

# How the cardiologist can help in stroke prevention

*L.N. Hopkins, MD*

*University at Buffalo Neurosurgery*

*Gates Vascular Institute at Kaleida Health*

*Toshiba Stroke Research Center*

*Jacobs Institute*

# Disclosure Statement of Financial Interest

I, L.N. Hopkins DO NOT have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation.

# U.S. Public Health Problem

## *Far Beyond the Scope of Neuro(INR,IN,ENS)*

**Circulation**  
JOURNAL OF THE AMERICAN HEART ASSOCIATION



### **Heart Disease and Stroke Statistics—2013 Update: A Report From the American Heart Association**

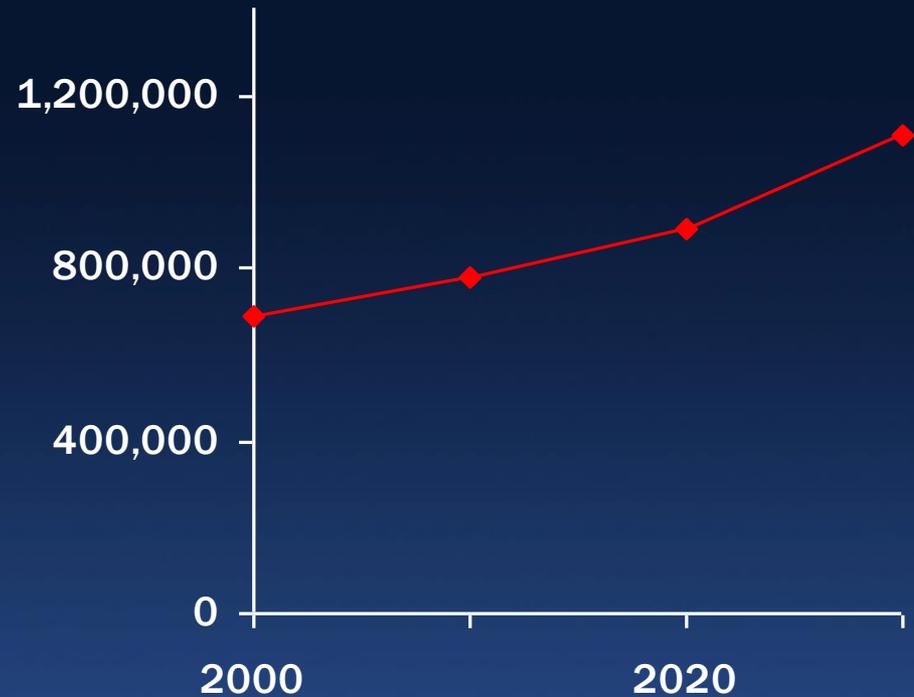
Alan S. Go, Dariush Mozaffarian, Véronique L. Roger, Emelia J. Benjamin, Jarett D. Berry, William B. Borden, Dawn M. Bravata, Shifan Dai, Earl S. Ford, Caroline S. Fox, Sheila Franco, Heather J. Fullerton, Cathleen Gillespie, Susan M. Hailpern, John A. Heit, Virginia J. Howard, Mark D. Huffman, Brett M. Kissela, Steven J. Kittner, Daniel T. Lackland, Judith H. Lichtman, Lynda D. Lisabeth, David Magid, Gregory M. Marcus, Ariane Marelli, David B. Matchar, Darren K. McGuire, Emile R. Mohler, Claudia S. Moy, Michael E. Mussolino, Graham Nichol, Nina P. Paynter, Pamela J. Schreiner, Paul D. Sorlie, Joel Stein, Tanya N. Turan, Salim S. Virani, Nathan D. Wong, Daniel Woo and Melanie B. Turner  
on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee

