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Healthcare Cost and Utilization Project (H-CUP)

A Research Tool

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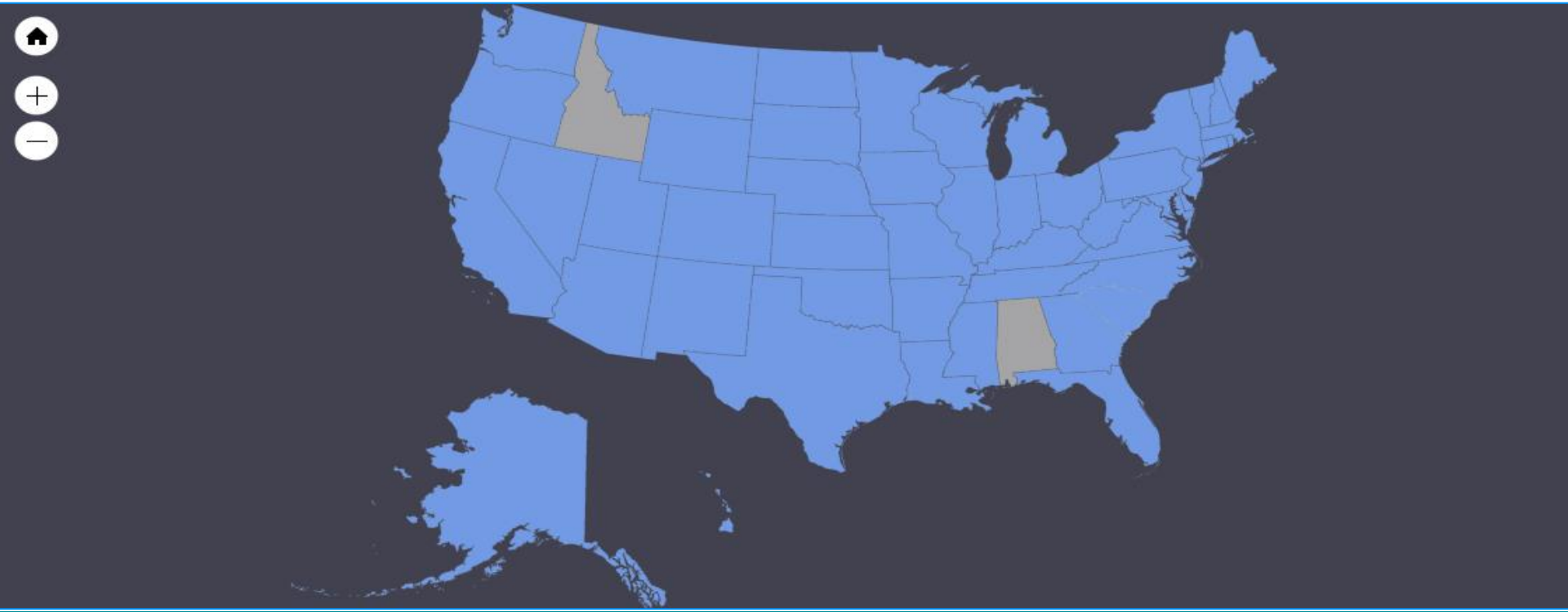
- Overview of H-CUP
- Application of HCUP in Clinical Research
- Current articles in Medicine
- Practice example

What is H-CUP?

- HCUP includes the LARGEST collection of multi-year hospital care (inpatient, outpatient, and emergency department) data in the United States, with all-payer, encounter-level information beginning in 1988.

- The NIS is drawn from all States participating in HCUP, representing more than 95 percent of the U.S. population.



- The NIS approximates a 20-percent stratified sample of discharges from U.S. community hospitals, excluding rehabilitation and long-term acute care hospitals.

- Primary and secondary diagnoses and procedures
- Patient demographic characteristics (e.g., sex, age, race, median household income for ZIP Code)
- Hospital characteristics (e.g., ownership)
- Expected payment source
- Total charges
- Discharge status
- Length of stay
- Severity and comorbidity measures

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H-CUP

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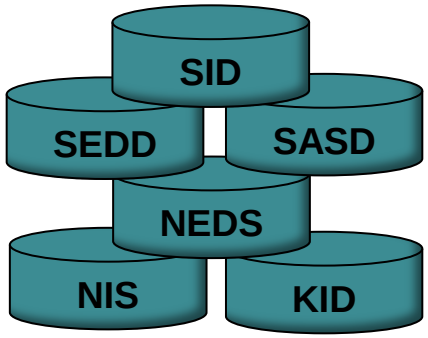
HEALTHCARE COST AND UTILIZATION PROJECT

HCUP Databases



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What can you get from HCUP?

Topic	Specific Findings
Cost	Septicemia was the most expensive reason for hospitalization in 2010—totaling nearly $18 billion in aggregate hospital costs (NIS)
Access	Americans in low-income areas visit EDs at rates 90 percent higher compared to those in the highest income areas (NEDS)
Quality	Oregon and Vermont had the Nation's lowest rates of avoidable hospitalizations for asthma in children ages 2 to 17 (PQI software, SID)
Utilization	Patients in rural hospitals were older (42 percent were 65 plus) than those in urban public hospitals (23 percent were 65 plus). (NIS)

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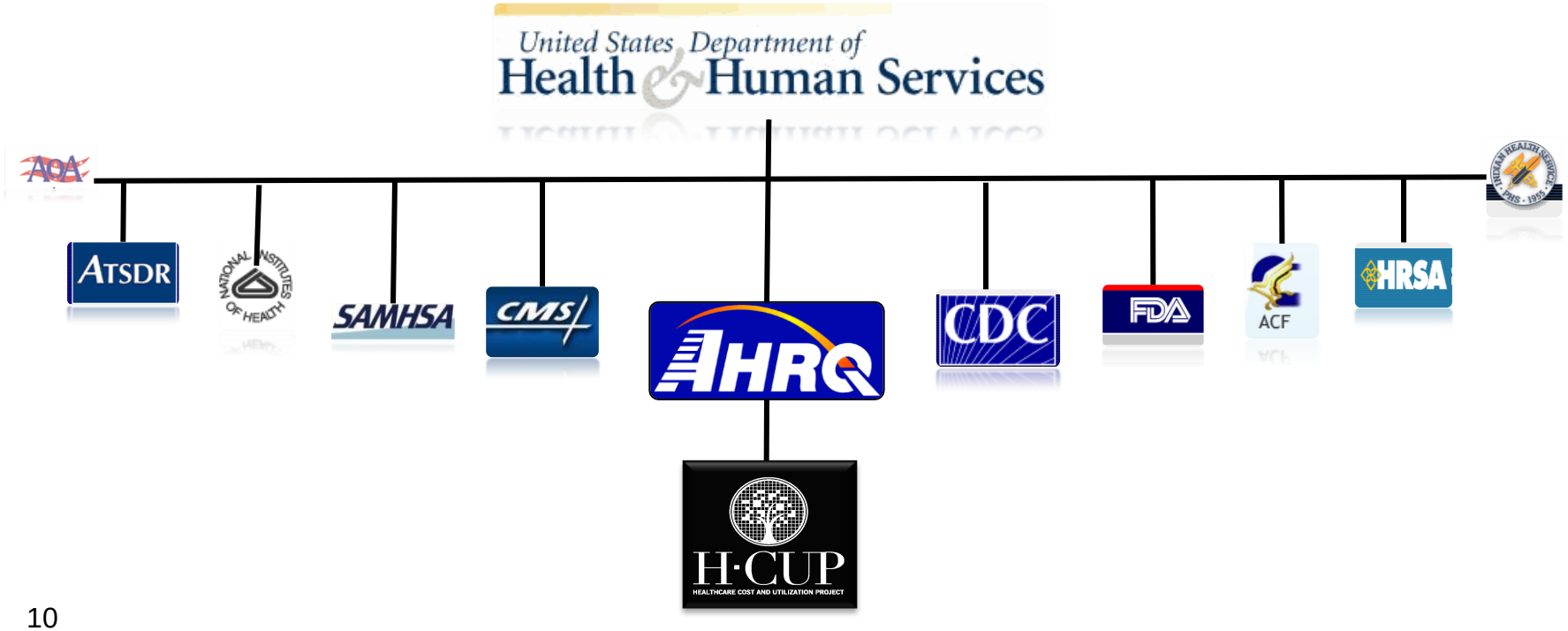
HCUP Supports High Impact Health Services, Policy & Clinical Research

What is the Agency for Healthcare Research and Quality (AHRQ)?

- The Agency for Healthcare Research and Quality (AHRQ) is a federal agency under the Department of Health and Human Services.
- The 2015 budget for AHRQ : $440 million.



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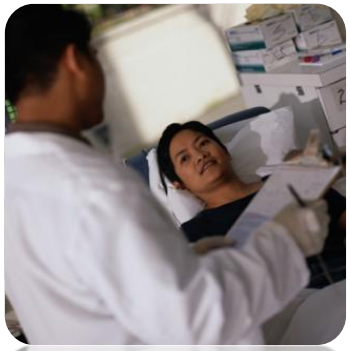
HCUP Has Six Types of Databases

- Three state-level databases



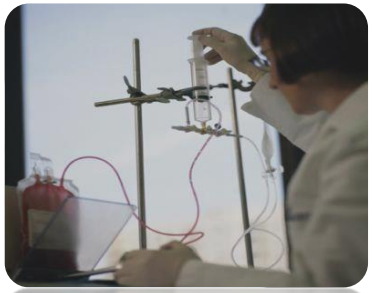
State Inpatient Databases (SID)

State Ambulatory Surgery Databases (SASD)

State Emergency Department Databases (SEDD)

HCUP Has Six Types of Databases

- Three nationwide databases



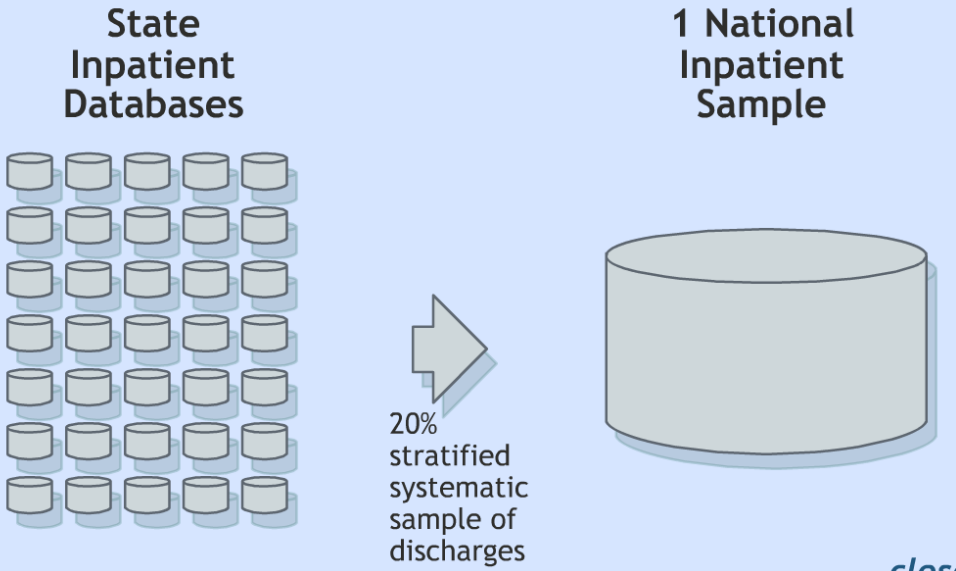
Nationwide Inpatient Sample
(NIS)

Kids' Inpatient Database
(KID)

Nationwide Emergency Department Sample
(NEDS)

Sample Design 3b

The NIS consists of a stratified systematic sample of discharges from all hospitals in HCUP, equal to approximately 20% of all discharges in U.S. community hospitals.



Sampling Strata

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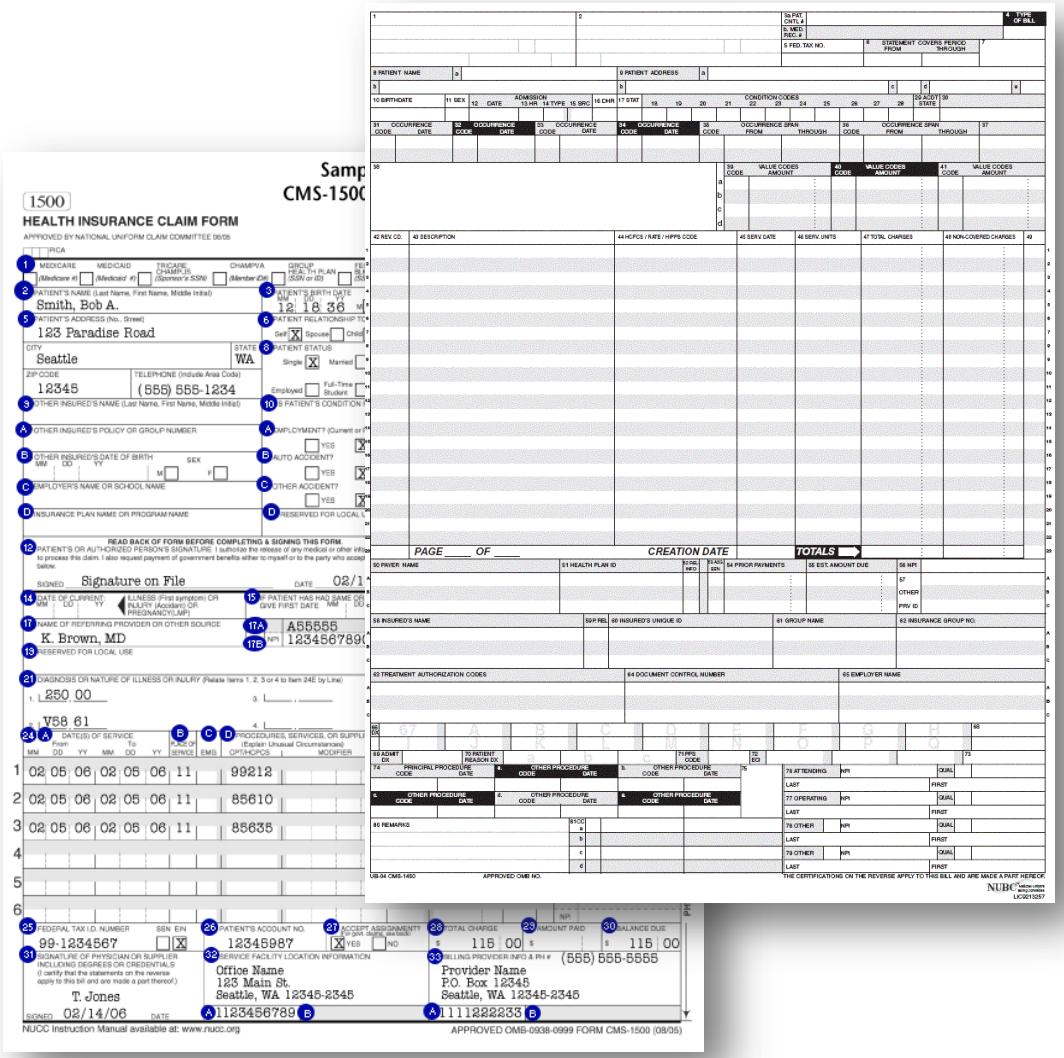
The Foundation of HCUP Data is Hospital Billing Data

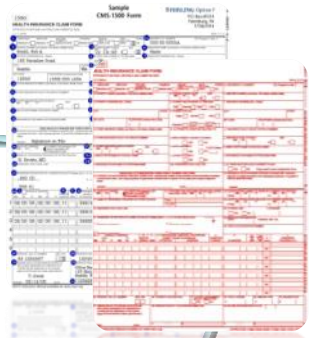
Demographic Data

Diagnoses
Procedures
Charges



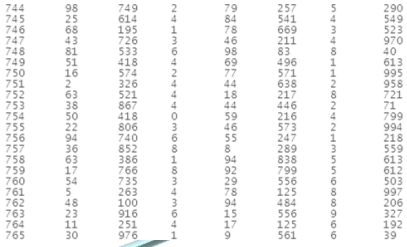
The Making of HCUP Data

Patient enters hospital



Billing record created

Hospital sends billing data and any additional data elements to data organizations



