women vs. men

Sub-group analysis: Arrive < 3 hrs, no c/i



Summary OR = 0.55, 95% CI 0.34-0.90

Stroke in the Elderly

Key Learning Points - I

- 1) We are all getting older.
- 2) The oncoming stroke epidemic is driven by the rapidly aging population:
 - By 2050 in the U.S. there will be about 2,000,000 stroke events and 400,000 stroke deaths every year!
 - Cumulative costs of stroke are estimated to be \$2 trillion!
- 3) Stroke will be dominated by geriatric care issues
 - Limited life expectancy, competing risks, pre-morbid function, quality of life concerns, preferences and expectations (patient and family), and different risks, benefits and cost-effectiveness of treatment interventions.

Stroke in the Elderly

Key Learning Points - II

- 4) Lack of evidence concerning the risks, benefits, and cost-effectiveness of many clinical treatments and interventions when applied to the elderly
- 5) Assessing the quality of stroke care in the elderly is complicated by nursing home patients, 'DNR orders', and 'comfort measures only'.
- 6) Age is the most important non-modifiable risk factor for stroke
 - After age 55, stroke rates double for each successive decade
 - 65% of all strokes occur over the age of 65.
 - 32% of stroke cases in women and 20% of stroke cases in men, are >80 years old

Age and Stroke Characteristics

- Older ischemic stroke patients have higher prevalence of AFib, HTN, CAD, and Stroke/TIA, but smoke less.
- Older patients are more likely to be white and female.
- Stroke severity increases with age and older patients have higher case fatality and worse functional outcomes.

Age and Stroke Care: Previous Studies

- Limited data on age-related stroke care.
 - Danish National Study found older patients received less oral anticoagulant therapy and early nutritional evaluation (Palnum, 2008)
 - Joint European study found patients >75 years were less likely to receive a CT scan, echo, or post-discharge rehabilitation (Bhalla, 2004)
 - Several studies show lower tPA rates in elder patients (Reed 2001, Deng 2006, Mateen 2009).
 - Less lipid testing and treatment in hospitalized patients > 80 years of age (Mullard, 2006).

GWTG-Stroke Age-based Differences in Stroke Care

- Will be 'out' SOON folks...!!!

Canadian Data on Age and Stroke Care (G. Saposnik)

- Age Disparities in Stroke Care (Stroke, 2009)
 - 11 Ontario stroke centers participating in RCSN
 - 3631 IS discharges, 2003-05
 - Compared data on 6 quality indicators, risk adjusted 30-d case fatality, LOS, disposition
 - 33% of cases were ≥ 80 yrs
 - Risk adjusted 30-d CFR
 - 7.1% ≤ 59 yrs
 - 6.5% 60-69 yrs
 - 8.8% 70-79 yrs
 - 14.8% ≥ 80 yrs

Age Disparities in Stroke Quality of Care, RCSN, (Saposnik, Stroke, 2009)

	<u>≤59</u>	<u>60-69</u>	<u>70-79</u>	<u>≥80</u>
Women	38%	33%	46%	62%
Severe stroke	8%	9%	14%	16%
HTN	46%	69%	72%	71%
Afib	4%	10%	17%	27%
CHF	3%	7%	9%	14%
Pre-stroke independent	96%	86%	81%	67%
Dementia	<1%	3%	8%	17%
Arrived from Nursing home	0%	2%	3%	14%

All trends P <0.05

Age Disparities in Stroke Quality of Care, RCSN, (Saposnik, Stroke, 2009)

<u>Quality Measure</u>	<u><=59</u>	<u>60-69</u>	<u>70-79</u>	<u>>=80</u>
tPA	14%	15%	15%	13%
Dysphagia screen*	46%	53%	59%	60%
Stroke unit admission	44%	48%	49%	49%
Stroke team manage.	62%	56%	58%	60%
Carotid imaging	85%	83%	82%	69%
Statins D/C*	57%	71%	65%	56%
Anti-throm D/C	94%	94%	93%	92%
Anti-coag Afib D/C	87%	82%	83%	77%

* P < 0.05

Age Disparities in Stroke Quality of Care, RCSN, (Saposnik, Stroke, 2009)

- As expected marked differences in stroke outcomes observed by age.
- But no evidence that quality of care was lower in elderly patients.
- Data is from 11 regional Ontario stroke centers so may not be generalizable.