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# U.S. Stroke Prevalence

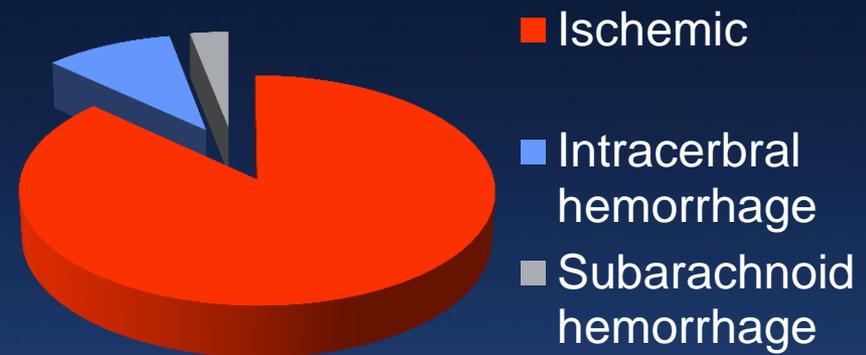
- An estimated 6.8 million Americans  $\geq 20$  years of age have had a stroke
- Projections show that by 2030, an additional 4 million people will have had a stroke, a 21.9% increase in prevalence from 2013



# U.S. Stroke Incidence

- Each year,  $\approx 800,000$  people experience a new or recurrent stroke.
- On average, every 40 sec, someone in the United States has a stroke.

Stroke Incidence



# U.S. Stroke Mortality

- On average, every 4 minutes, someone dies of a stroke
- Stroke accounted for  $\approx 1$  of every 19 deaths in the United States in 2009
- Stroke #4 cause of death
- Stroke #1 cause of adult disability

# Rationale for Cardiologist Involvement

- Approximately 7000 interventional cardiologists in the U.S.

Feldman T, CCI 58:137-138, 2003

- Fewer than 300 neurointerventionalists

# Rationale for Cardiologist Involvement

Cardiologists are already involved in stroke prevention :

- Management of hypertension
- Management of hyperlipidemia
- Management of atrial fibrillation and PFO
- Increased role in carotid disease
- Peri-procedural stroke care
- Catheter and wire skills
- Mind set
- Location...where do strokes occur?

# Rationale for Cardiologist Involvement

- There is already an organizational link between cardiology and stroke neurology
- American Stroke Council is a part of the American Heart Association

# Rationale for Cardiologist Involvement

- More than 600,000 elderly Americans with atrial fibrillation (AF) take an oral anticoagulant (OA) daily to prevent embolic stroke.
- Future- up to 1/4 older Americans

Prevention of Embolic Strokes

The Role of the American College of Chest Physicians

James E. Dalen , MD , Master FCCP *CHEST* 2012; 141(2):294–299

# CAD in Stroke

- Coronary artery disease is a leading cause of death patients with TIA or stroke
- In The PRECORIS Study
  - >20% of patients with nondisabling, noncardioembolic ischemic stroke/TIA have  $\geq$ 50 asymptomatic CAD.

*Prevalence of Asymptomatic Coronary Artery Disease in Ischemic Stroke Patients  
Circulation Volume 121(14):1623-1629 April 13, 2010*

# Stroke as a Complication of Cardiac Catheterization

- In United states: Stroke is reported to occur in 0.05-0.1% of diagnostic cardiac catheterizations and in 0.18-0.44% of patients treated with percutaneous coronary intervention in clinical routine today.
- The rate of stroke after cardiac catheterization has remained almost constant over the last 20 years

*Stroke in patients undergoing coronary angiography and percutaneous coronary intervention: incidence, predictors, outcome and therapeutic options*

*Expert Review of Cardiovascular Therapy*

*October 2012, Vol. 10, No. 10, Pages 1297-1305 , DOI*

*10.1586/erc.12.78 (doi:10.1586/erc.12.78)*

# Stroke Complicating Cardiac Cath

*Best Candidates/Poorest Results of Intervention*

**Circulation**

JOURNAL OF THE AMERICAN HEART ASSOCIATION



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**Prevalence of Asymptomatic Coronary Artery Disease in Ischemic Stroke Patients: The  
PRECORIS Study**

David Calvet, Emmanuel Touzé, Olivier Varenne, Jean-Louis Sablayrolles, Simon Weber and  
Jean-Louis Mas