States store data in varying formats

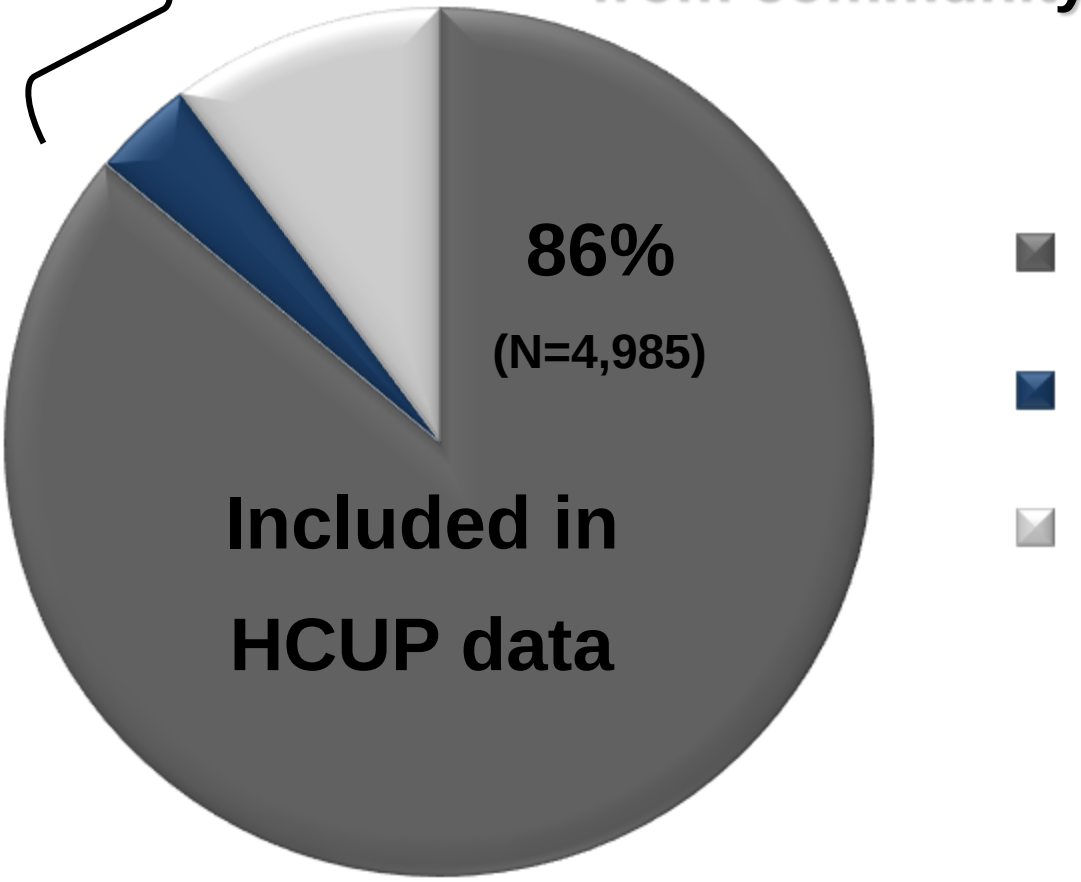
AHRQ standardizes data to create uniform HCUP databases

Where Do We Get HCUP Data?

14% **(N=769)**

Typically not included in HCUP data

HCUP data is mostly from community hospitals



Source: American Hospital Association (AHA), 2010

What Are Community Hospitals?

American Hospital Association Definition:

Non-Federal, short-term, general, and other specialty hospitals, excluding hospital units of other institutions (e.g., prisons)

Included	Excluded
Multi-specialty general hospitals	Long-term care
OB-GYN	Psychiatric
ENT	Alcoholism/Chemical dependency
Orthopedic	Rehabilitation
Pediatric	DoD / VA / IHS
Public	
Academic medical centers	

What Data Elements are included in the HCUP databases?

Data Elements:

- Patient demographics (age, sex)
- Diagnoses & procedures
- Expected payer
- Length of stay
- Patient disposition
- Admission source & type
- Admission month
- Weekend admission

Some Data Elements Vary by State

- Race/Ethnicity
- Patient county
- Patient ZIP Code
- Severity of illness
- Birthweight
- Procedure date (days from admission)
- Primary payer details
- Secondary payer
- Detailed charges
- Patient identifiers encrypted
- Physician identifiers encrypted
- Physician specialty
- Hospital identifier unencrypted

NIS is a Stratified Sample of Hospitals from the SID

State Inpatient Databases

(SID)

N = ~ 5K hospitals
~ 36M records

5 NIS Strata

1. U.S. Region
2. Urban/Rural
3. Teaching Status
4. Ownership/Control
5. Bed Size

Stratified Sample of *HOSPITALS*

Nationwide Impatient Sample

(NIS)

N = ~ 1K hospitals
~ 8M records

100% of all discharges from each hospital

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What is HCUP and What Is It Not?

HCUP is…	HCUP is NOT…
Discharge database for health care encounters	A survey
All payer, including the uninsured	Specific to a single payer, e.g. Medicare
Hospital, ambulatory surgery, emergency department data	Office visits, pharmacy, laboratory, radiology
All hospital discharges	Only a sample
Accessible multiple ways: raw data, regular reports, online	Just another database

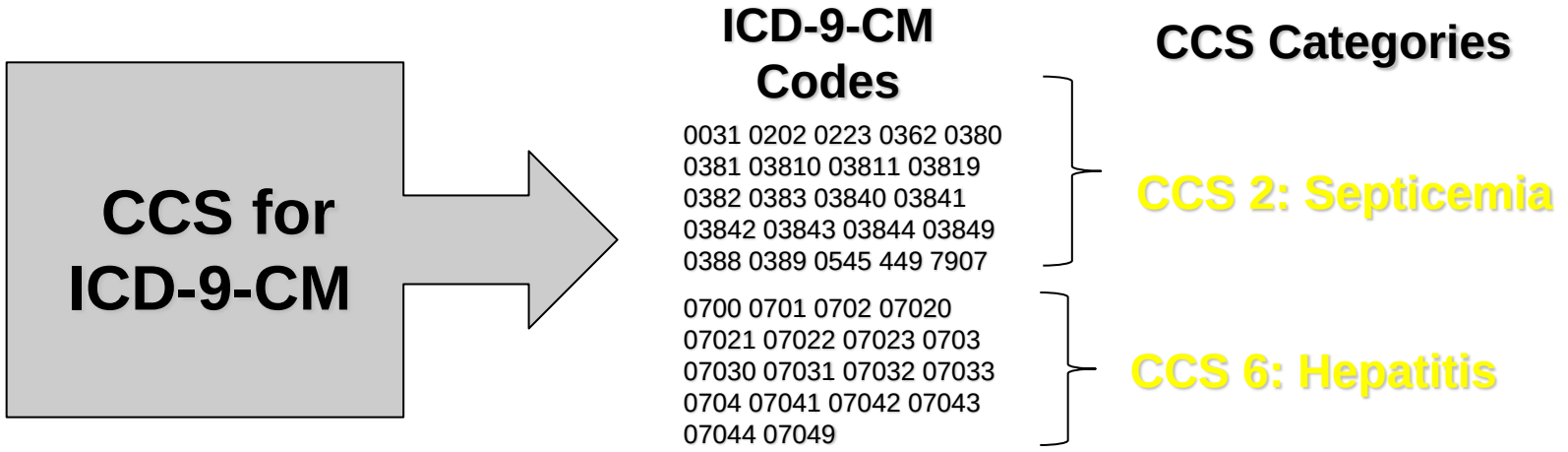
Hospital Billing Data Have Benefits and Limitations

Benefits
Large number of visit records
Uniformity of coding
Routine, regular collection
Ease of access
All-payer
Available at local, state, regional and national level
Supplemental files available to facilitate research

Differences in coding across hospitals
Limited clinical details
Lack revenue information
May not include all hospitals
May not show complete experience of care
No data on individuals outside of hospital system

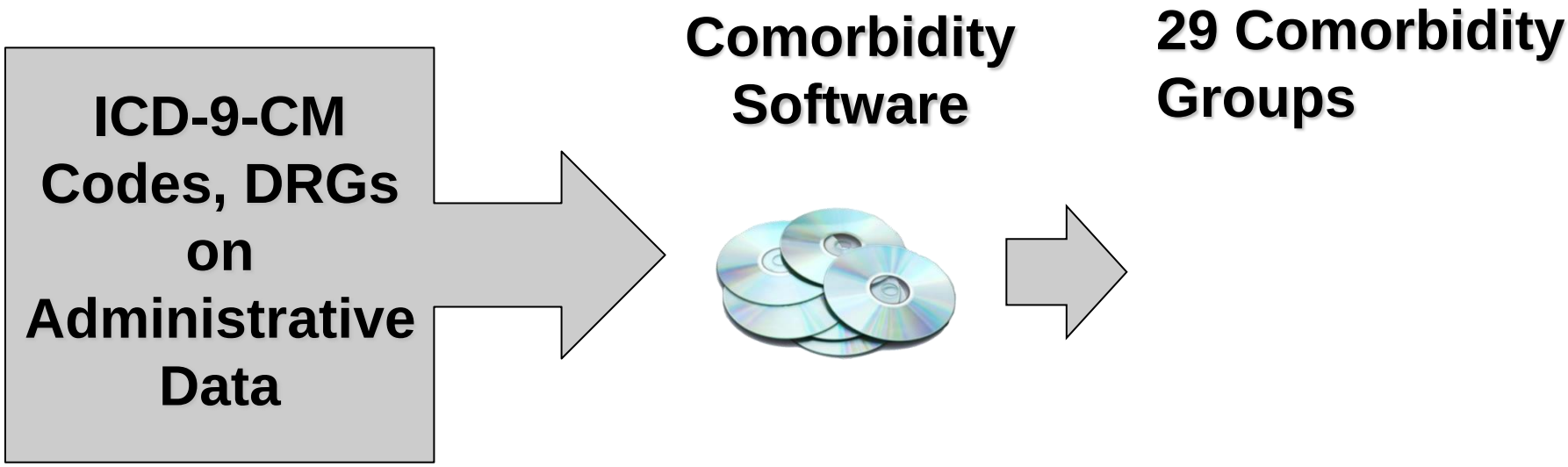
Clinical Classifications Software (CCS)

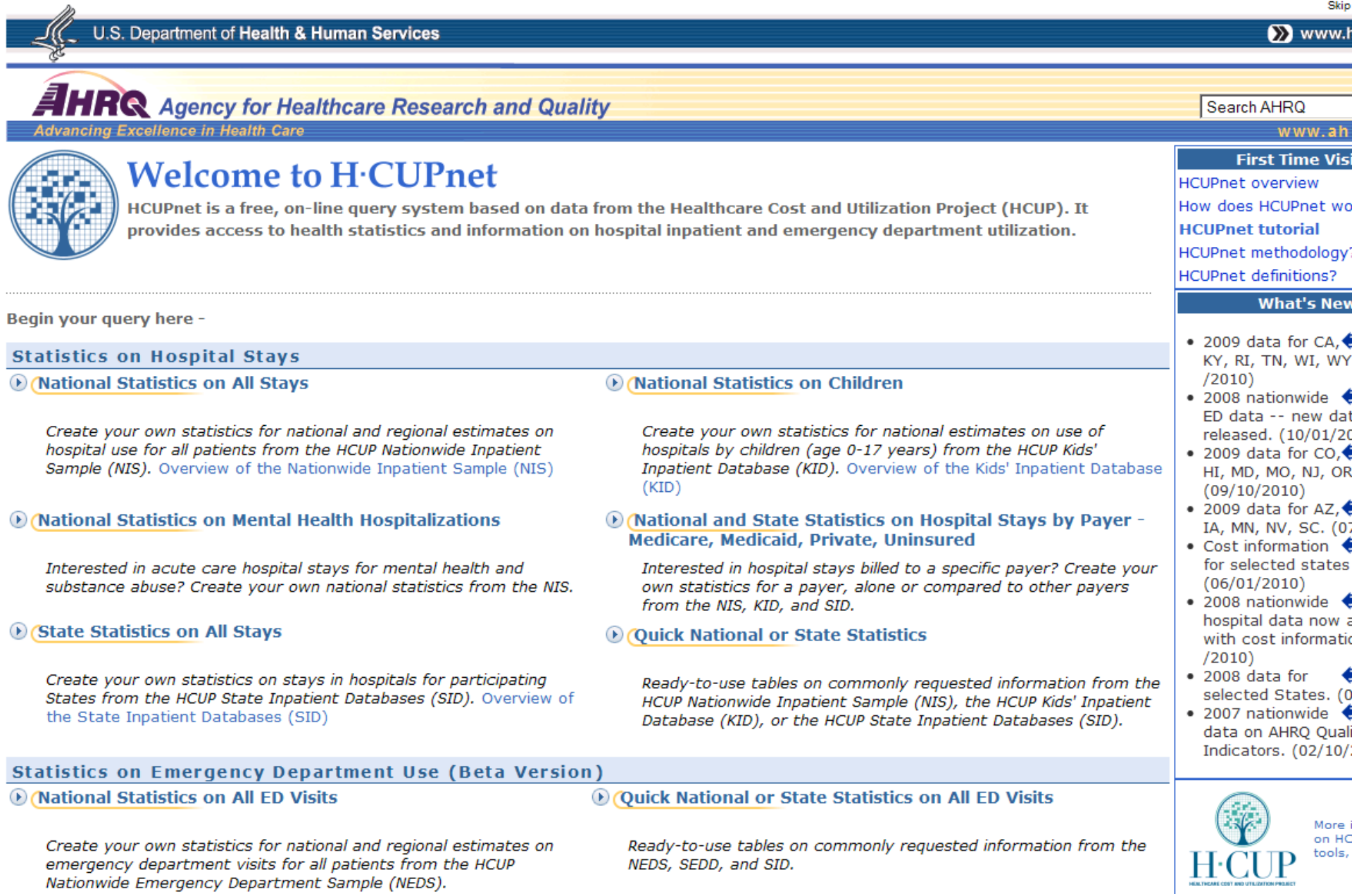
- Clusters diagnosis and procedure codes into categories
  - >12,000 diagnosis codes → ~260 categories
  - > 4,000 procedure codes → ~230 categories
- Useful for presenting descriptive statistics, understanding patterns



Comorbidity Software

- Creates and appends indicator flags to each record for 29 major comorbidities





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   Aliment Pharmacol Ther. 2015 Dec;42(11-12):1271-80. doi: 10.1111/apt.13426. Epub 2015 Oct 13.
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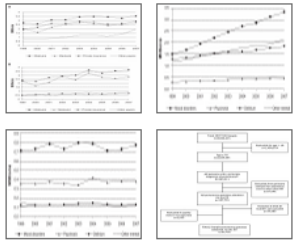

