

Epilepsy Surgery Trends in the United States from 1990 to 2008

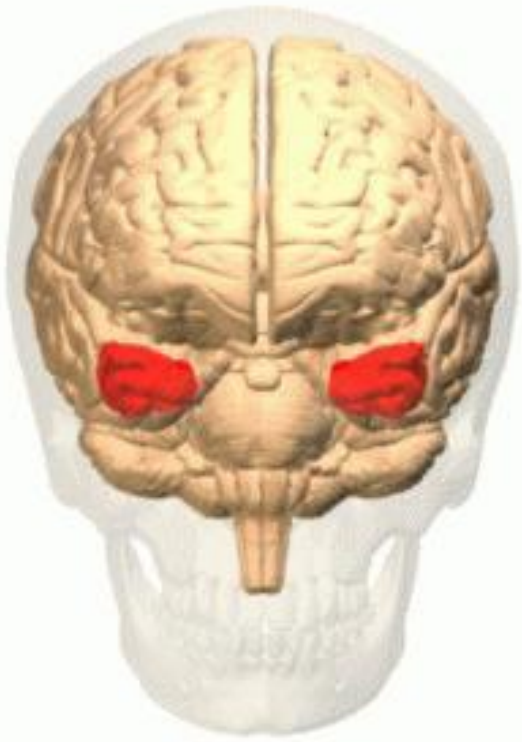
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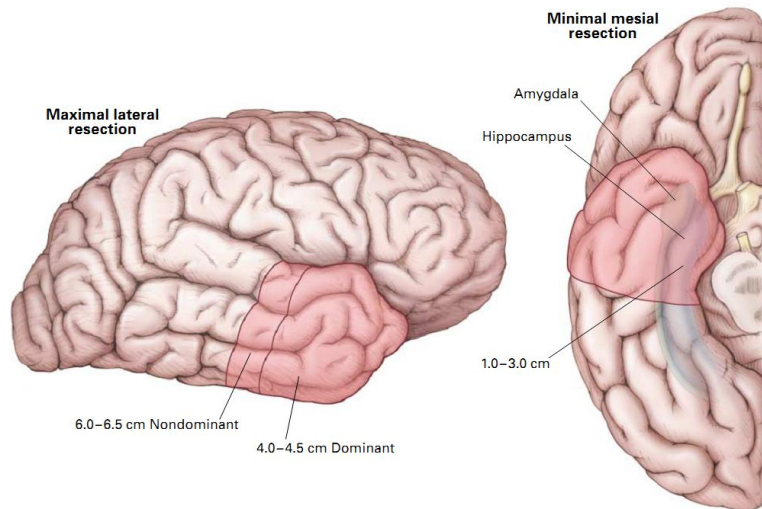


Medically refractory epilepsy is a common, highly morbid disease.



- 3 Million Americans
- Estimated annual price tag of \$12.5 billion in direct and indirect costs
- Pharmacotherapy is unsuccessful in controlling seizures in 20% to 40% of patients.

Anterior temporal lobectomy has been validated as a treatment for temporal lobe epilepsy



