

Learning Objectives

1. To describe the burden of Intracranial abscesses in the United States and identify those who are at greater risk
2. To evaluate the neurosurgical management and outcomes of patients with intracranial abscesses.

Introduction

There is limited data on the burden of intracranial abscesses (ICA). We sought to quantify the inpatient burden, neurosurgical management and outcome of ICA in the United States.

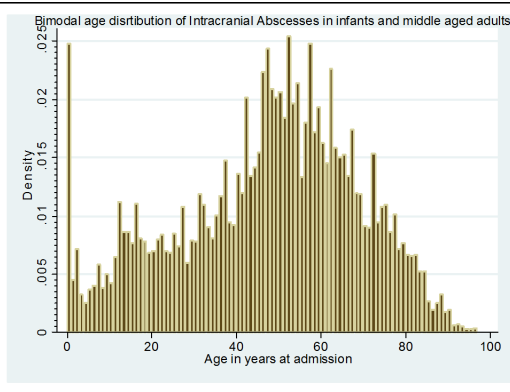
Methods

The 2001-2010 Nationwide Inpatient Sample was queried and appropriate ICD-9CM diagnostic and procedure codes identified patients with ICA diagnosis (324.0), patients that underwent craniotomy surgery [drainage of epidural-01.24, and/or subdural-01.31 abscesses], and ventriculostomy/shunting procedures (0.22; 02.31-02.39). Descriptive analysis and multivariate logistic regression examined outcomes. Data were weighted to the US national population.

Results

A total of 55,535 ICA inpatient admissions were identified. Age distribution was bimodal (See attached figure); overall mean age was 46.8 years [Standard Error/SE=0.20]. Most patients were male (65.4%), race was distributed as follows: whites (50.8%), blacks (11.5%), Hispanics (9.3%), other/unknown (28.4%).

Patient Characteristics	Percentage of Total [N=55,535]
Sex (Male)	65.4%
Age	
≤18 years	13.7%
19-44 years	26.1%
45-64 years	38.7%
≥65 years	21.5%
Race	
Whites	50.8%
Blacks	11.5%
Hispanics	9.3%
Others	5.9%
Missing	22.5%



Results

In all, 20.1% of patients had surgery. Average time-to-surgery was 3.18 days (SE=0.13).
 Ventriculostomy/shunting was performed in 8.4% of patients and in 11.3% that underwent surgery;
 intracranial pressure monitors placement in 0.4% overall, and in 0.8% that had surgery, $p < 0.001$;
 while mechanical ventilation was indicated in 14.5% of patients, and in 17.8% that had surgery, $p < 0.001$.

Surgical procedures performed in patients with intracranial abscesses	Percentage of Total [N=55,535]
Craniotomy for drainage of subdural abscess	9.5%
Craniotomy for drainage of epidural abscess	11.4%
Ventriculostomy/shunt procedures	8.4%
Insertion of Intracranial monitors	0.4%

Results (Continued)

Patients that had surgery [Odds-ratios/OR=1.37; 95%Confidence-interval/CI=1.14-1.64] and ≤ 18 -year-olds (OR1.86; 95%CI=1.28-2.70) were more likely for ventriculostomy/shunting.

Mechanical ventilation was more likely in ≥ 65 -year-olds (OR1.11; 95%CI=1.02-1.20), persons undergoing surgery (OR1.22; 95%CI=1.05-1.45), and ventriculostomy/shunting (OR4.42; 95%CI=3.74-5.22).

Overall inpatient mortality was 6.5%, and was lower in surgery vs non-surgery patients (4.5% vs. 7.0%, $p < 0.001$). Most survivors were discharged to intermediate/long-term care (40.0%), routine/homecare (28.5%), and hospice-care (25.0%), $p < 0.001$.

Average length of hospitalization was 16.5 days (SE=0.18). Annual total charges averaged \$610,786,703.

	Mortality Odds Ratios	95% Confidence Interval
Race (Whites-ref)		
Blacks	1.22	0.93 – 1.58
Hispanics	1.12	0.84 – 1.50
Others	2.40	1.56 – 3.70
Age (≤ 18 years -ref)		
19-44 years	1.72	1.16 – 2.57
45-64 years	2.39	1.63 – 3.51
≥ 65 years	3.76	2.36 – 5.97
Craniotomy Drainage Surgery vs. Non-surgery (ref)	0.48	0.37 – 0.63
Time from admission to surgical drainage of abscesses [≤ 48 vs. > 48 hours (ref)]	0.80	0.65 – 0.98
Ventriculostomy/ shunt surgery vs. no surgery (ref)	1.93	1.47 – 2.55

	All patients	Surgery	Non-Surgery	p-value (surgery vs. non-surgery)
ICP-monitor	0.4	0.8	0.3	<0.001
Mechanical ventilation	14.5	17.8	13.6	<0.001
Discharge disposition				
Home	28.5	30.5	28.0	
Another facility	40.0	37.4	40.6	<0.001
Hospice care	25.0	27.7	24.3	
Mortality	6.5	4.5	7.0	
Average Length of Stay in days (\pm SE)	16.5 (\pm .18)	18.7 (\pm .43)	15.9 (\pm .20)	<0.001
Average Total charges in USD (\pm SE)	109928.4 (\pm 1,370.12)	139480.4 (\pm 3,422.58)	102,463.1 (\pm 1,472.01)	<0.001

Surgery refers to persons who had craniotomy for drainage of abscesses; USD= US dollars; Another facility refers to nursing home, rehabilitation, short term, intermediate, and long-term care; SE=Standard Error

Results (Continued)

Factors significantly associated with inpatient mortality were: ≥ 65 -year-olds (OR3.8; 95%CI=2.4-6.1), Hispanics (OR2.36; 95%CI=1.53-3.64), ventriculostomy/shunting (OR1.93; 95%CI=1.46-2.54), surgery (OR0.47; 95%CI=0.35-0.61), and time-to-surgery of ≤ 48 hours (OR0.79; 95%CI=0.65-0.98).

Conclusions

Intracranial abscesses constitute a significant morbidity burden among infants and older adults. Early neurosurgical drainage is associated with improved survival.