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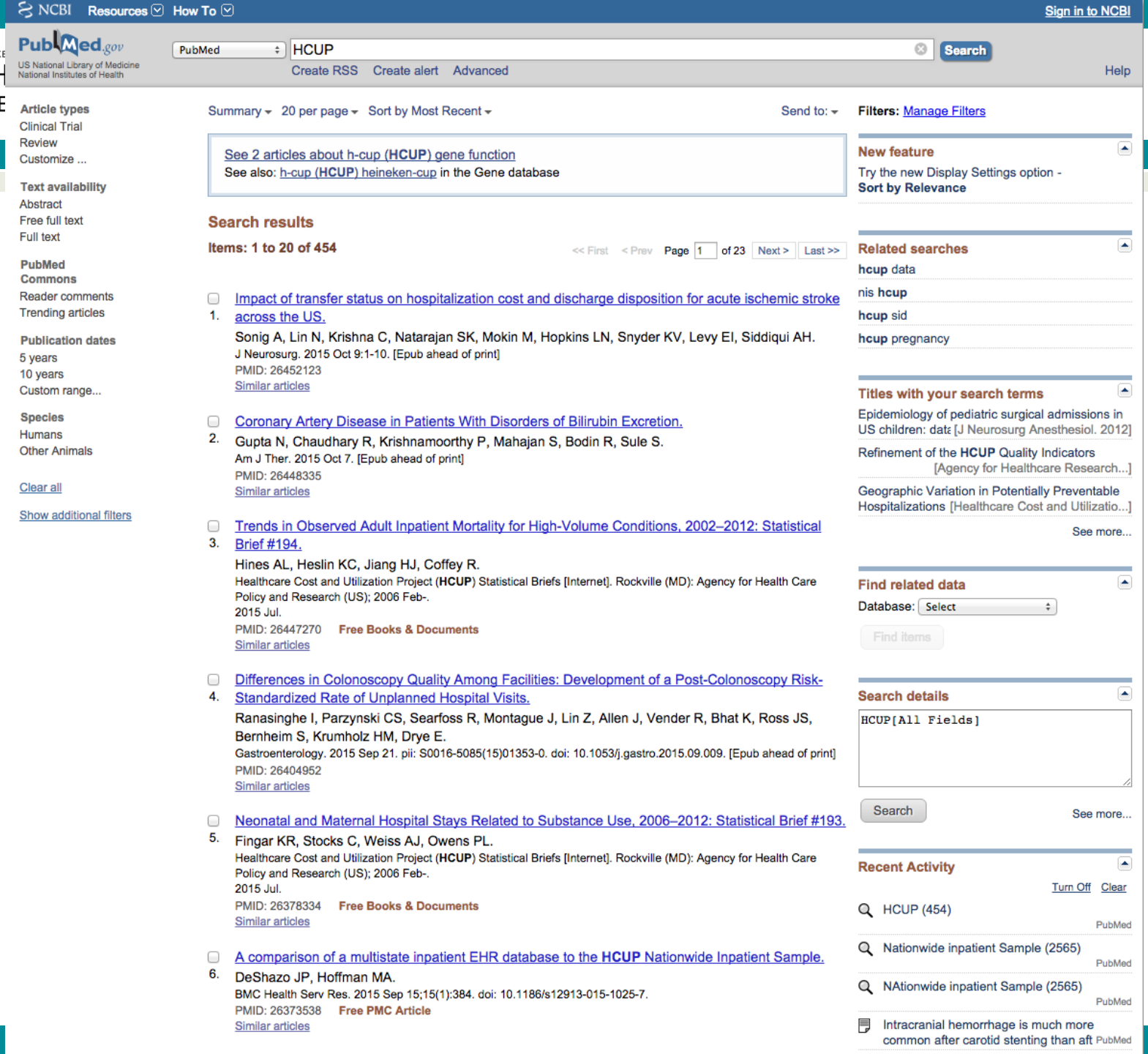

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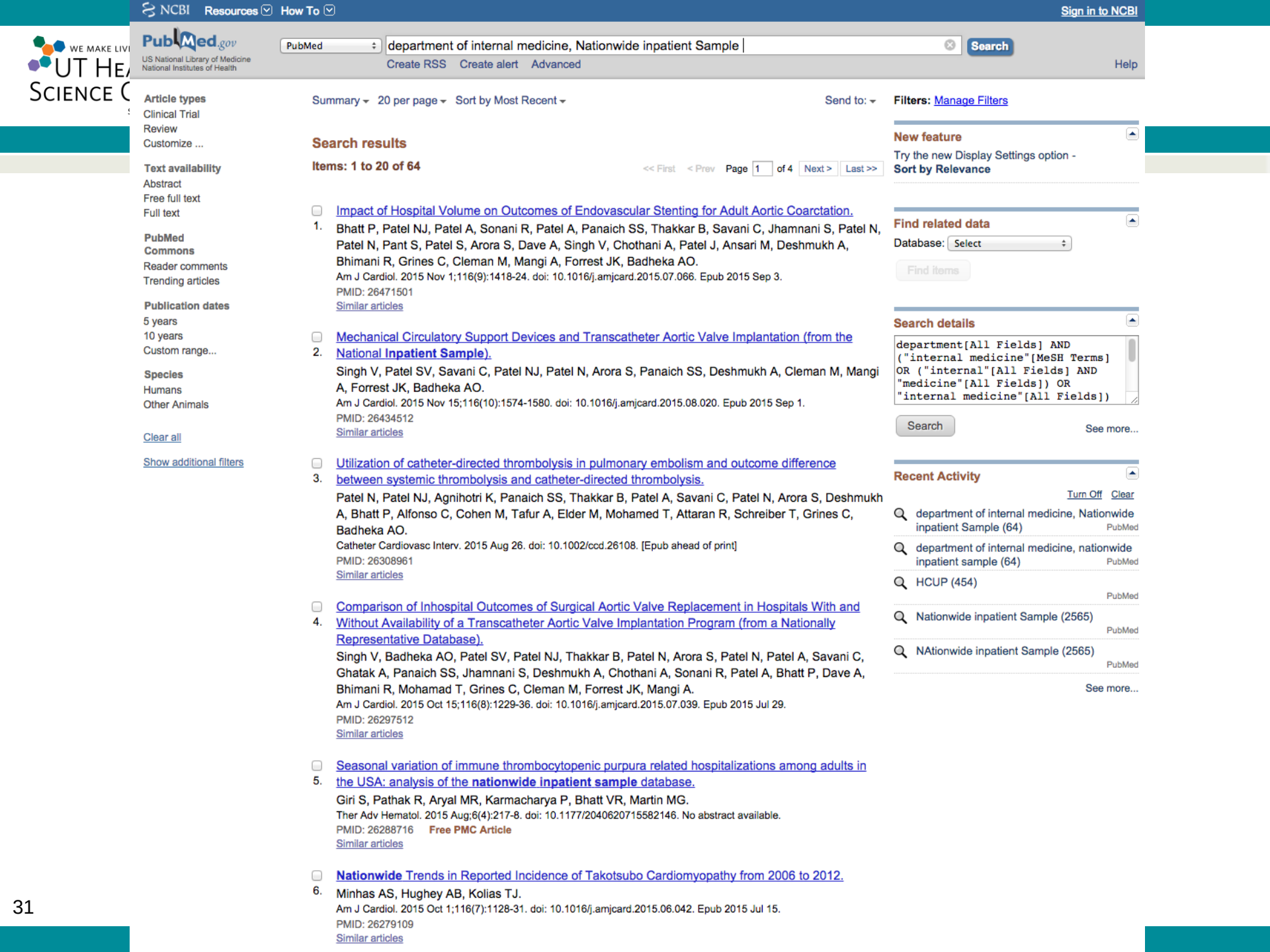

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The American Journal of Cardiology

Volume 116, Issue 7, 1 October 2015, Pages 1128–1131

Cardiomyopathy

Nationwide Trends in Reported Incidence of Takotsubo Cardiomyopathy from 2006 to 2012

Anum S. Minhas, MD · , Andrew B. Hughey, MD, Theodore J. Kolias, MD

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doi:10.1016/j.amjcard.2015.06.042

Referred to by John E. Madias

Prevalence of Diabetes Mellitus in Patients With Takotsubo Syndrome

The American Journal of Cardiology, Volume 116, Issue 10, 15 November 2015, Pages 1648-1649

PDF (125 K)

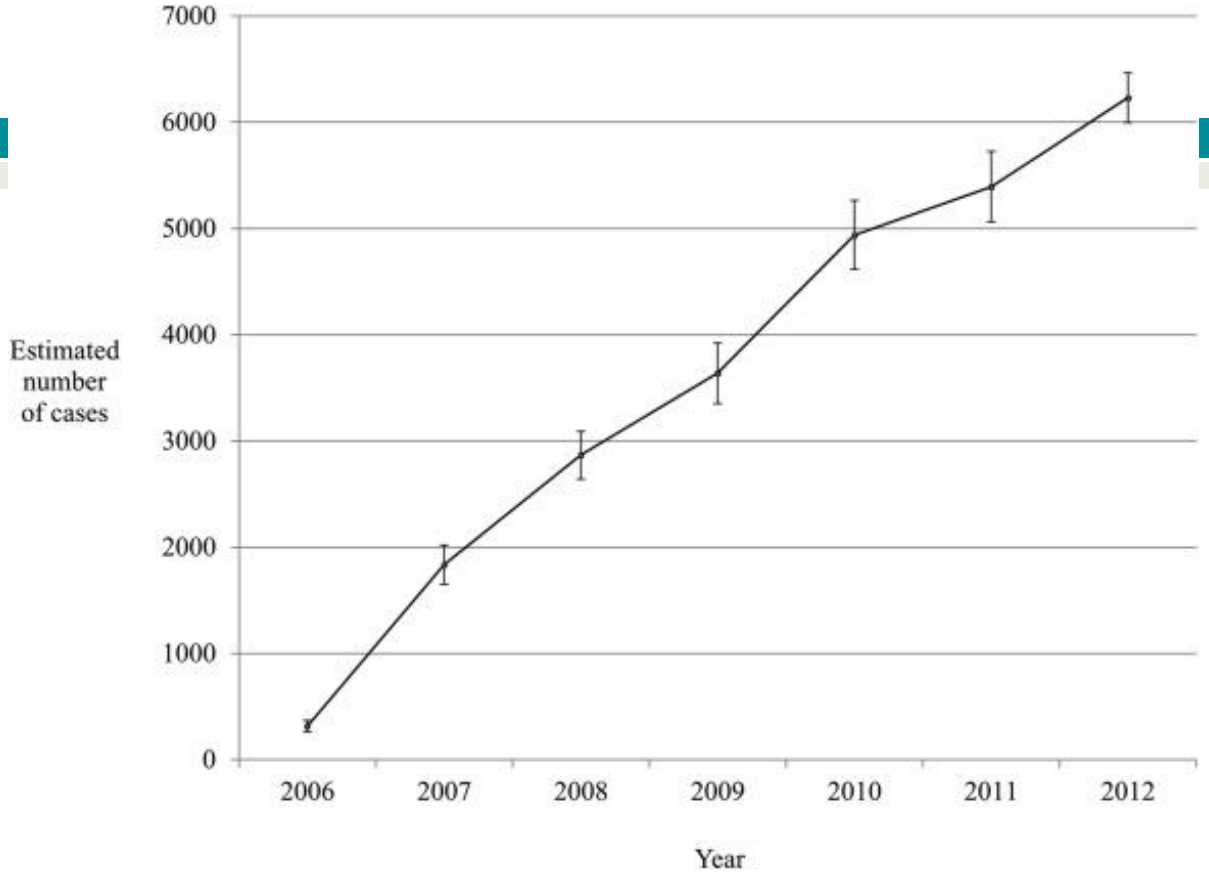

Figure 1. Estimated number of cases of TC increases every year.

Anum S. Minhas, Andrew B. Hughey, Theodore J. Kolias

Nationwide Trends in Reported Incidence of Takotsubo Cardiomyopathy from 2006 to 2012

The American Journal of Cardiology, Volume 116, Issue 7, 2015, 1128–1131

http://dx.doi.org/10.1016/j.amjcard.2015.06.042

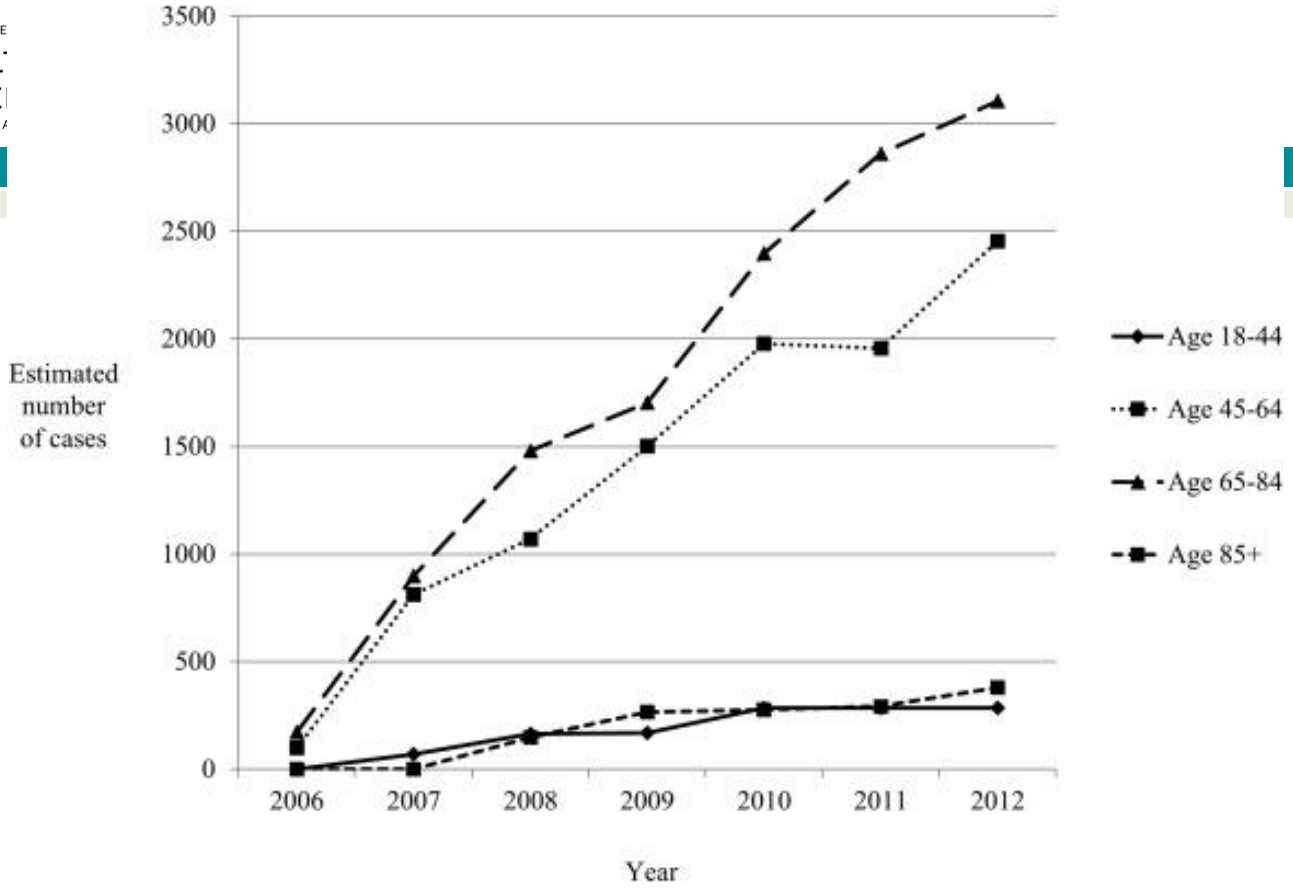

Figure 2. Estimated number of cases of TC is highest among the 65 to 84 and 45 to 64 year age groups in each year.