- 1.5% of eligible received surgery

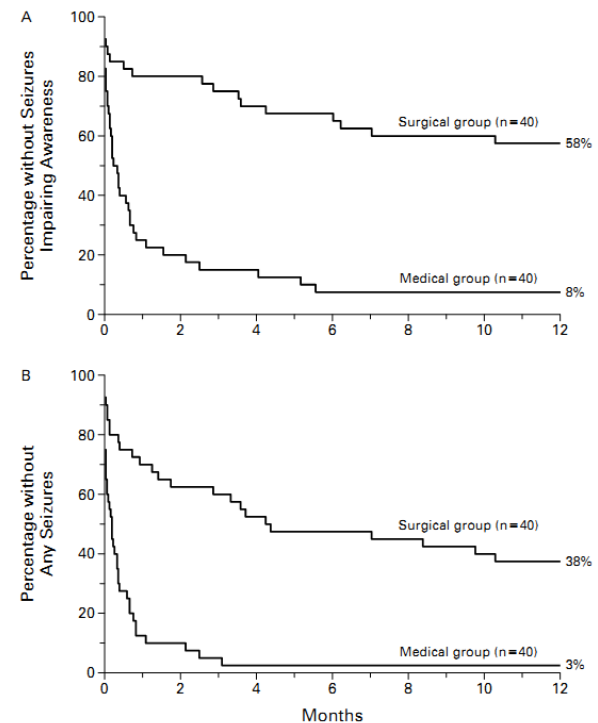


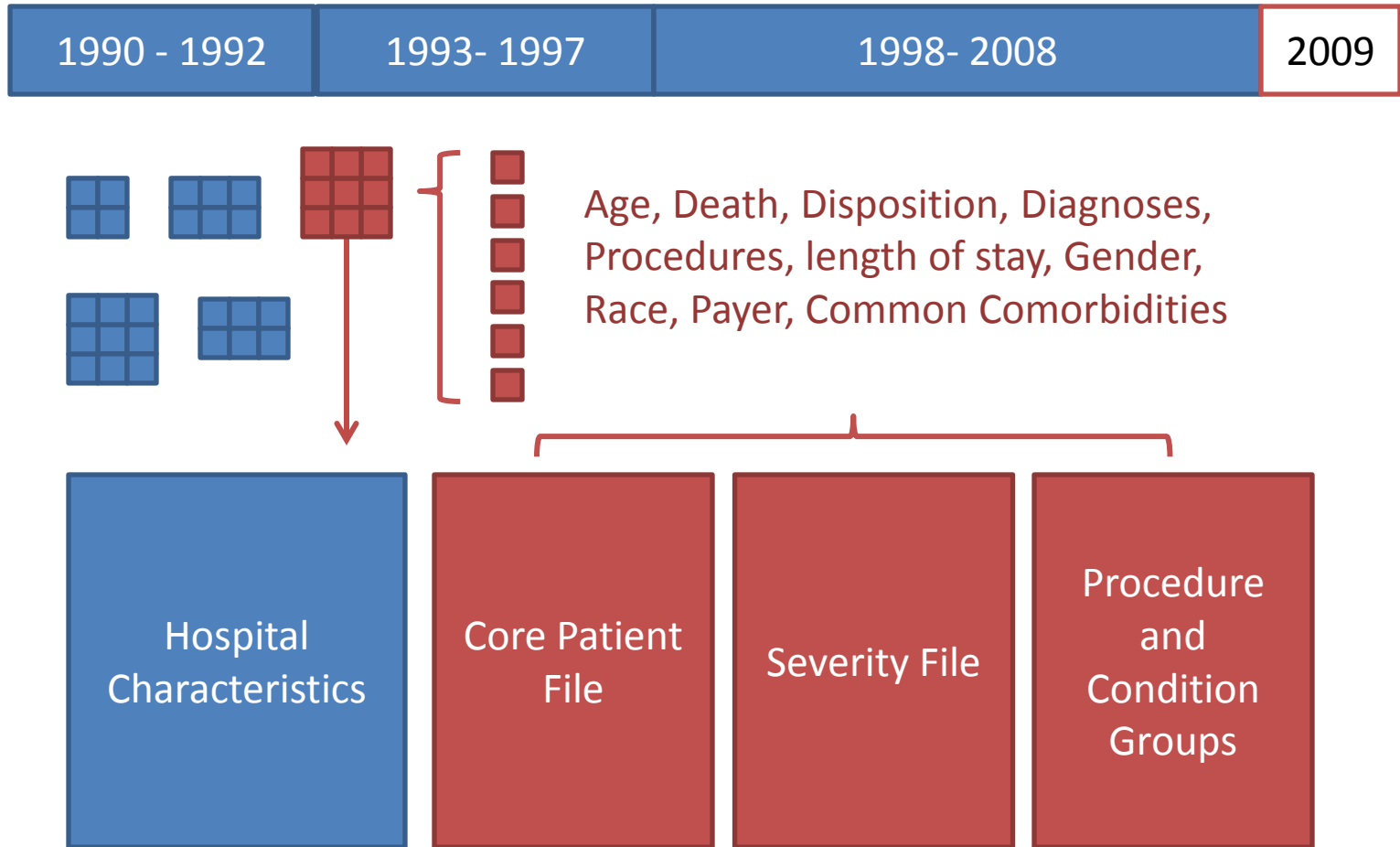
Figure 2. Kaplan-Meier Event-free Survival Curves Comparing the Cumulative Percentages of Patients in the Two Groups Who Were Free of Seizures Impairing Awareness (Complex Partial or Generalized Seizures) (Panel A) and Free of All Seizures (Including Auras) (Panel B).

