

THE NATIONAL
BRAIN
ANEURYSM
CENTER

The Acute In-Hospital Mortality for Intracranial Hemorrhage
Patients with a Dedicated Neurocritical Care Team.

Authors:

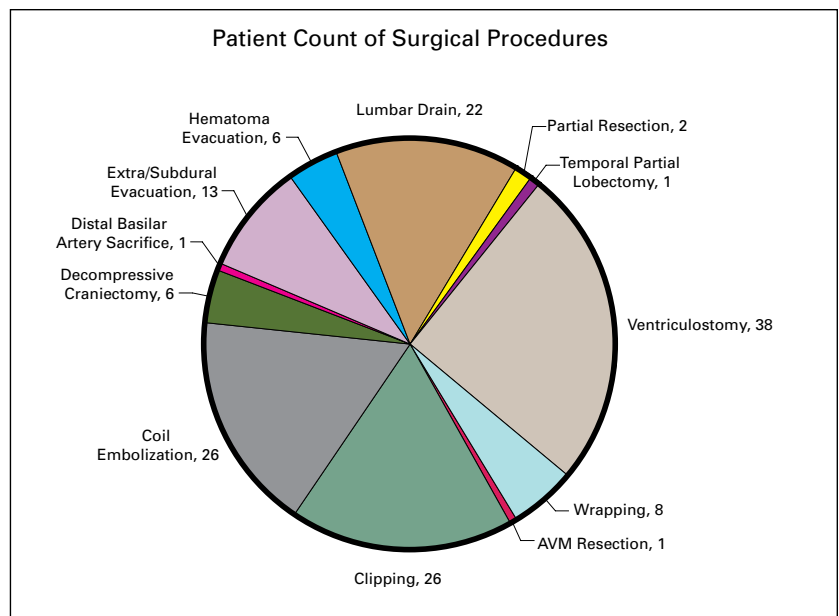
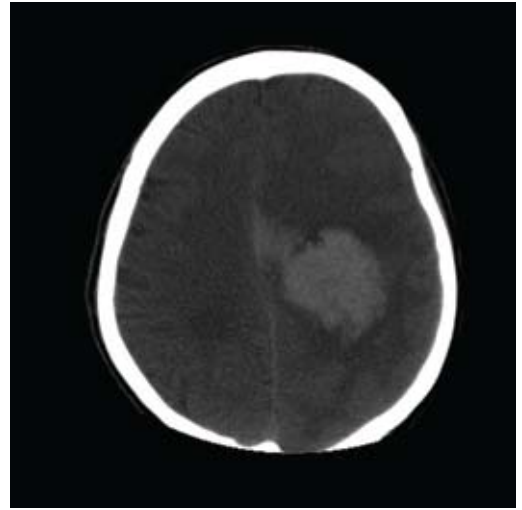
T. Janjua, MD
E. Nussbaum, MD
H.P. Lochungvu, BA
P.J. Tatman, MPH
A. Zelensky, MPP

INTRODUCTION

Dedicated neurocritical care teams (NCT) increase survival for neurologically unstable patients. We were interested in the in-hospital mortality of patients with intracranial hemorrhage (ICH) treated in an ICU by a NCT. The reported in-hospital mortality rates for intracerebral hemorrhage are 26% - 46%¹⁻⁵, and for subarachnoid hemorrhage are 29% - 32%^{2,4}.

METHODS

The charts of patients who were discharged from the hospital between January 1, 2006 and December 31, 2006 were retrospectively reviewed. In-hospital mortality was assessed and information regarding patient demographics, surgical procedures and NCT treatments were collected. Statistical analyses using Pearson's chi-square tests, Fisher's exact tests and Student's t-tests were performed using SPSS 15.0.



RESULTS

There were 140 patients who were treated for ICH during the study period; 16 (11.4%) died prior to discharge. Patients ranged in age from 22 to 92 years (mean = 63.0 years) and 62% were female. Sixteen (11.4%) patients died during this time period.

Twelve (19.4%) intracerebral hemorrhage patients died and four (6.6%) subarachnoid hemorrhage patients died. There were 17 patients with subdural hematomas, none of whom died.

Patients that died were significantly older, had significantly higher systolic blood pressure on admission, were less likely to have a surgical intervention, and were more likely to have an intracerebral bleed than patients that survived. Also, 9 (20.9%) patients who required a pharmacological approach for intracranial pressure control (ICP) died compared to 7 (7.2%) patients who did not require this method of ICP control. Lastly, 9 (39.1%) patients that were not on anti-epileptic medication died compared to 7 (6%) patients that were taking anti-epileptic medication.