*Circulation.* 2010;121:1623-1629; originally published online March 29, 2010;

- In Europe: Stroke as complication of PCI occurs rarely (0.4%) in clinical practice in Europe today. However, peri-interventional stroke is still associated with an exceedingly high in-hospital mortality rate

# Pediatric Stroke as a Complication

- Children with acute neurological complications resulting from cardiac catheterization (n=3648) is 0.38%
  - Neurologic complications due to catheterization. *Pediatric Neurology*. 24(4):270-5, 2001
- Congenital anomalies of the heart and aorta are likely more safely catheterized by experienced pediatric interventional cardiologists

# Cardiologists

## *Experts in Vascular Emergencies*

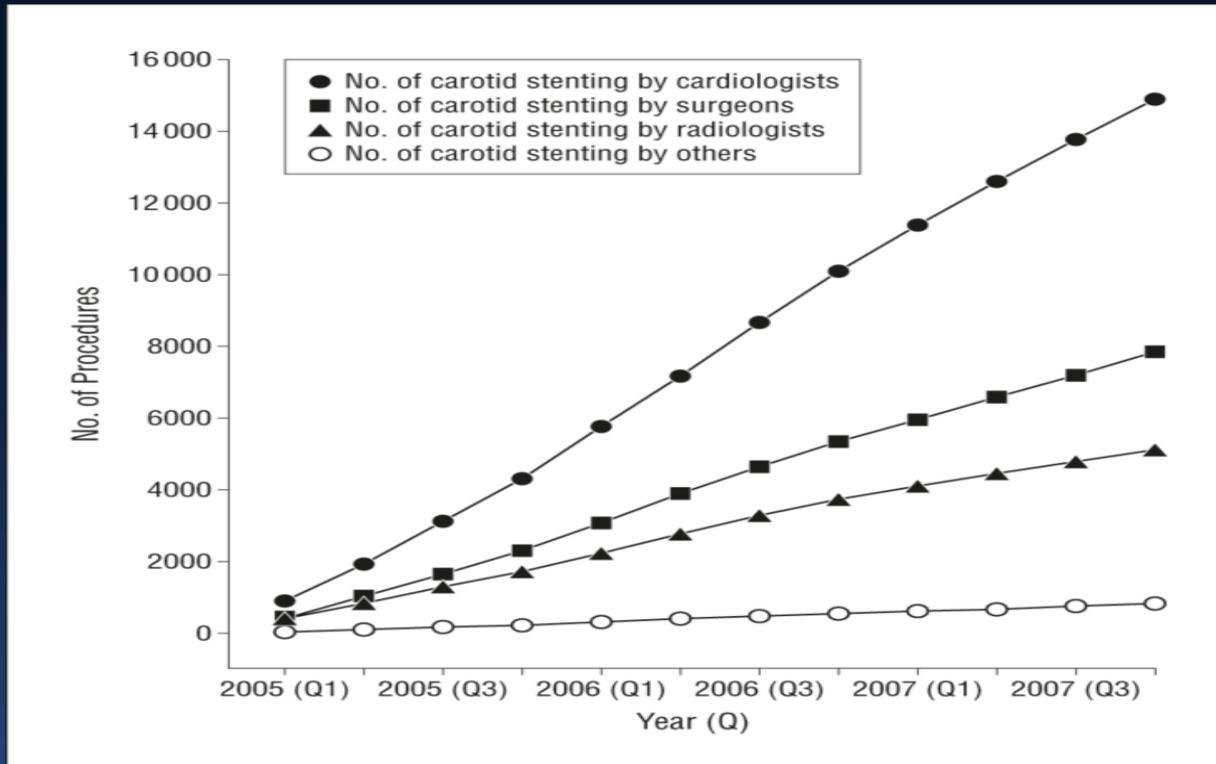
- Interventional cardiologists are familiar with treatment for:
  - Dissection
  - Sudden thrombosis
  - Occlusion
- They have skills and knowledge of catheters, thrombolytics, stents, balloons, and snares
- They are accustomed to making quick, thoughtful decisions at any hour