In both analyses, more patients in the surgical group were free of seizures ($P < 0.001$ by the log-rank test). Follow-up began 1 day after surgery in the surgical group and 25 days after randomization in the medical group.

Research Question

Has the use of lobectomy for patients with intractable epilepsy increased in light of class I clinical evidence demonstrating efficacy?

The National Inpatient Sample is a 20% stratified sample of inpatient admissions of US hospitals



Hospital Name, Address, Bed Size, Teaching Status, Rural/urban, total number of discharges, RN FTEs

Study Design

simple or complex localized epilepsy (n = 22,133)

Temporal lobectomy (n = 1,326)

No temporal lobectomy (n = 20,807)

1990 - 2001

863

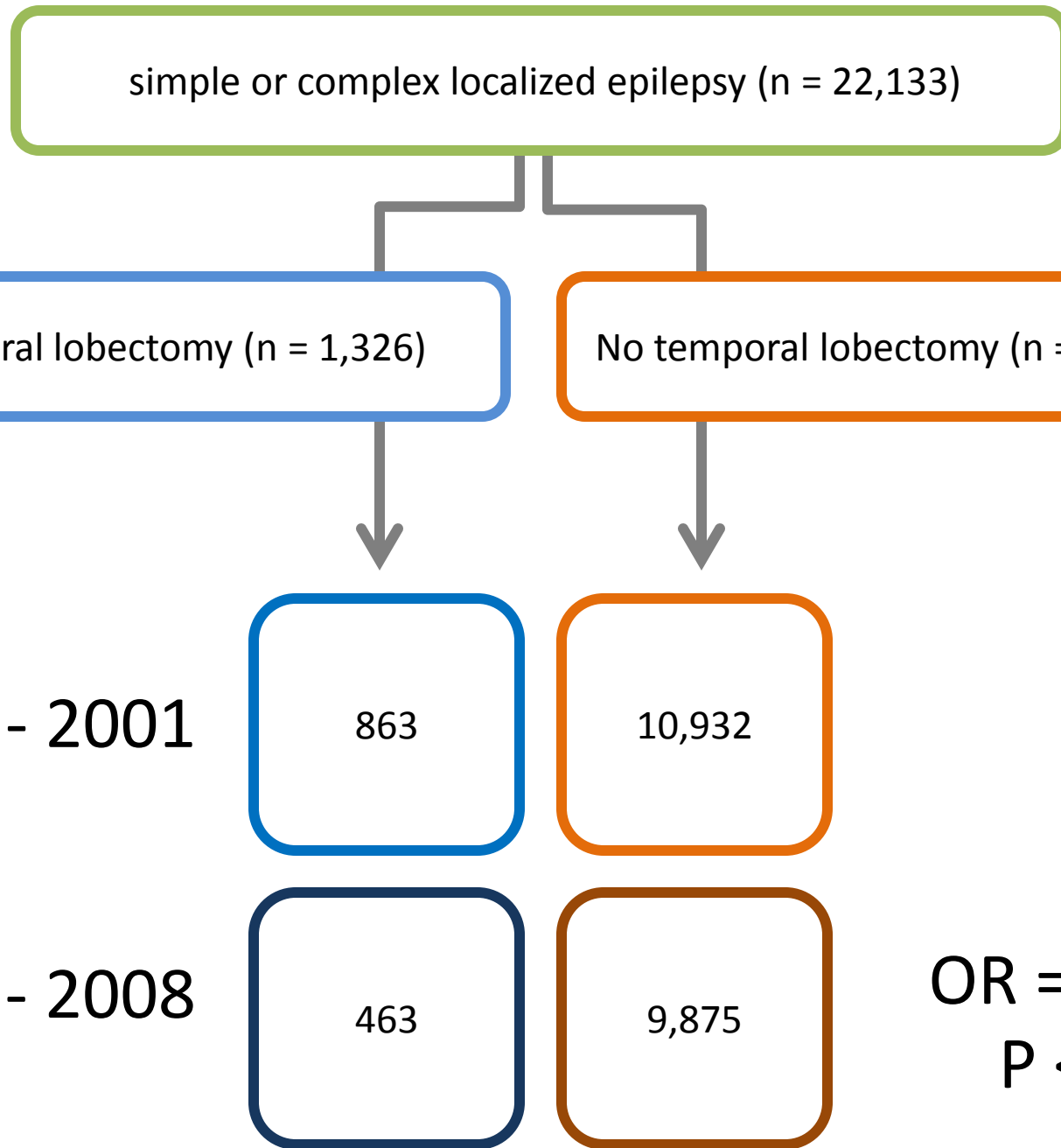
10,932

2002 - 2008

463

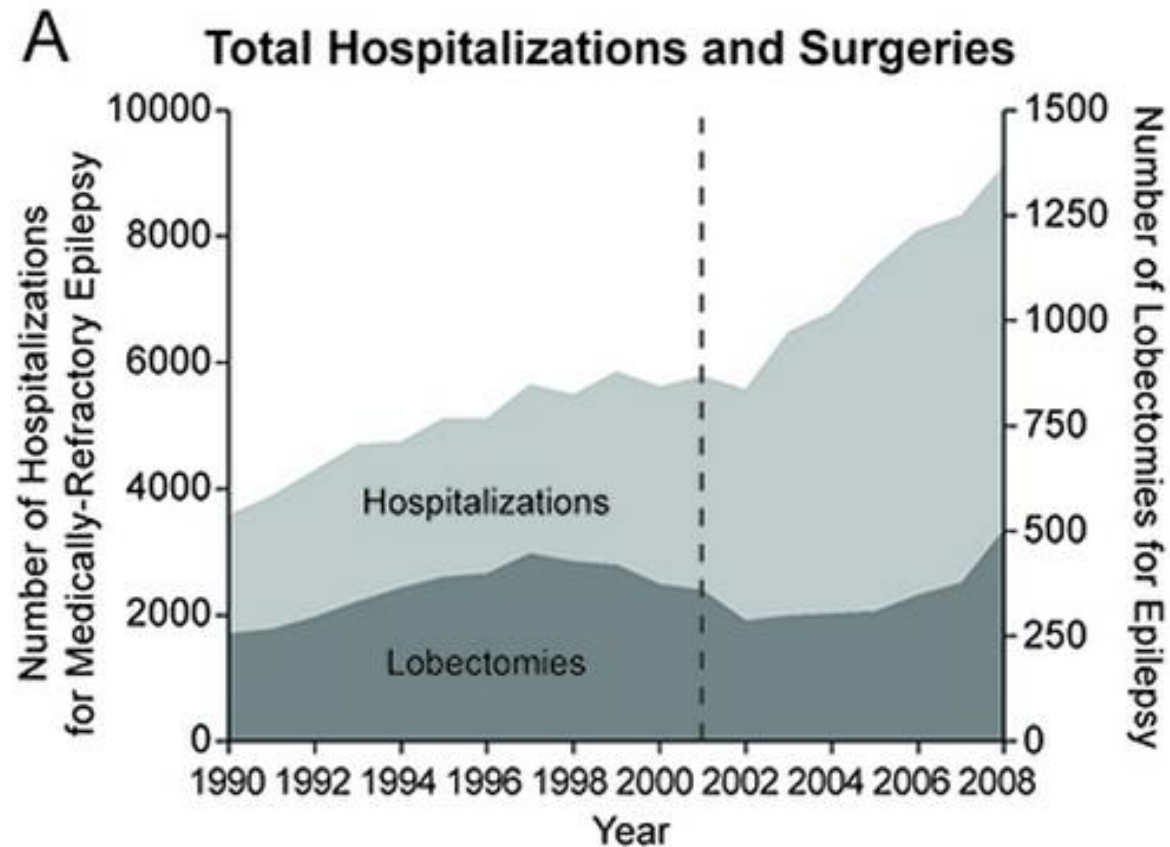
9,875

OR = 0.595
P < 0.001



Results

The use of lobectomy for medically intractable epilepsy has not increased between 1990 – 2008.