Anum S. Minhas, Andrew B. Hughey, Theodore J. Kolias

Nationwide Trends in Reported Incidence of Takotsubo Cardiomyopathy from 2006 to 2012

The American Journal of Cardiology, Volume 116, Issue 7, 2015, 1128–1131

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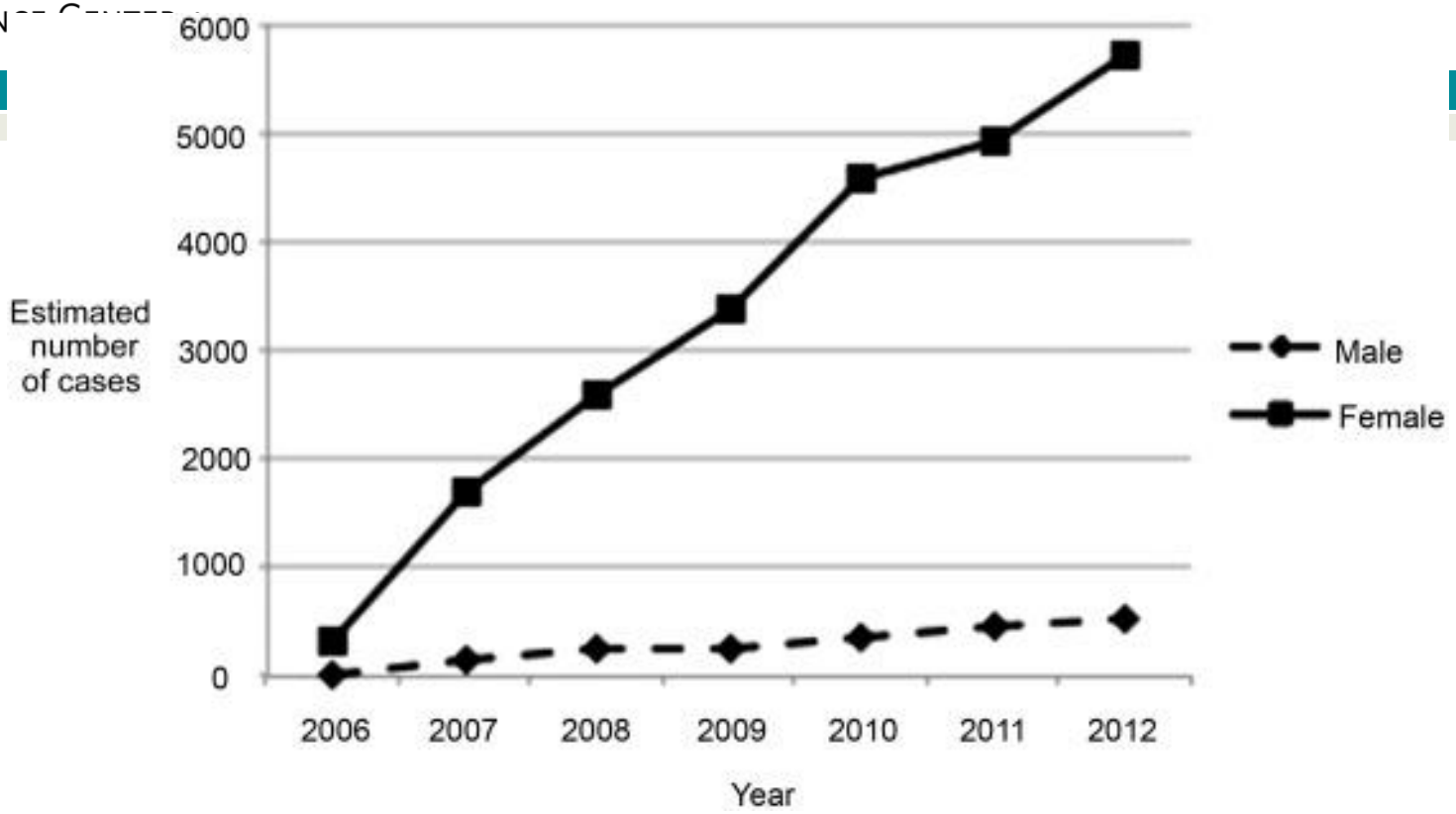

Figure 3. Estimated number of cases is higher among women than men in each year.

Anum S. Minhas, Andrew B. Hughey, Theodore J. Kolias

Nationwide Trends in Reported Incidence of Takotsubo Cardiomyopathy from 2006 to 2012

The American Journal of Cardiology, Volume 116, Issue 7, 2015, 1128–1131

http://dx.doi.org/10.1016/j.amjcard.2015.06.042

Neurosurg Focus 37 (5):E10, 2014

A socioeconomic analysis of intraoperative neurophysiological monitoring during spine surgery: national use, regional variation, and patient outcomes

WHITNEY SHEEN JAMES, M.D., M.H.S.,[1] ANAND I. RUGHANI, M.D.,[2] AND TRAVIS M. DUMONT, M.D.[1]

[1]Division of Neurosurgery, University of Arizona, Tucson, Arizona; and [2]Neuroscience Institute, Maine Medical Center, Portland, Maine

- Use of IONM , ICD9-code 00.94 was compared over time and between geographic regions

➢# **443,194** spine procedures ,

➢# **31,680** IONM cases in 2007 to 2011.

- Iatrogenic nerve and spinal cord injury were rare; they occurred in less than 1% of patients and *did not significantly decrease* when IONM was used.

Increased use of intraoperative monitoring during spine surgery

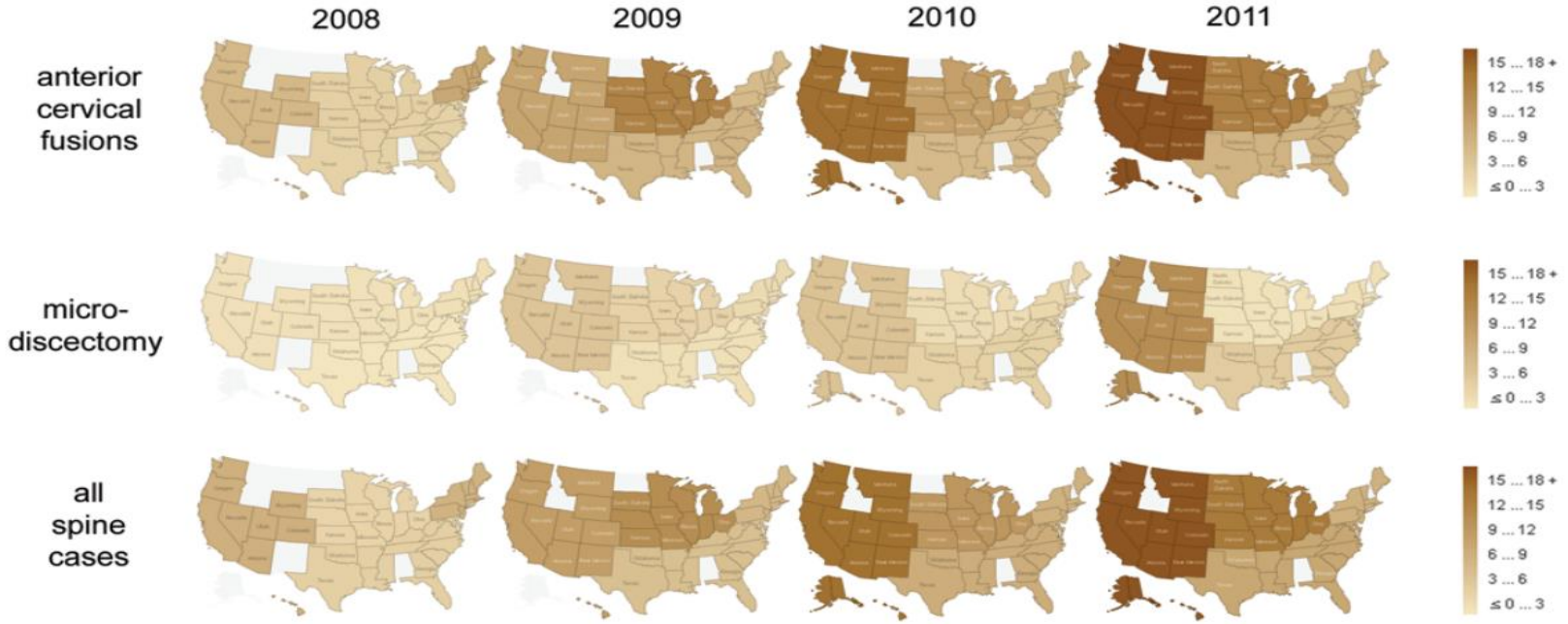

FIG. 1. Illustration showing the increase in percentage use, by geographic region, of IONM during anterior cervical discectomy and fusion surgeries, microdiscectomy surgeries, and all spine surgeries in the United States, 2008–2011.

OPEN ACCESS PEER-REVIEWED

RESEARCH ARTICLE

The Incidence and Risk Factors of Associated Acute Myocardial Infarction (AMI) in Acute Cerebral Ischemic (ACI) Events in the United States

Ali Seifi, Kevin Carr, Mitchell Malterfort, Michael Moussouttas, Lee Birnbaum, Augusto Parra, Owoicho Adogwa, Rodney Bell, Fred Rincon

Published: August 28, 2014 • DOI: 10.1371/journal.pone.0105785

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Table 1. ICD codes.

ICD-9 Codes	Definition
Acute Cerebral Ischemic events	
430	Subarachnoid hemorrhage
431	Intracerebral hemorrhage
432	Other and unspecified hemorrhage
433	Occlusion and stenosis of pre-cerebral arteries
434	Occlusion of cerebral arteries
435	Transient cerebral ischemia
436	Acute, but ill-defined, cerebrovascular disease
437	Other and ill-defined cerebrovascular disease
438	Late effects of cerebrovascular disease
Injurious cardiac events	
410.0	Acute myocardial infarction of anterolateral wall
410.1	Acute myocardial infarction of other anterior wall
410.2	Acute myocardial infarction of inferolateral wall
410.3	Acute myocardial infarction of infer posterior wall
410.4	Acute myocardial infarction of other inferior wall
410.5	Acute myocardial infarction of other lateral wall
410.6	True posterior wall infarction
410.7	Sub-endocardial infarction
410.8	Acute myocardial infarction of other specified sites
410.9	Acute myocardial infarction of unspecified site
Administration of IV rTPA	
99.10	Injection of infusion of thrombolytic agent

doi:10.1371/journal.pone.0105785.t001

Seifi A,, et al. (2014) The Incidence and Risk Factors of Associated Acute Myocardial Infarction (AMI) in Acute Cerebral Ischemic (ACI) Events in the United States. PLoS ONE 9(8): e105785. doi:10.1371/journal.pone.0105785
http://127.0.0.1:8081/plosone/article?id=info:doi/10.1371/journal.pone.0105785

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- During 10 years the NIS recorded 886,094 Stroke admissions with 17,526 diagnoses of AMI (1.98%).

- In-hospital mortality was associated with:
  - AMI (aOR 3.68; 95% CI 3.49–3.88, p≤0.0001),
  - rTPA administration (aOR 2.39 CI, 2.11–2.71, p<0.0001),
  - older age (aOR 1.03, 95% CI, 1.03–1.03, P<0.0001)
  - women (aOR 1.06, 95% CI 1.03–1.08, P<0.0001).

The Incidence and Risk Factors of Associated Acute Myocardial Infarction (AMI) in Acute Cerebral Ischemic (ACI) Events in the United States

Seifi A, et al. (2014) The Incidence and Risk Factors of Associated Acute Myocardial Infarction (AMI) in Acute Cerebral Ischemic (ACI) Events in the United States. PLoS ONE 9(8): e105785. doi: 10.1371/journal.pone.0105785

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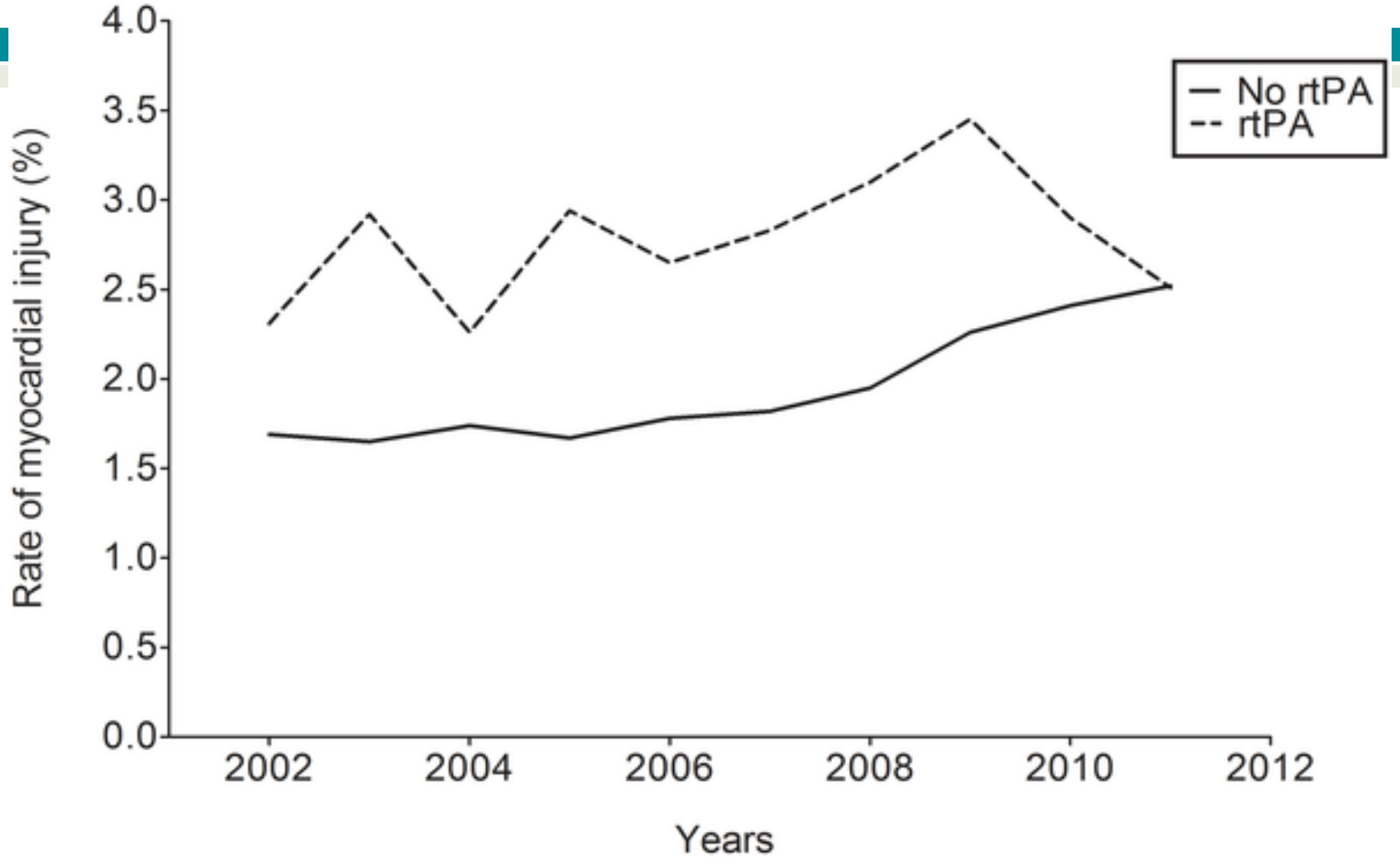
Increased risk of associated AMI in patients treated with IV rTPA.