# Summary of Pros

- Catheter skills
- Knowledge of pharmacotherapeutics
- Knowledge of devices
- Familiarity with emergency situations
- Availability at any hour
- Stroke patients typically have cardiac issues
- These patients may already have a cardiologist
- Immediate treatment of their own complications
- The number of strokes are far too great and not in locations where neurointerventionalists work

# Cardiologists: Now Leading CAS

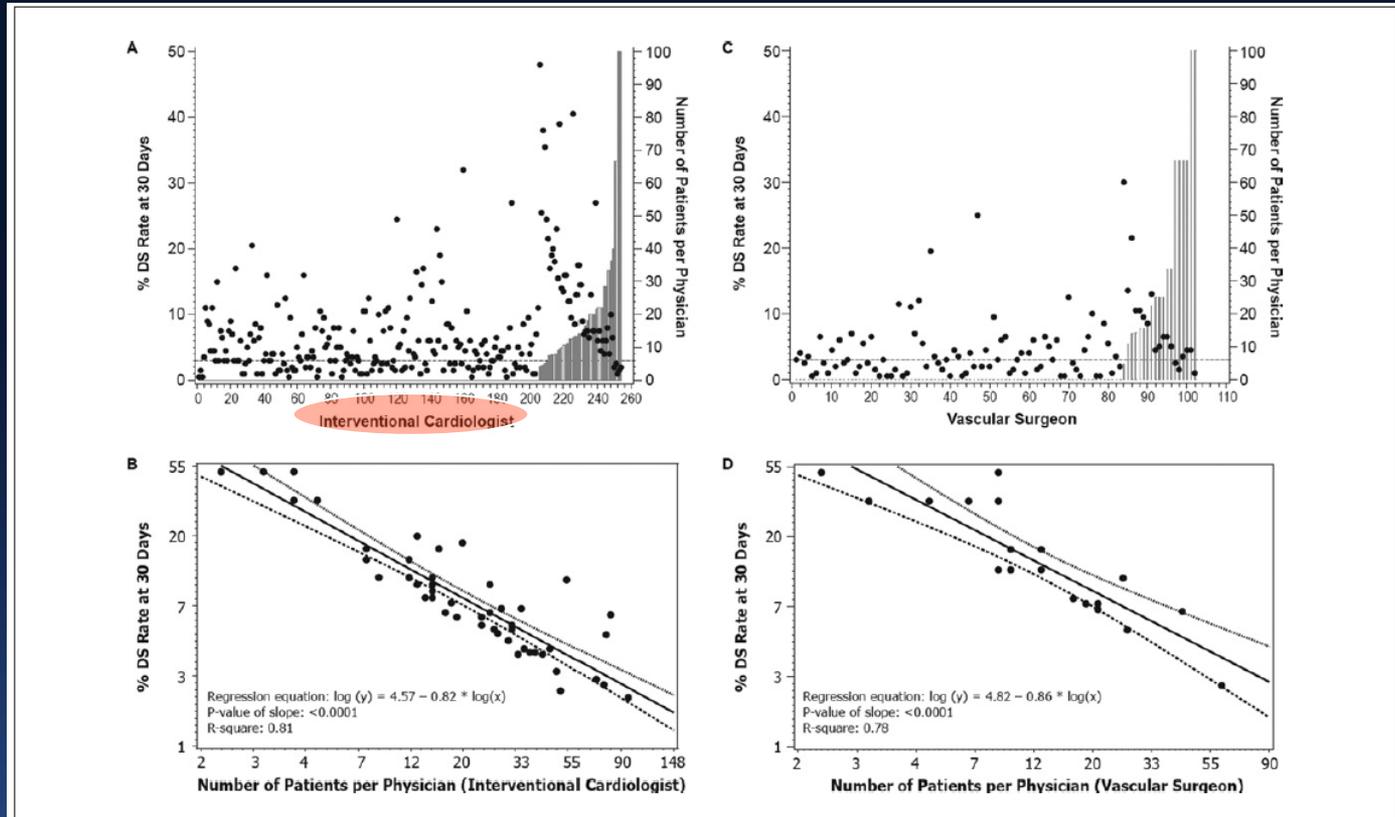
**Cardiologist perform most of carotid Stenting in United States  
Stroke is the most feared complication**