Over time, a greater proportion of medically refractory epilepsy patients are referred to low volume centers

1990 - 1994

2004 - 2008

	Hospitals Admitting for Medically- Refractory Epilepsy, n (%)	Hospitalizations for Medically- Refractory Epilepsy, n (%)	Percent of Hospitalizations Including Lobectomy	Hospitals Admitting for Medically- Refractory Epilepsy, n (%)	Hospitalizations for Medically- Refractory Epilepsy, n (%)	Percent of Hospitalizations Including Lobectomy
Top 20 Hospitals Performing Lobectomy	20 (1.1)	6,450 (30.6)	9.5	20 (0.9)	4,406 (11.0)	9.6
Other Hospitals Performing Lobectomy	140 (7.6)	6,704 (31.8)	9.4	350 (15.6)	27,285 (67.9)	4.5
Hospitals Not Performing Lobectomy	1,685 (91.3)	7,936 (37.6)	0	1,880 (83.6)	8,520 (21.2)	0
Total	1,845 (100)	21,090 (100)	6.9	2,250 (100)	40,210 (100)	4.3

For lobectomy patients, the risk of adverse events increases at low volume centers

Table: Peri-operative adverse events by center volume

	Low	Middle	High
Stroke/neurological complication	14 (3.8)	33 (1.8)	55 (1.3)
Post-operative infection	10 (2.5)	66 (3.5)	86 (2.0)
Hematoma	10 (2.5)	28 (1.5)	40 (0.9)
Status epilepticus	5 (1.3)	9 (0.5)	10 (0.2)
Ventriculostomy/ Hydrocephalus	0 (0)	9 (0.5)	5 (0.1)
Pulmonary complication	10 (2.5)	28 (1.5)	40 (0.9)
Cardiac complication	0 (0)	5 (0.3)	5 (0.1)
Deep venous thrombosis/Pulmonary embolism	0 (0)	5 (0.3)	20 (0.5)
Death	0 (0)	5 (0.3)	0 (0)
Total	48 (12.5)	190 (10.1)	262 (6.1)

Data are N (%) of each event within each group of centers, 1990-2008.

$\chi^2 = 13.6$,
p = 0.0002

Conclusions

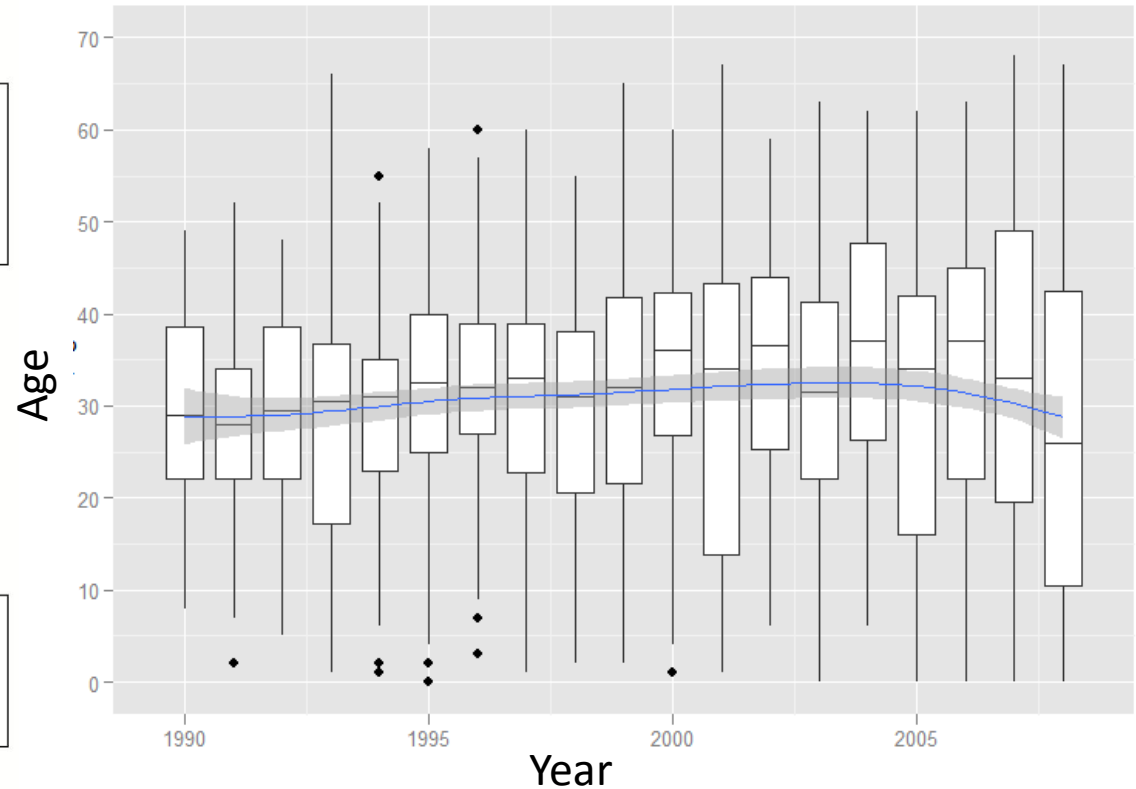
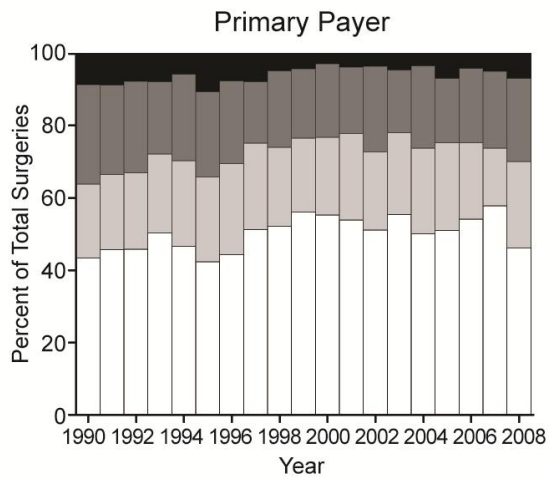
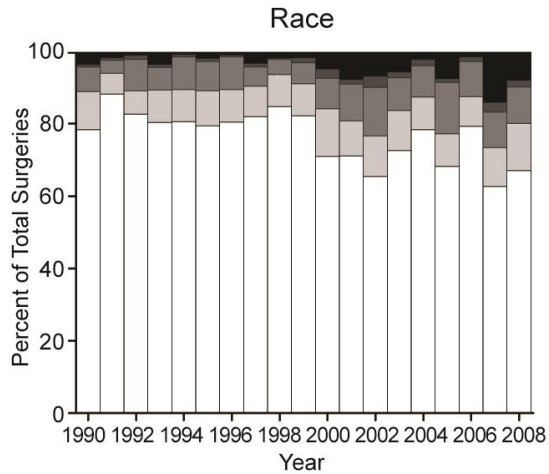
- Lobectomy for medically intractable epilepsy is still underutilized, particularly among racial minorities and the underinsured.
- Patients with medically refractory epilepsy should be referred to a comprehensive epilepsy center for surgical evaluation by an experienced epilepsy treatment team.