Seifi A,, et al. (2014) . The Incidence and Risk Factors of Associated Acute Myocardial Infarction (AMI) in Acute Cerebral Ischemic (ACI) Events in the United States. PLoS ONE 9(8): e105785. doi:10.1371/journal.pone.0105785
http://127.0.0.1:8081/plosone/article?id=info:doi/10.1371/journal.pone.0105785

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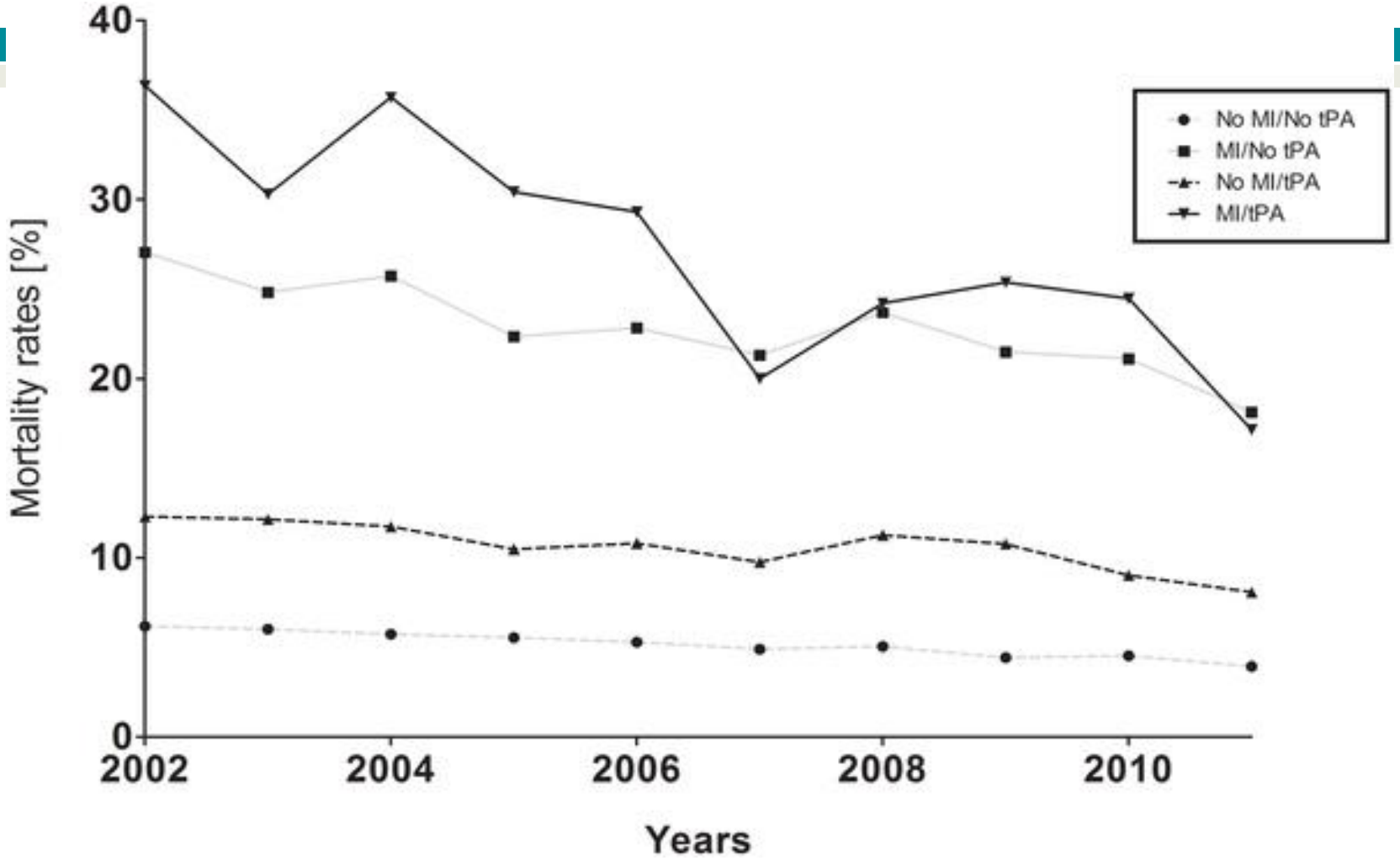
Annual mortality: Inpatients admitted with Stroke



Seifi A, et al. (2014) The Incidence and Risk Factors of Associated Acute Myocardial Infarction (AMI) in Acute Cerebral Ischemic (ACI) Events in the United States. PLoS ONE 9(8): e105785. doi:10.1371/journal.pone.0105785
http://127.0.0.1:8081/plosone/article?id=info:doi/10.1371/journal.pone.0105785

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Multivariate analysis predicting the odds of mortality.

Comorbidities	Odds Ratio	95% Confidence Interval	P value
Congestive Heart Failure	1.94	1.89–1.99	0
Alcohol use	1.08	1.01–1.15	0.022567
Coagulopathy	1.75	1.66–1.85	<0.0001
Diabetes	0.97	0.94–0.99	0.015118
rtPA	2.39	2.11–2.71	<0.0001
Myocardial Infarction	3.68	3.49–3.88	0
Obesity	0.83	0.78–0.88	<0.0001
Hypertension	0.62	0.61–0.64	0

doi:10.1371/journal.pone.0105785.t005

Seifi A, et al. (2014) The Incidence and Risk Factors of Associated Acute Myocardial Infarction (AMI) in Acute Cerebral Ischemic (ACI) Events in the United States. PLoS ONE 9(8): e105785. doi:10.1371/journal.pone.0105785
http://127.0.0.1:8081/plosone/article?id=info:doi/10.1371/journal.pone.0105785

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Multivariate regression analysis predicting odds of having associated AMI.

Comorbidities	Odds Ratio	95% Confidence Interval	P value
Congestive Heart Failure	2.79	2.68–2.89	<0.0001
Neurological pathology	2.34	2.03–2.69	<0.0001
Metastatic disease	2.21	2.00–2.45	<0.0001
rTPA administration	1.91	1.51–2.42	<0.0001
Acute blood loss	1.77	1.51–2.07	<0.0001
Coagulopathy	1.7	1.57–1.84	<0.0001
Electrolyte abnormality	1.68	1.62–1.74	<0.0001
Paralysis	1.56	1.46–1.68	<0.0001
Renal failure	1.43	1.36–1.50	<0.0001
Pathologic weight loss	1.39	1.29–1.50	<0.0001
Substance Abuse	1.34	1.16–1.54	<0.0001
Valvular disease	1.21	1.15–1.27	<0.0001
Tumor	1.19	1.08–1.32	0.0007
Alcohol use	1.16	1.05–1.27	0.0034
Anemia	1.12	1.06–1.17	<0.0001
Year	1.05	1.04–1.05	<0.0001
rTPA per Year	0.91	0.88–0.94	<0.0001
Obesity	0.85	0.78–0.92	<0.0001
Hypothyroidism	0.84	0.79–0.89	<0.0001
Depression	0.73	0.68–0.79	<0.0001
Hypertension	0.72	0.70–0.75	<0.0001

doi:10.1371/journal.pone.0105785.t004

Seifi A, et al. (2014) The Incidence and Risk Factors of Associated Acute Myocardial Infarction (AMI) in Acute Cerebral Ischemic (ACI) Events in the United States. PLoS ONE 9(8): e105785. doi:10.1371/journal.pone.0105785
http://127.0.0.1:8081/plosone/article?id=info:doi/10.1371/journal.pone.0105785

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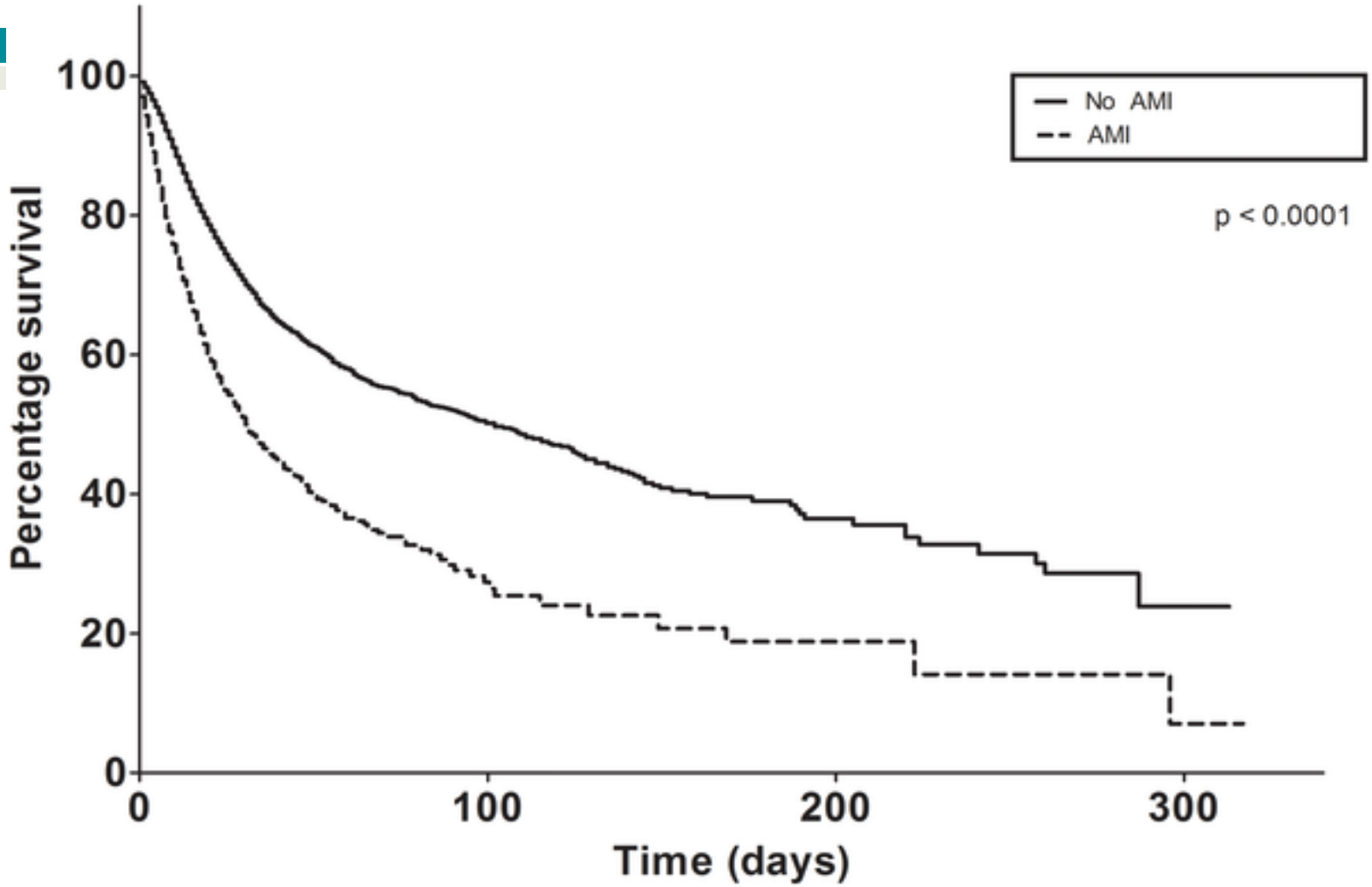
Figure 3. Kaplan-Meier survival analysis with and without AMI.



Seifi A, et al. (2014) The Incidence and Risk Factors of Associated Acute Myocardial Infarction (AMI) in Acute Cerebral Ischemic (ACI) Events in the United States. PLoS ONE 9(8): e105785. doi:10.1371/journal.pone.0105785
http://127.0.0.1:8081/plosone/article?id=info:doi/10.1371/journal.pone.0105785

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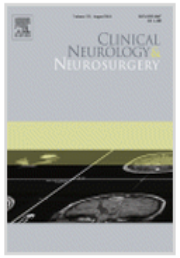
Clinical Neurology and Neurosurgery

Volume 123, August 2014, Pages 174–180



Longitudinal incidence and concurrence rates for traumatic brain injury and spine injury – A twenty year analysis

George M. Ghobrial[a], Peter S. Amenta[a], Mitchell Maltenfort[b], Kim A. Williams Jr[a], James S. Harrop[a], Ashwini Sharan[a], Jack Jallo[a], Joshua Heller[a], John Ratliff[c], Srinivas Prasad[a],

[a] Department of Neurosurgery, Thomas Jefferson University Hospital, Philadelphia, USA

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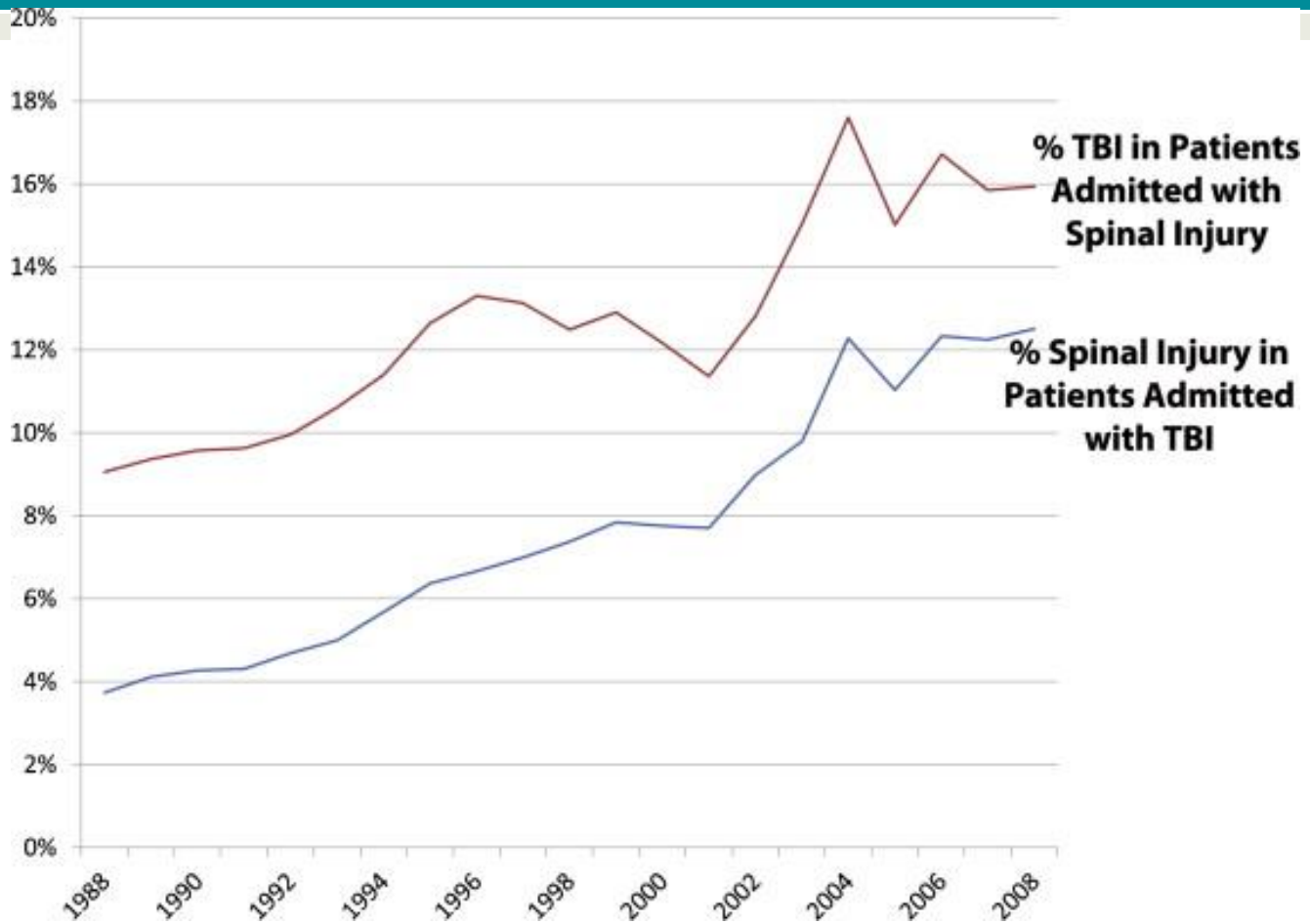
[c] Department of Neurosurgery, Stanford University, Stanford, USA

Received 17 February 2014, Revised 15 April 2014, Accepted 18 May 2014, Available online 9 June 2014

- There was an increase in the incidence of TBI among SCI admission from 3.7% (1988) to 12.5% (2008) (OR = 1.067 per year; 95% CI = 1.065–1.069 per year; P < 0.0001).
- Concurrently, SCI patients had an increase in TBI (9.1% (1988)–15.9% (2008) (OR=1.038 per year (95% CI 1.036–1.040; P < 0.001).



Longitudinal incidence and concurrence rates for traumatic brain injury and spine injury – A twenty year analysis

Fig. 2 Twenty year (1988–2008) trend in the proportionate concurrence of TBI and SCI.