From: *Physician Specialty and Carotid Stenting Among Elderly Medicare Beneficiaries in the United States*  
*Arch Intern Med.* 2011;171(20):1804-1810. doi:10.1001/archinternmed.2011.354

Figure Cumulative number of carotid stenting procedures performed by physician specialty over time. Q indicates quarter.

# CAPTURE 2 Clinical study: Similar outcome rates by specialty,



(A) Death and stroke (DS) rate by number of patients/physician for interventional cardiologists (dotted horizontal line indicates American Heart Association guideline of 3% event rate for asymptomatic patients).

# Staged Carotid Artery Stenting and Coronary Intervention/ Bypass

Eur J Vasc Endovasc Surg (2009) 37, 379–387



ELSEVIER



REVIEW

## A Systematic Review and Meta-analysis of 30-Day Outcomes Following Staged Carotid Artery Stenting and Coronary Bypass

A.R. Naylor<sup>a,\*</sup>, Z. Mehta<sup>b</sup>, P.M. Rothwell<sup>b</sup>

<sup>a</sup> The Department of Vascular Surgery, Clinical Sciences Building, Leicester Royal Infirmary, Infirmary Square, Leicester LE2 7LX, UK

<sup>b</sup> The Stroke Prevention Research Unit, University Department of Clinical Neurology, The John Radcliffe Hospital, Oxford, UK

Table 4 30-day outcomes following CAS + CABG stratified for whether CABG was performed <48 h of CAS or >2 weeks of CAS

Endpoint	CABG <48 h of CAS	CABG >2 weeks of CAS
n=	104	579
Death	5/104 (4.8%) (95%CI 0.0–11.4))	31/579 (5.4%) (95%CI 2.5–8.3)) <sup>a</sup>
Death/ ipsilateral stroke	6/104 (5.8%) (95%CI 0.0–12.8))	46/523 (8.8%) (95%CI 4.9–12.6)) <sup>a</sup>
Death/any stroke	6/104 (5.8%) (95%CI 0.0–12.8))	50/579 (8.6%) (95%CI 5.3–11.9)) <sup>a</sup>
Death/stroke/ MI	7/104 (6.7%) (95%CI 0.0–15.2))	39/517 (7.5%) (95%CI 5.4–9.7)) <sup>a</sup>

<sup>a</sup> Note that the denominator varies between endpoints as not all studies reported all of this information.

*Conclusions: In a cohort of predominantly asymptomatic patients with unilateral carotid disease, the 30-day risk of death/any stroke was 9.1%. These data are comparable to previous systematic reviews evaluating the roles of staged and synchronous carotid endarterectomy (CEA) plus CABG, and suggest that staged CAS plus CABG is an attractive and less invasive alternative to CEA plus CABG*