Acknowledgements

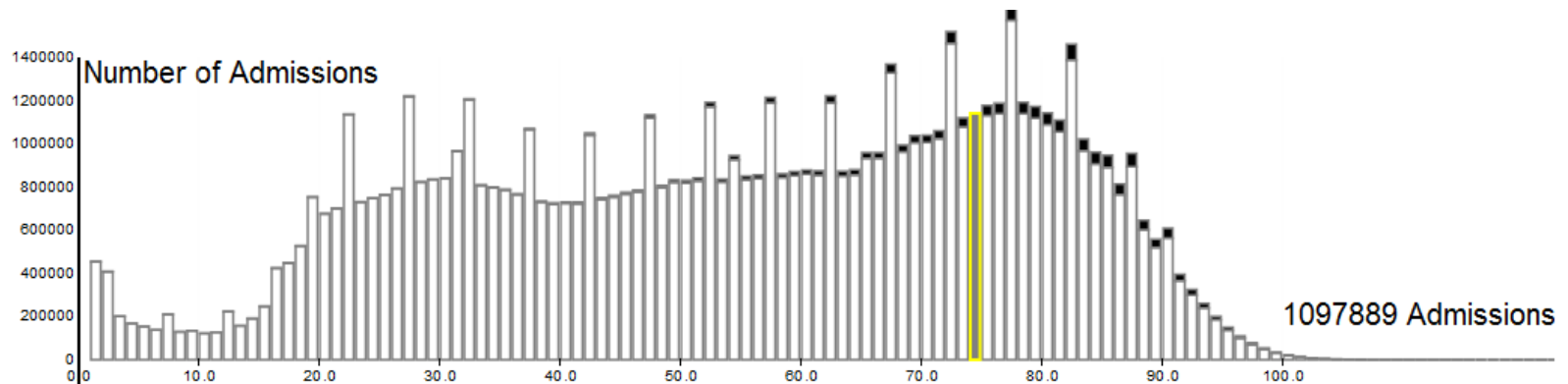
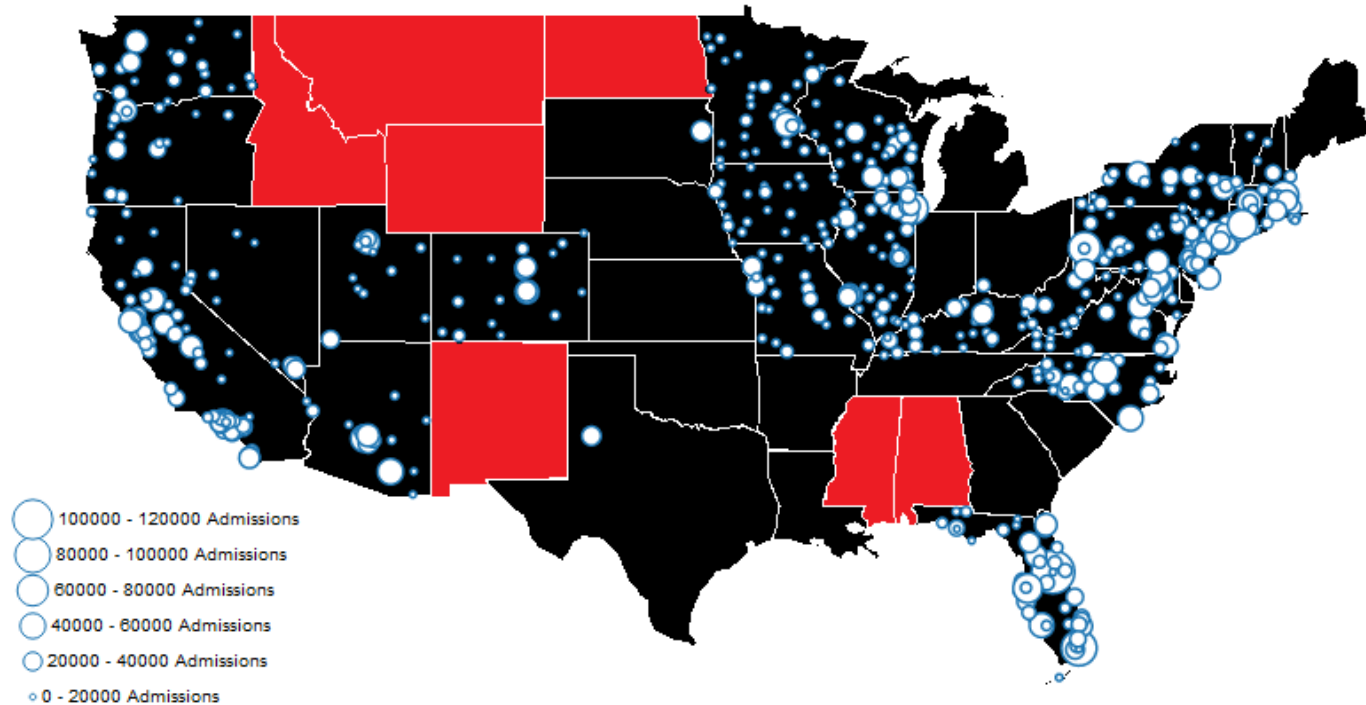
- Eddie Chang MD
- Paul Garcia MD

- Dario Englot MD PhD
- Doris Wang MD PhD
- John Rolston MD PhD

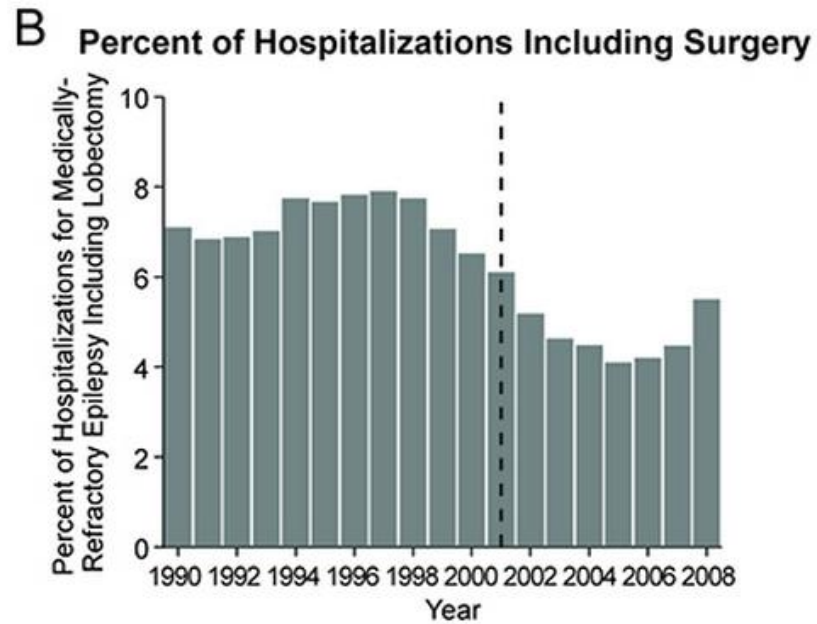
Patient demographics did not change over time