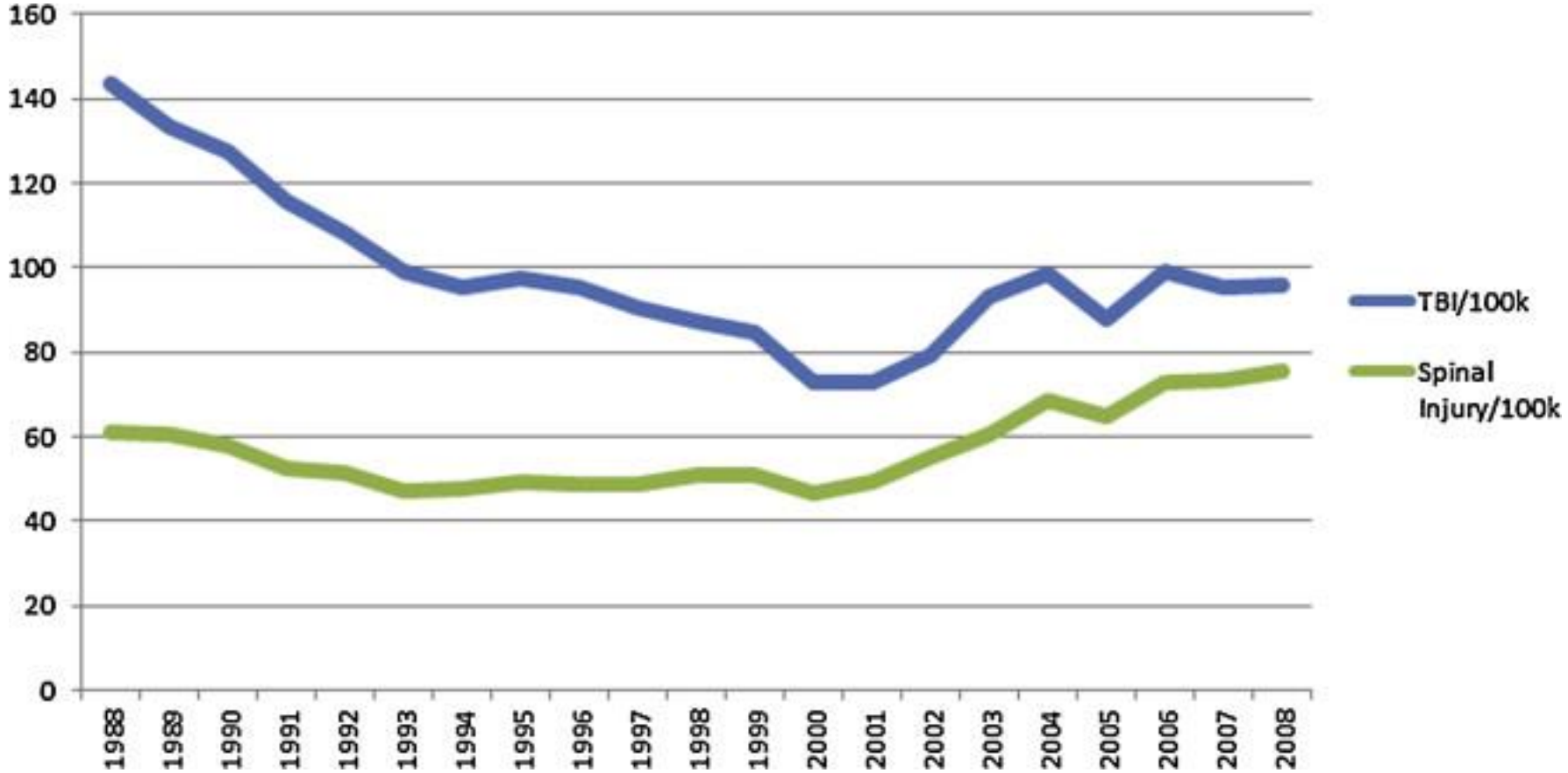
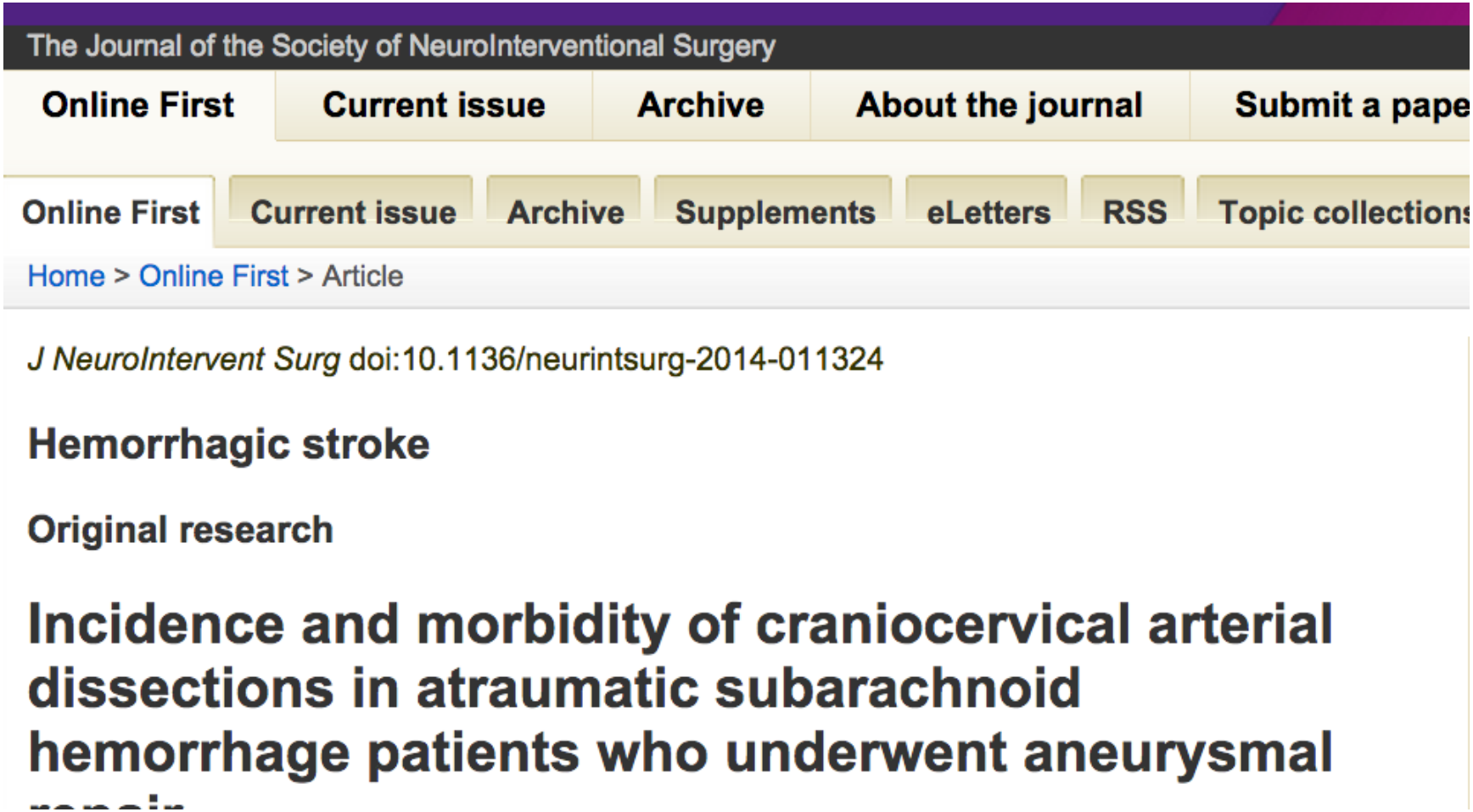


Fig. 1 Twenty year (1988–2008) trend in the incidence of TBI and SCI per 100k determined from the Nationwide Inpatient Sample.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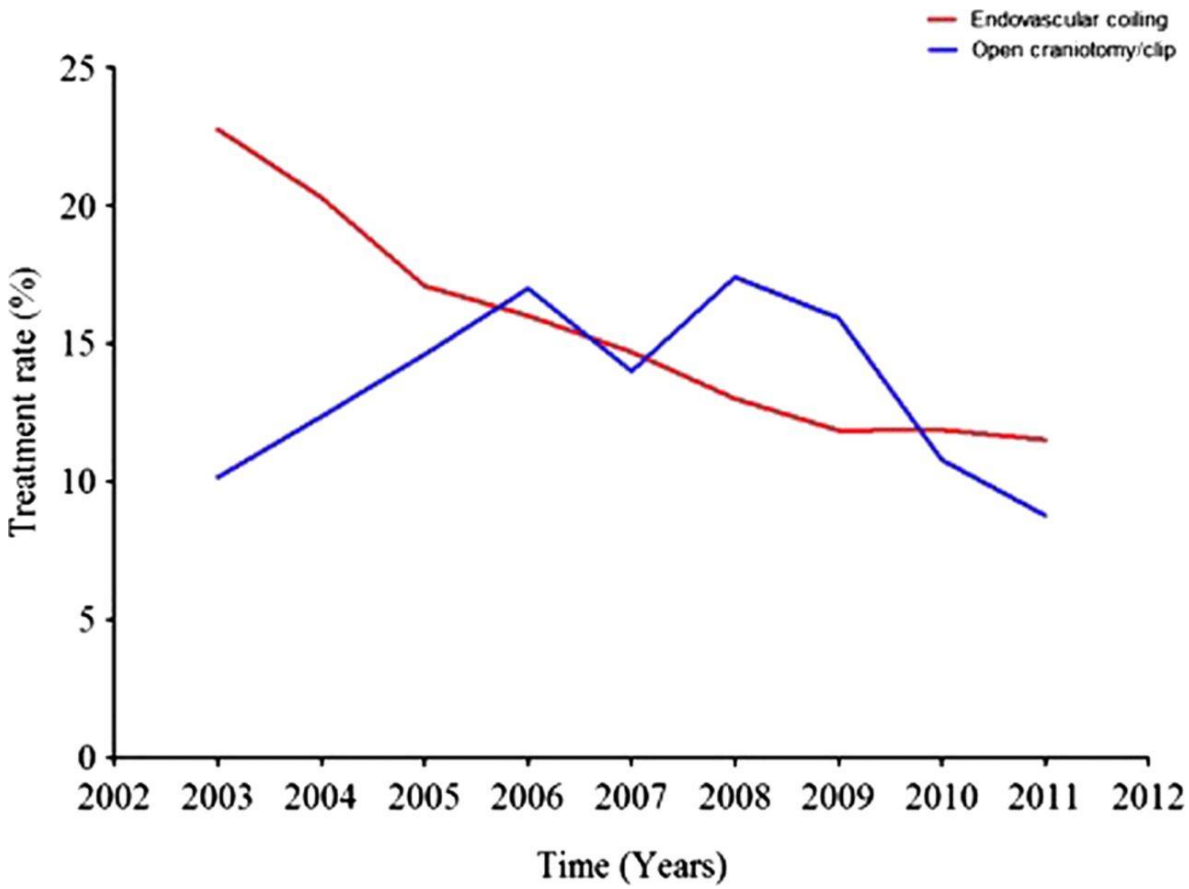
J NeuroIntervent Surg doi:10.1136/neurintsurg-2014-011324
Hemorrhagic stroke
Original research
Incidence and morbidity of craniocervical arterial dissections in atraumatic subarachnoid hemorrhage patients who underwent aneurysmal

During the period 2003–2011,
18,260 recorded repaired SAH :

- 9737 (53.32%) underwent endovascular coiling and
- 8523 (46.48%) had surgical clipping.

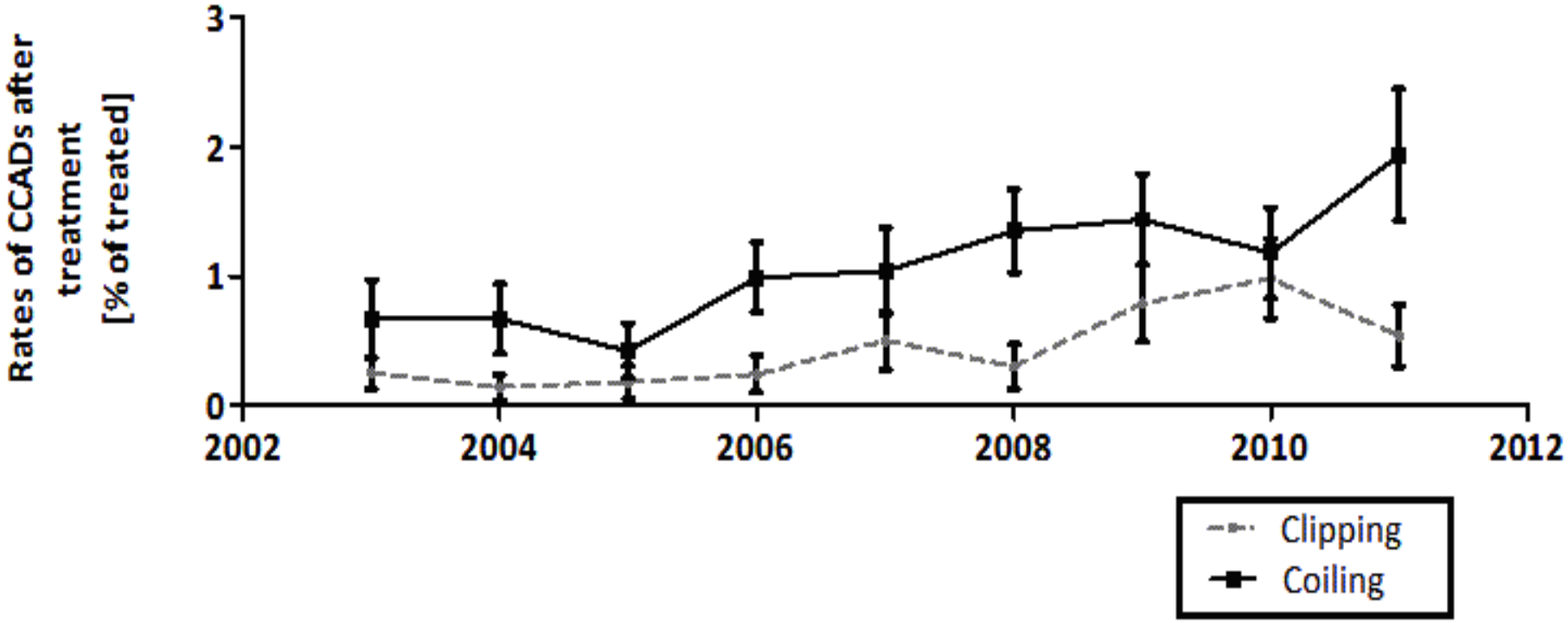
131 patients in the cohort with reported Dissection

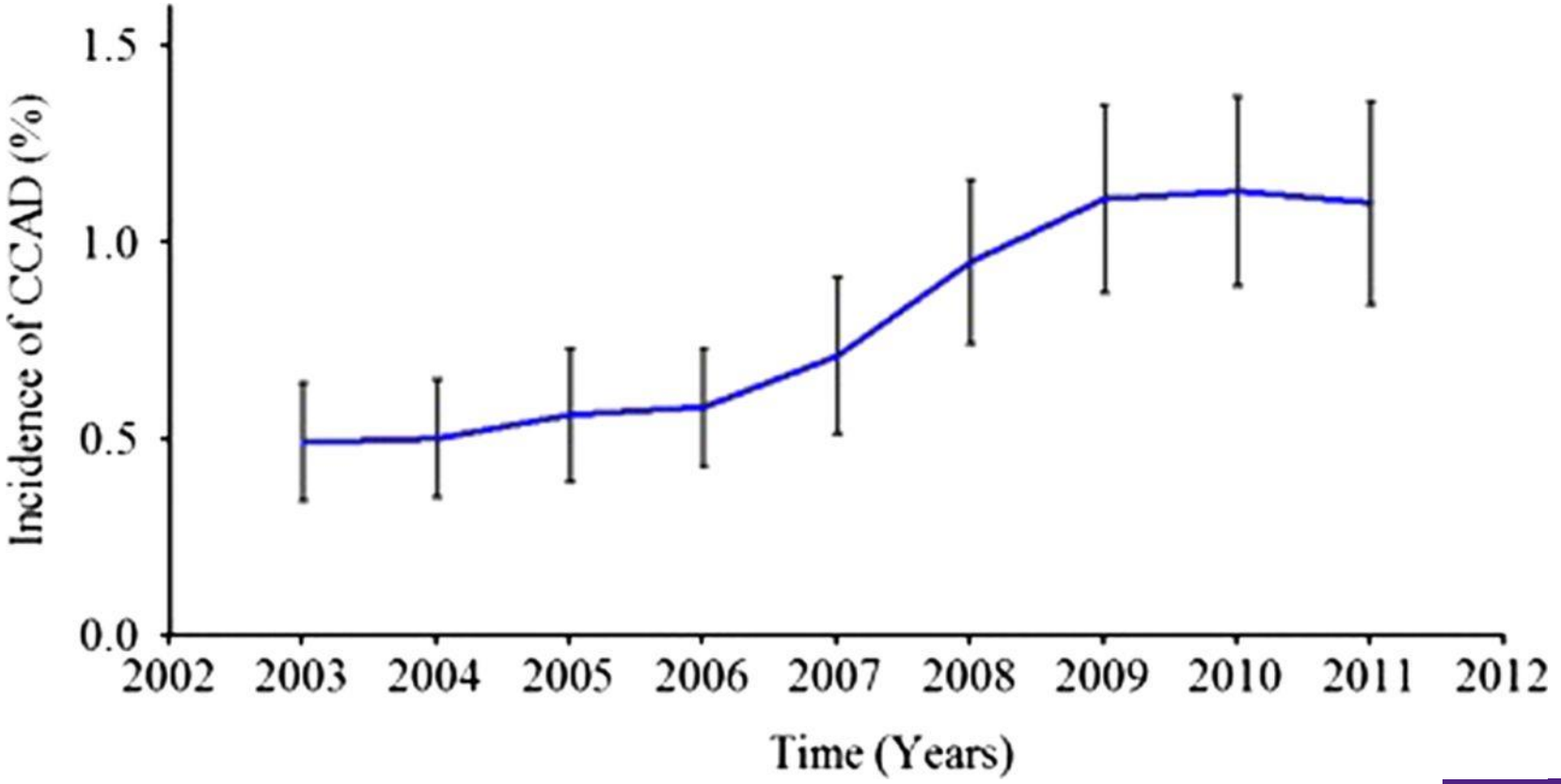
Patients who underwent endovascular coiling had a higher rate of Dissection in this cohort
(OR 2.94; 95% CI 2.00 to 4.31, p<0.0001).