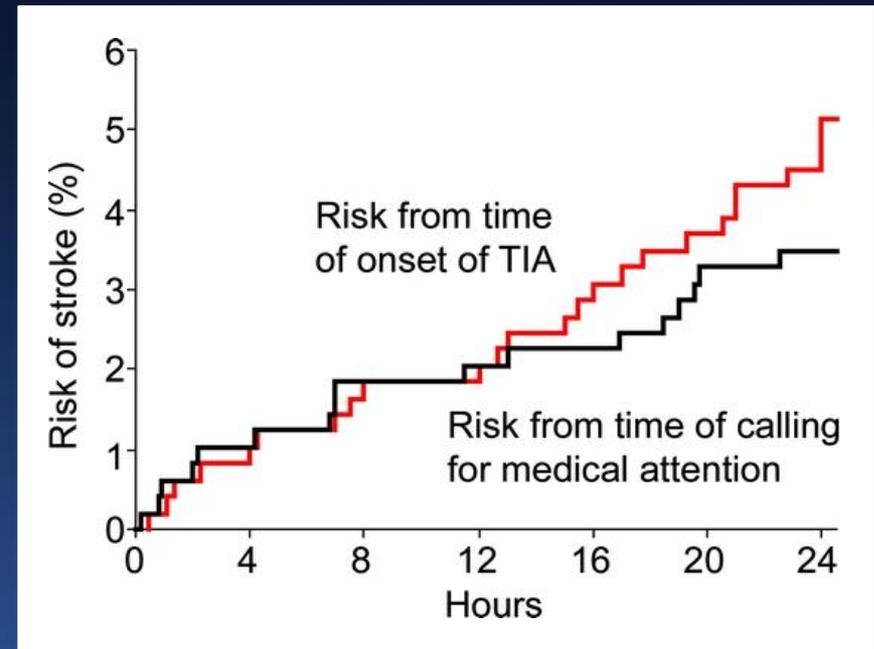
## Population-based study of risk and predictors of stroke in the first few hours after a TIA.

Chandratheva A, Mehta Z, Gerahty OC, Marquardt L, Rothwell PM; Oxford Vascular Study.

Stroke Prevention Research Unit, Oxford University Department of Clinical Neurology, UK.

- Following a TIA:
  - 6 hr stroke risk = 1%
  - 12 hr stroke risk = 2%
  - 24 hr stroke risk = 5%
- Results of prospective Oxford Vascular Study

### *Risk of recurrent stroke within first 24 hrs of onset of TIA*



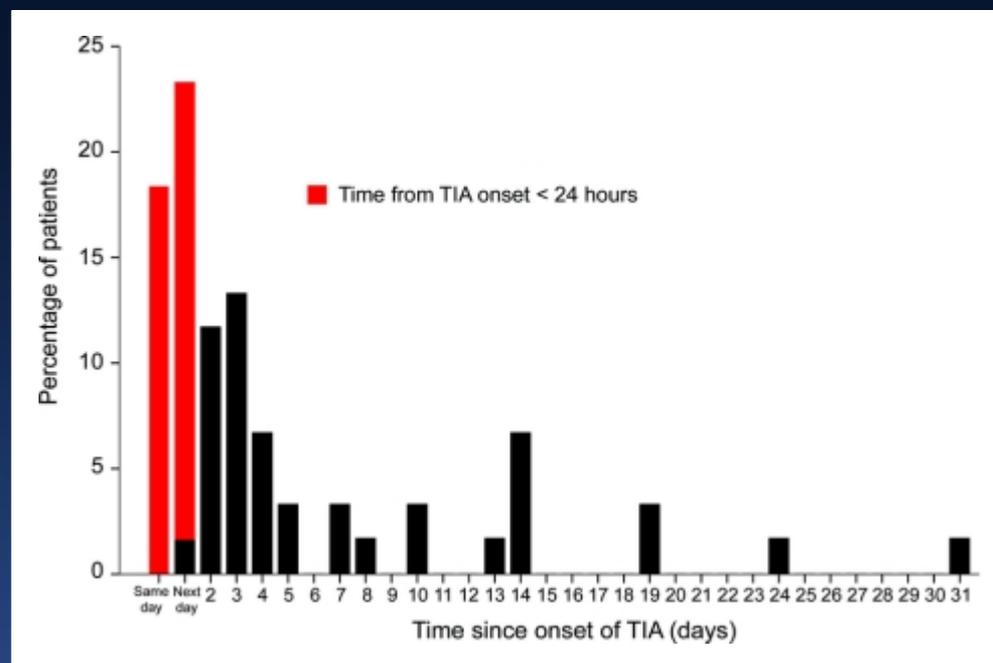
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Stroke Prevention Research Unit, Oxford University Department of Clinical Neurology, UK.