Data was extracted from the National Inpatient Sample non-delimited ASCII files using Python and R.



Proportion of hospitalizations with surgery decreased.



There exists regional, payer, race, and hospital status based disparity in the utilization of lobectomy

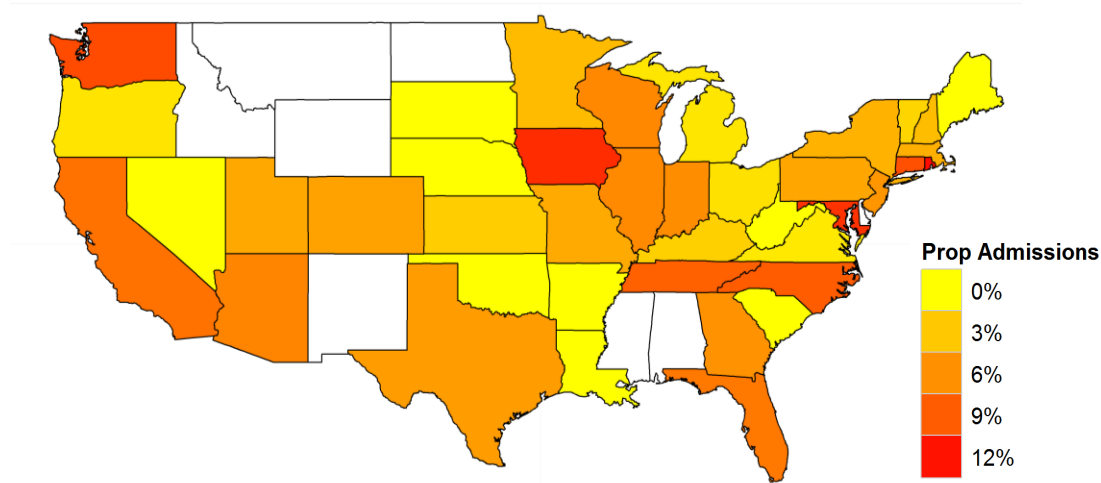


Table 2: Predictors of ATL during TLE admission from multivariate analysis

	Odds ratio	95% CI	P value
Pediatric (age < 18 y)	1.57	1.30 – 1.89	< 0.001*
White race	1.56	1.28 – 1.90	< 0.001*
Income above 25 th percentile	1.02	0.84 – 1.25	0.83
Private insurance	1.73	1.47 – 2.03	< 0.001*
Large hospital	1.51	1.26 – 1.82	< 0.001*
Teaching hospital	1.88	1.51 – 2.34	< 0.001*
Urban hospital	1.12	0.72 – 1.75	0.62
Hospital in South or West	1.74	1.49 – 2.03	< 0.001*

Over time, a greater proportion of medically refractory epilepsy patients are referred to low volume centers

1990 - 1994

2004 - 2008

	Hospitalizations for Medically- Refractory Epilepsy, n (%)	Percent of Hospitalizations Including Lobectomy	Hospitalizations for Medically- Refractory Epilepsy, n (%)	Percent of Hospitalizations Including Lobectomy	Relative Risk (95% CI) ^b
Top 20 Hospitals Performing Lobectomy	6,450 (30.6)	9.5	4,406 (11.0)	9.6	1.01 (0.90-1.13)
Other Hospitals Performing Lobectomy	6,704 (31.8)	9.4	27,285 (67.9)	4.5	0.38 (0.35-0.41) ^a
Hospitals Not Performing Lobectomy	7,936 (37.6)	0	8,520 (21.2)	0	--
Total	21,090 (100)	6.9	40,210 (100)	4.3	0.62 (0.58-0.65)^a