Carr K et al. J NeuroIntervent Surg
doi:10.1136/neurintsurg-2014-011324

Annual rate of reported dissection in SAH based on treatment option





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Journal of Stroke and Cerebrovascular Diseases

Volume 23, Issue 10, November–December 2014, Pages 2708–2713

Original Article

Clinical Outcomes after Thrombectomy for Acute Ischemic Stroke on Weekends versus Weekdays

Ali Saad, MD*, Malik Muhammad Adil, MD†, Vikas Patel, MD*, Kumiko Owada, MD*, Melanie J. Winningham, MD*, Fadi Nahab, MD*

* Department of Neurology, Emory University, Atlanta, Georgia

† Department of Internal Medicine and Neurology, and Ochsner Neuroscience Institute, Ochsner Clinic Foundation, New Orleans, LA

Conclusions

- Stroke patients undergoing thrombectomy who were admitted to Nonteaching hospitals on weekends were more likely to be discharged with moderate-to-severe disability than those admitted on weekdays.
- No weekend effect on discharge clinical outcome was seen in Teaching hospitals.

Table 2.

Multivariable logistic regression analysis of factors associated with moderate-to-severe disability at discharge in patients who underwent thrombectomy at nonteaching hospitals

	Unadjusted		Adjusted odds*	
Factors associated	OR (95% CI)	*P* value	OR (95% CI)	*P* value
Hypertension	2.3 (1.2-4.4)	.009	1.9 (1.0-3.6)	.05
Intracranial hemorrhages	8.4 (1.0-67.5)	.04	6.6 (.9-51.3)	.06
Days of hospitalization				
Weekend	1.7 (1.1-2.7)	.02	1.6 (1.0-2.8)	.04
Insurance status				
Medicare/Medicaid	2.6 (1.5-4.2)	.0002	2.1 (1.1-4.3)	.02

Abbreviations: OR, odds ratio; CI, confidence interval.

* Adjusted for age, sex, and diagnosis of atrial fibrillation.

J Neurosurg 121:262–276, 2014

Worse outcomes for patients undergoing brain tumor and cerebrovascular procedures following the ACGME resident duty-hour restrictions

Clinical article

Ranjith Babu, M.S.,[1] Steven Thomas, M.S.,[1] Matthew A. Hazzard, M.D.,[1] Allan H. Friedman, M.D.,[1] John H. Sampson, M.D., Ph.D.,[1] Cory Adamson, M.D., Ph.D.,[1] Ali R. Zomorodi, M.D.,[1] Michael M. Haglund, M.D., Ph.D.,[1] Chirag G. Patil, M.D.,[2] Maxwell Boakye, M.D.,[3,4] and Shivanand P. Lad, M.D., Ph.D.[1]

[1]Department of Surgery, Division of Neurosurgery, Duke University Medical Center, Durham, North Carolina; [2]Department of Neurosurgery, Cedars-Sinai Medical Center, Los Angeles, California; [3]Department of Neurosurgery, University of Louisville; and [4]Roblex Rex VA Medical Center, Louisville, Kentucky

- Multivariate analysis demonstrated :
  - Significantly higher complication risk in Teaching institutions
    (OR 1.33 [95% CI 1.11–1.59], p = 0.0022)
  - No significant change in Nonteaching hospitals (OR 1.11 [95% CI 0.91–1.37], p = 0.31).

TABLE 7: Outcomes of brain tumor and cerebrovascular patients in teaching hospitals by time period

Parameter	Pre–Duty Hour Restriction: 2000–2002	Post–Duty Hour Restriction: 2005–2008	Test Statistic (p value)
total no. of patients (%)	28,086 (100.0)	43,940 (100.0)	
no. who died in hospital (%)	909 (3.24)	1017 (2.32)	56.48 (<0.0001)
no. of complications (%)	3313 (11.80)	5221 (11.88)	0.12 (0.7270)
complication count (%)			1.34 (0.2472)
none	24,773 (88.20)	38,719 (88.12)	
1	2683 (9.55)	4381 (9.97)	
2	502 (1.79)	696 (1.58)	
≥3	128 (0.46)	144 (0.33)	
LOS in days			14.05 (<0.0001)
mean ± SD	9.2 ± 10.91	8.4 ± 10.02	
median (IQR)	6.0 (3.0–11.0)	5.0 (3.0–10.0)	
adjusted charges in $ × 10^3			–173.83 (<0.0001)
mean ± SD	70.7 ± 81.35	97.3 ± 104.14	
median (IQR)	46.8 (30.9–78.0)	66.1 (43.0–110.0)	

TABLE 10: Complication types of brain tumor and cerebrovascular patients in teaching hospitals by time period

Parameter	Value*		Test statistic (p value)
	Pre–Duty Hour Restriction: 2000–2002	Post–Duty Hour Restriction: 2005–2008	
total no. of complications (%)	3313 (11.80)	5221 (11.88)	0.12 (0.7270)
mean no. of complications/patient (± SD)	0.1 ± 0.44	0.1 ± 0.42	3.39 (0.0007)
complications by type			
accidental puncture or laceration	194 (0.69)	316 (0.72)	0.20 (0.6572)
hematoma (intraop or postop)	451 (1.61)	767 (1.75)	2.01 (0.1559)
medical care or postop nervous system	741 (2.64)	1323 (3.01)	8.55 (0.0035)
postop respiratory	291 (1.04)	335 (0.76)	14.90 (0.0001)
foreign body inadvertently left in wound	1 (0.00)	10 (0.02)	4.14 (0.0420)
therapeutic misadventure, NEC	9 (0.03)	48 (0.11)	12.91 (0.0003)
therapeutic misadventure, surgical treatment	—	2 (0.00)	1.28 (0.2582)
cardiac &/or acute MI	279 (0.99)	440 (1.00)	0.01 (0.9162)
peripheral vascular	80 (0.28)	113 (0.26)	0.49 (0.4835)
op wound	55 (0.20)	132 (0.30)	7.24 (0.0071)
postop infection	272 (0.97)	397 (0.90)	0.79 (0.3755)
other specified	275 (0.98)	311 (0.71)	15.63 (<0.0001)
CSF leak	54 (0.19)	76 (0.17)	0.35 (0.5517)
carotid or vertebral artery injury	652 (2.32)	1100 (2.50)	2.39 (0.1221)
hoarseness due to paralysis of vocal cords	121 (0.43)	158 (0.36)	2.25 (0.1333)
dysphagia	544 (1.94)	678 (1.54)	15.94 (<0.0001)

* Values are number of complications (%) unless noted otherwise.

Seifi *et al. SpringerPlus* 2014, **3**:332
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RESEARCH **Open Access**

The epidemiology, risk factors, and impact on hospital mortality of status epilepticus after subdural hematoma in the United States

Ali Seifi[1*], Ali Akbar Asadi-Pooya[2,3], Kevin Carr[1], Mitchell Maltenfort[4], Mehrdad Emami[2], Rodney Bell[4], Michael Moussouttas[6], Moussa Yazbeck[7] and Fred Rincon[5]

Table 1 The ICD-9-CM classification of study cohort

ICD9-CM code	Description	References
432.1, 852.2, 852.3	Subdural-hematoma	(11, 17, 41, 43)
518.5, 518.82	Grand Mal Status	
96.70, 96.71, 96.72		
458.0, 458.8, 458.9, 796.3, 785.51, 785.59	Cardiovascular dysfunction, hypotension, shock	-27
286.2, 286.6, 286.9, 287.3-5	Hematological dysfunction, disseminated intravascular coagulation, purpura fulminans, coagulopathy, thrombocytopenia	-27
570, 572.2, 573.3	Hepatic dysfunction, acute hepatic failure, hepatic encephalopathy, hepatitis	-27
584, 580, 585, 39.95	Renal dysfunction, acute renal failure, acute glomerulonephritis, renal shutdown, hemodialysis	-27
293, 348.1, 348.3, 780.01, 780.09, 89.14	Neurological dysfunction, transient organic psychosis, anoxic brain injury, encephalopathy, coma. altered consciousness, electroencephalography	-27
	Comorbidities (Charlson et al. 1987)	(13, 27, 30)
428.0-428.9	Congestive heart failure	
401	Hypertension	
249, 250	Diabetes mellitus	
491, 492, 496	COPD	
571	Chronic liver failure	
585, 586	Chronic kidney disease	
196, 199	Cancer	

SDH, SE, co-morbidities, and acute organ dysfunctions used in this study.

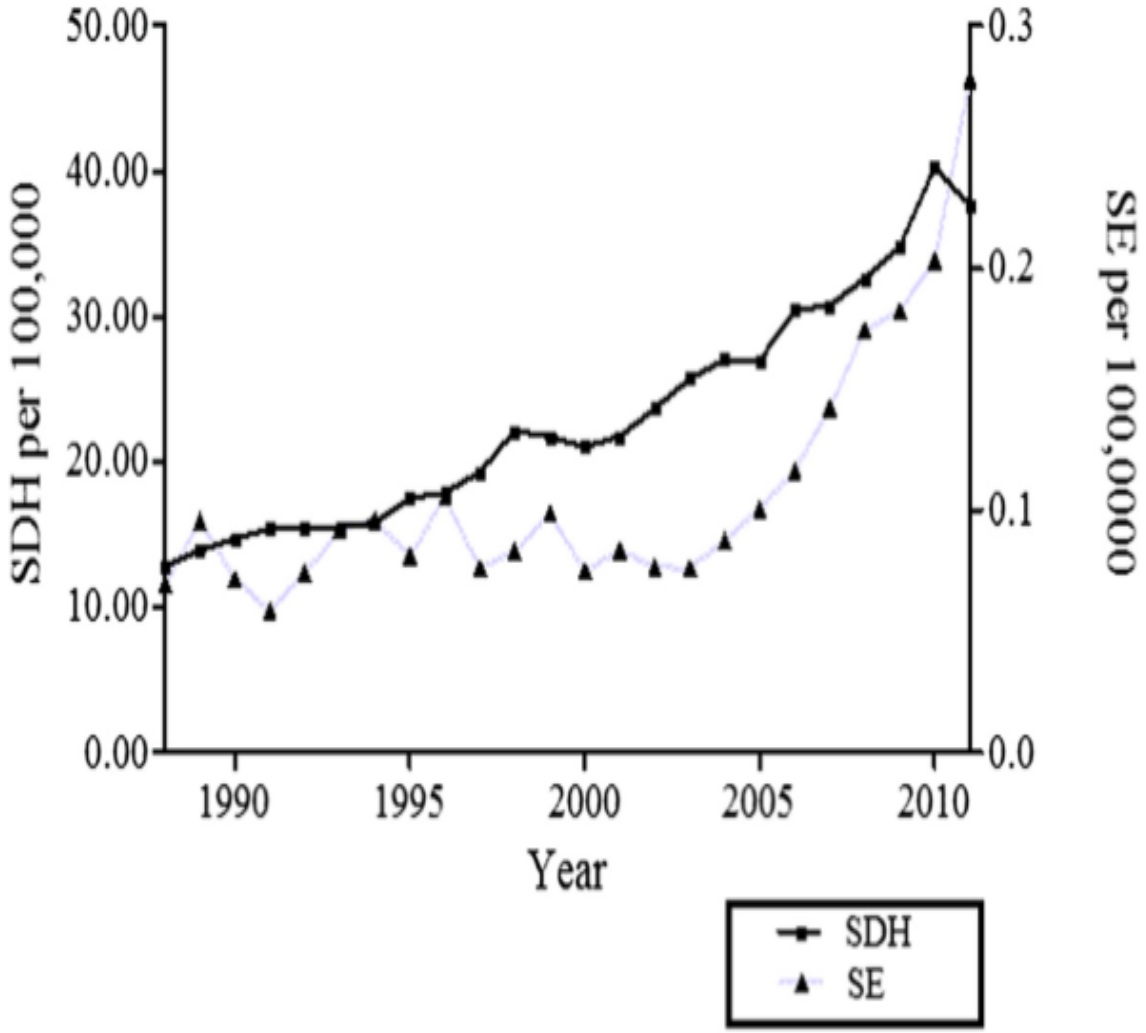

Figure 1 The population adjusted rate of subdural hematoma (SDH) hospitalizations from 1988 through 2011 in the USA.

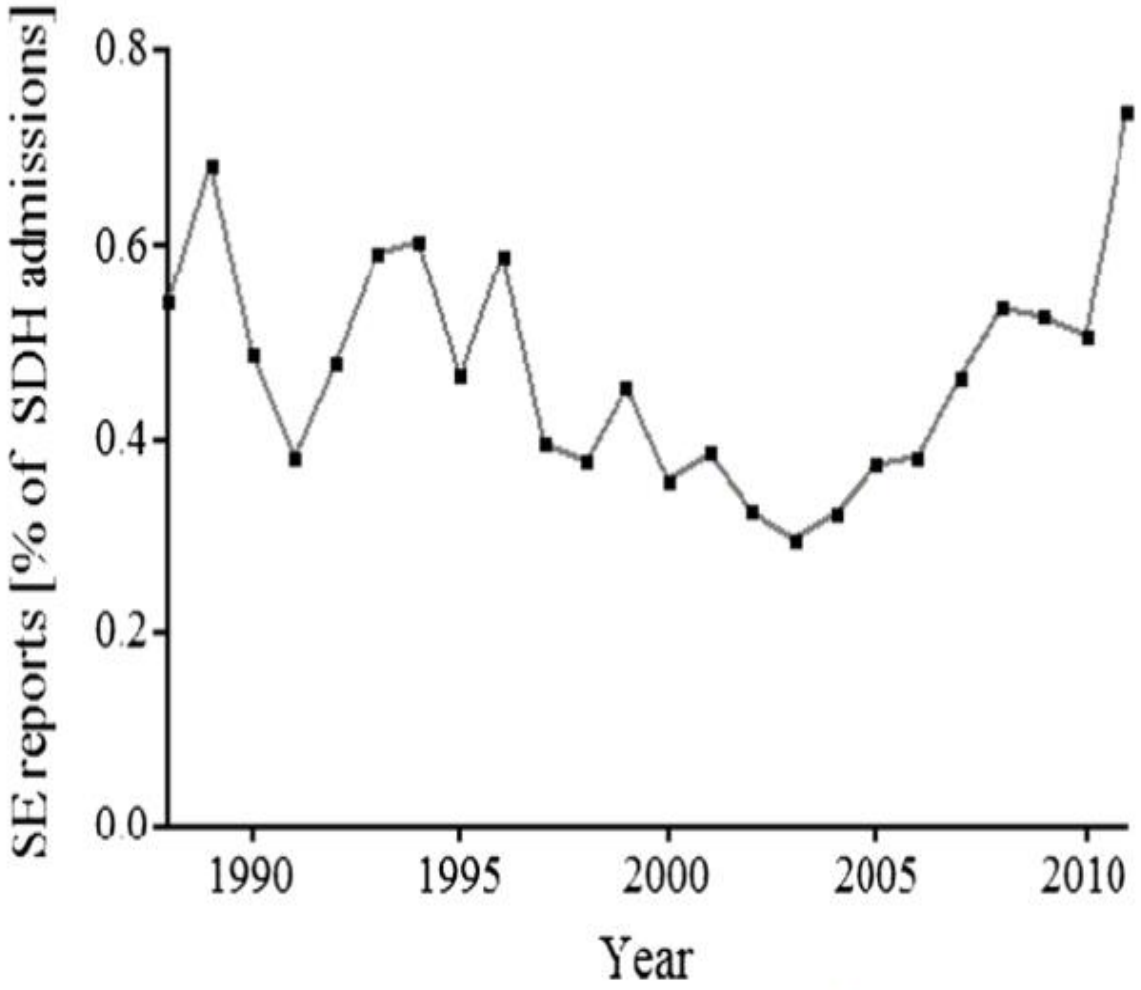

Figure 2 Prevalence of status epilepticus in admissions with subdural hematoma (SDH) from 1988 through 2011 in the USA.