### *Time from onset of TIA to onset of stroke*

- 42% of all strokes during the 30-day follow-up a first TIA occurred within the first 24 hour



[Lancet Neurol](#). 2007 Dec;6(12):1063-72. Epub 2007 Nov 13.

## **Risk of stroke early after transient ischaemic attack: a systematic review and meta-analysis.**

[Giles MF](#), [Rothwell PM](#).

Stroke Prevention Research Unit, Oxford University Department of Clinical Neurology, Radcliffe Infirmary, Oxford, UK. [matthew.giles@clneuro.ox.ac.uk](mailto:matthew.giles@clneuro.ox.ac.uk)

- Risk of stroke 5% at 7 days

[Arch Intern Med](#). 2007 Dec 10;167(22):2417-22.

## **Early risk of stroke after transient ischemic attack: a systematic review and meta-analysis.**

[Wu CM](#), [McLaughlin K](#), [Lorenzetti DL](#), [Hill MD](#), [Manns BJ](#), [Ghali WA](#).

Department of Medicine, University of Calgary, Calgary, AB, Canada.

- All studies - risk of stroke 3.5% at 2 days, 8% at 30 days
- If only including studies with face-to-face follow up data (excluding studies using “administrative” data): 10% at 2 days and 13% at 30 days

# Urgent Revascularization – Timing is Key!

- Best timing...within first 3-7 days
- CAS will be the answer (eventually)
- Cardiologist are used to vascular emergencies

# Decreasing trends in 30-day events from 2000 to 2008 in various carotid studies reported during that period



WORLD NEUROSURGERY 76 (6S): S40-S59, DECEMBER 2011

# Decreasing trends in 30-day events from 2000 to 2008 in various

- Cardiologists are the experts in using serial trials to improve results over time

# Simulator Based Training: The Way to Go

## **Objective Simulator-Based Evaluation of Carotid Artery Stenting Proficiency (from Assessment of Operator Performance by the Carotid Stenting Simulator Study [ASSESS])**

Giora Weisz, MD<sup>a,b,\*</sup>, Nathaniel R. Smilowitz, MD<sup>a</sup>, Helen Parise, ScD<sup>b</sup>, Jacques Devaud<sup>c</sup>, Issam Moussa, MD<sup>d</sup>, Stephen Ramee, MD<sup>e</sup>, Mark Reisman, MD<sup>f</sup>, Christopher J. White, MD<sup>e</sup>, and William A. Gray, MD<sup>a,b</sup>

*A Center for Interventional Vascular Therapy, New York Presbyterian Hospital, Columbia University Medical Center, New York, New York;*

*B Cardiovascular Research Foundation, New York, New York; cAxion Health, Denver, Colorado; dMayo Clinic, Jacksonville, Florida; e Ochsner*

*Clinic, New Orleans, Louisiana; and fSwedish Heart & Vascular Institute, Seattle, Washington. Manuscript received January 27, 2013; revised*

*manuscript received and accepted February 28, 2013.*

# The Continuum of Stroke

*Multidisciplinary Approach*

- **Cardiac sources (AF, PFO, AMI)**
- **Arch traffic**
- **Carotid arteries**
- **Intracranial stenosis**
- **Clot retrieval**
- **Coag abnormalities**
- **Pharmacology & Platelet management**

# Conclusions

*Cardiologists Involved at all levels*

- There is an enormous need for stroke interventionalists
- Cardiologists possess the catheter skills and understanding of the pharmacology
- Cardiologists are accustomed to emergencies
- Training in basic neurology and neuroanatomy
- Neurology/neurosurgery back-up
- Clot retrieval

# Cardiologist and Acute Stroke: Can it Happen?

Yes it can with training, experience and removal of political barriers

## Management of Acute Stroke by Cardiologists

L Nelson Hopkins

*Departments of Neurosurgery and Radiology, and Toshiba Stroke Research Center, School of Medicine and Biomedical Sciences,  
University at Buffalo, State University of New York*

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Correspondence: L Nelson Hopkins, 3 Gates Circle, Buffalo, NY 14209, US. E: Inhbuffns@aol.com*