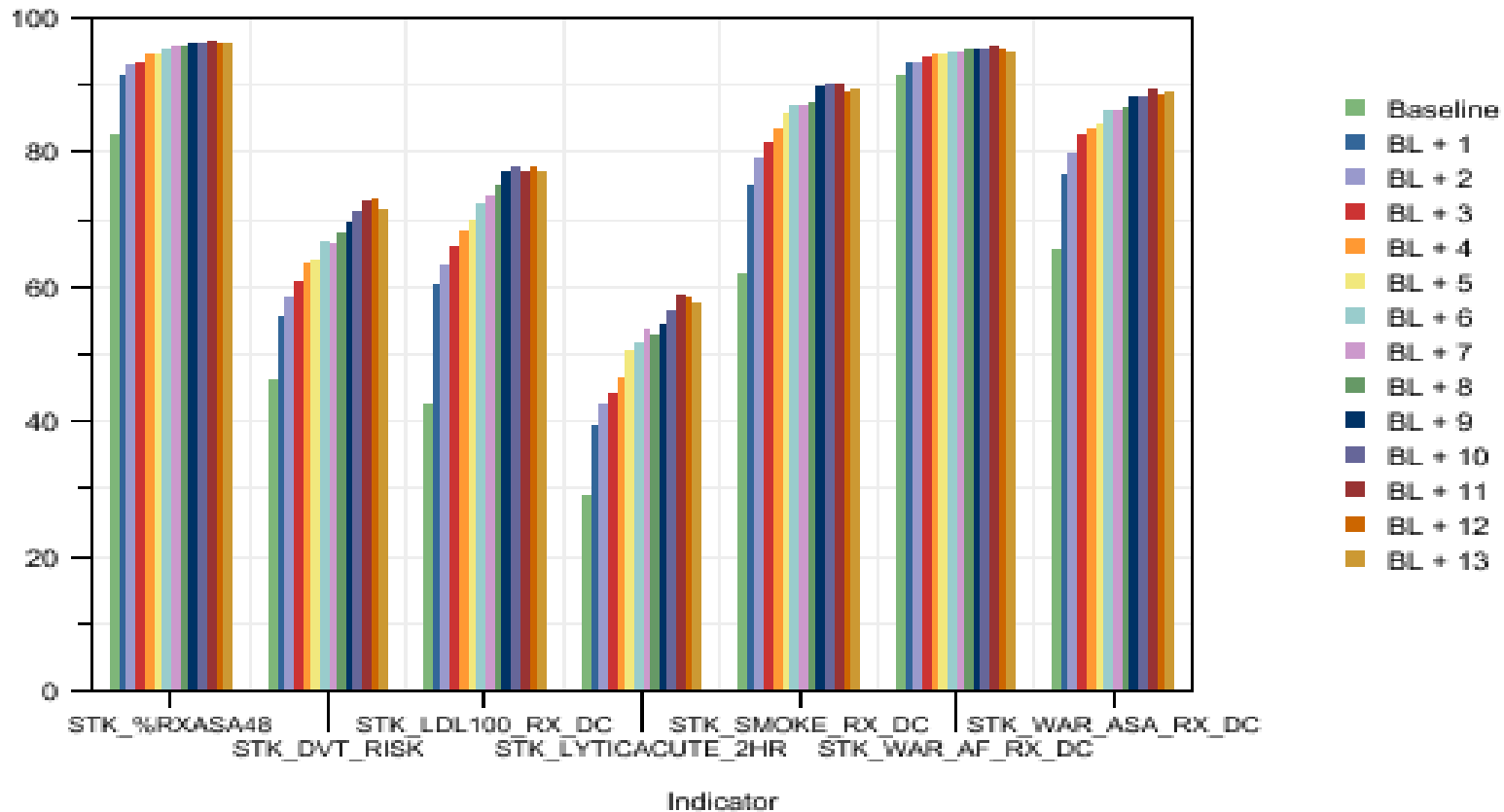
Summary – Disparities in Stroke Care

- Little evidence of major disparities in stroke care by race, gender or even age.
- Much of this data comes from volunteer hospitals or larger, specialist hospitals so disparities may be larger at smaller hospitals with less interest in stroke.