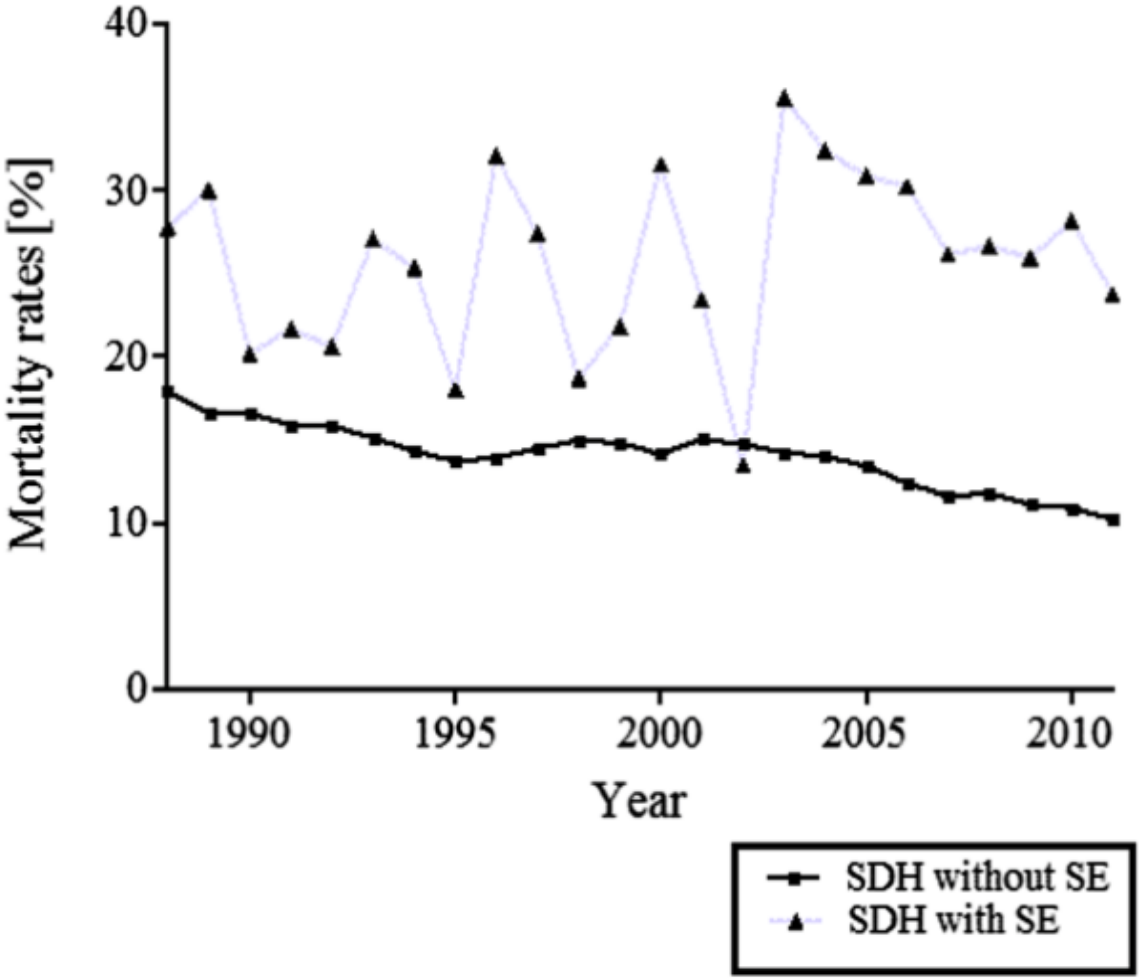

Figure 3 Mortality rates among admissions with SDH, with and without status epilepticus from 1988 through 2011in the USA.

Impact of Payment Source on Craniotomy Mortality in the United States During 2000-2011

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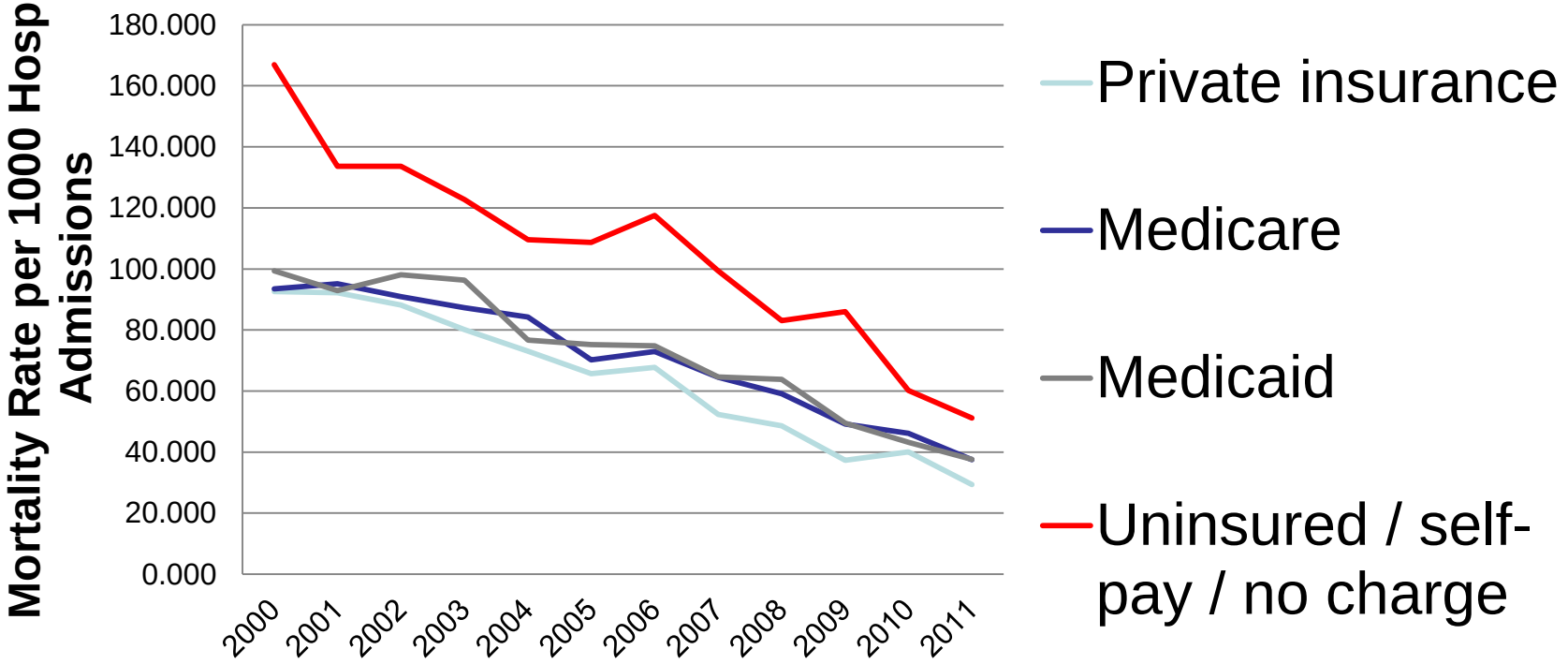
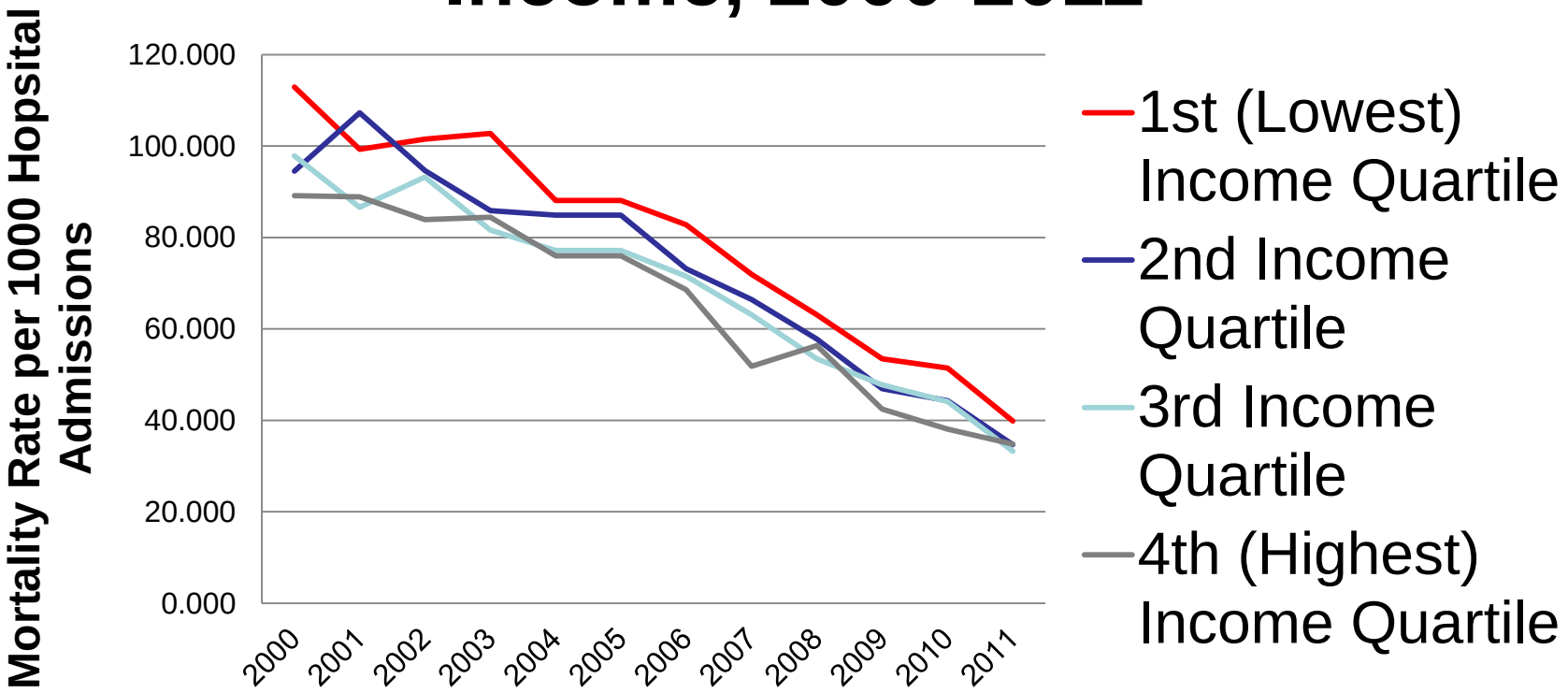
Craniotomy Mortality Rates by Payment Type, 2000-2011



Craniotomy Mortality Rates by Income, 2000-2011



Poster #: 32369

AANS , Washington 2015

Title: Impact of Resident Duty-Hour Restrictions on Mortality of Nervous System Disease and Disorder

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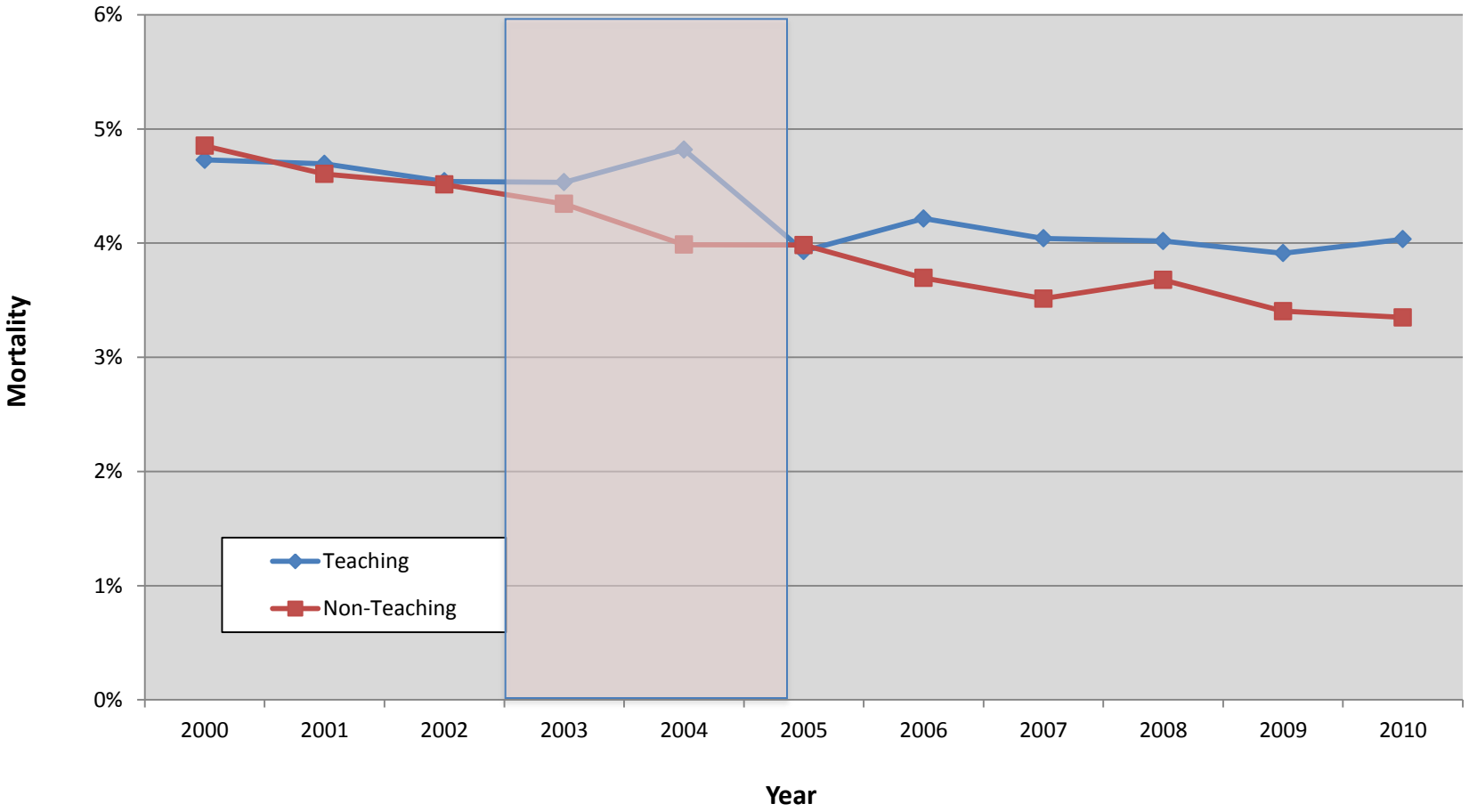
Figure 1. Nervous System Disease/Disorder Mortality by Hospital Teaching Status



Questions/Comments?

Time for Questions and/or Comments.

Reference:
http://www.ahrq.gov/research/data/hcup/index.html