GWTG Stroke Compliance

April 2008: BL + 13

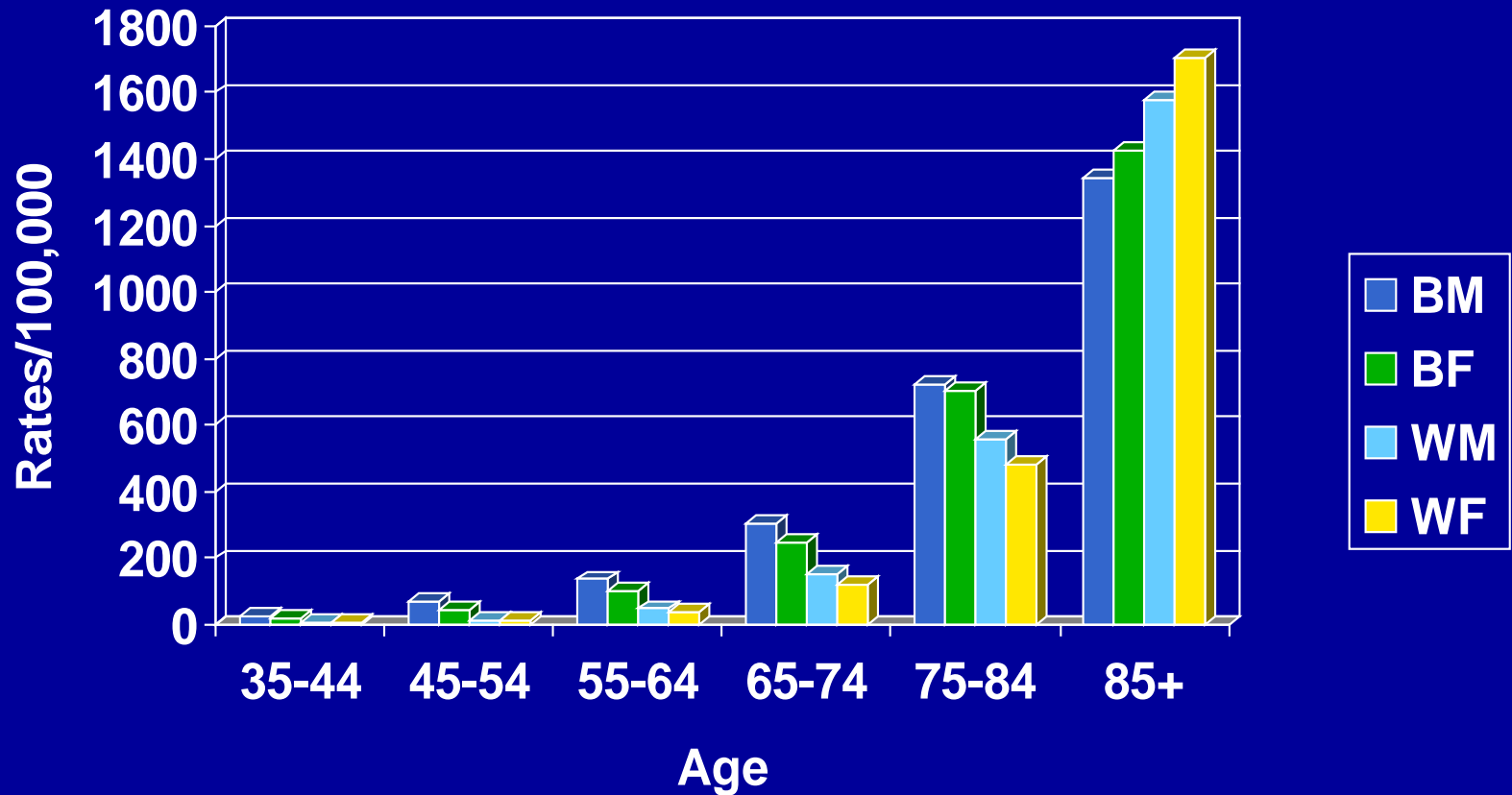
(Source: Siebel Dashboards 4/15/08)



Racial Differences in Quality of Stroke Care: Previous Studies

- 4). Oddone (1993, 1999), Mitchell (2000)
 - Several studies have shown that blacks were less likely to receive carotid imaging compared to whites.
- 5). Mitchell (2000)
 - Black stroke patients were 21% less likely to be treated by a neurologist - which is a major determinant of referral for further testing.
- 6). Lisabeth, Neurology, 2004
 - Data from Michigan Medicare population found no differences in the use of anti-thrombotics at discharge by race (or gender) after adjustment for confounders.

Stroke Mortality by Age and Race/Gender, US, 1989 (per 100,000)



Canadian Data on Age and Stroke Care (G. Saposnik)

- Stroke Outcome in Over 80 (Stroke, 2008)
 - Canadian Hospital D/C Data, 2003-04
 - 26,000 IS discharges from 606 hospitals
 - 38% of cases were ≥ 80 yrs
 - In-hospital CFR
 - 5.7% <59 yrs
 - 8.6% 60-69 yrs
 - 13.4% 70-79 yrs
 - 24.2% ≥ 80 yrs
 - Subjects ≥ 80 were less likely to be admitted to ICU, or D/C to previous residence, and had longer LOS