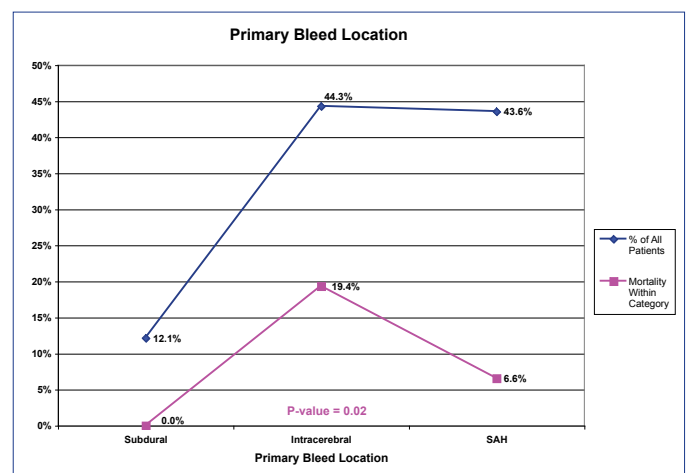
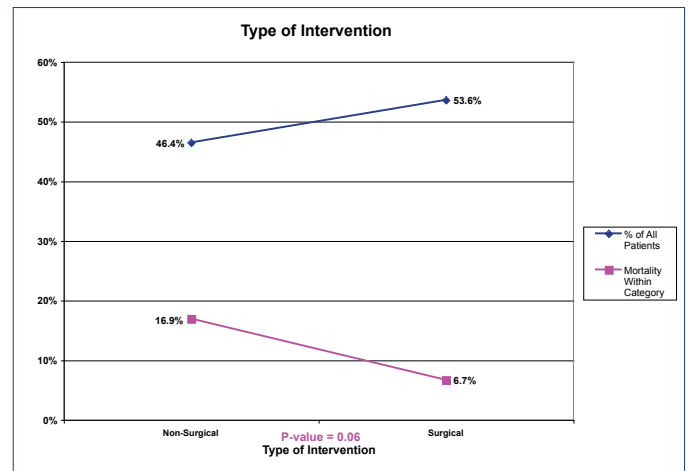
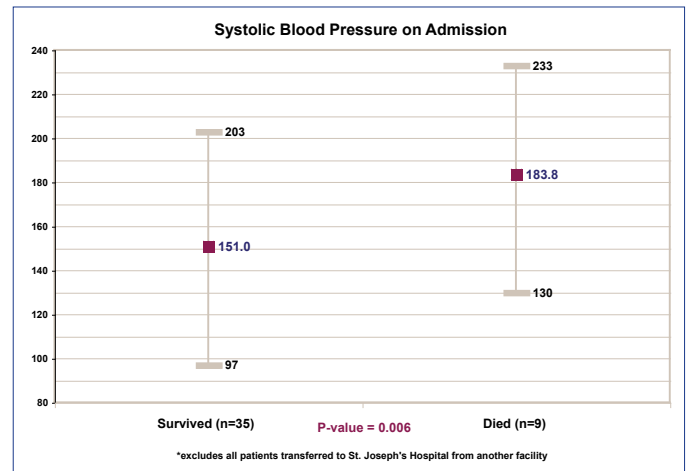
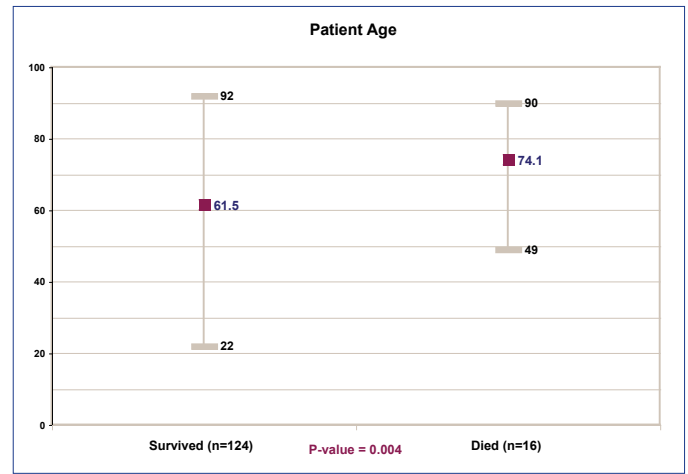


Table 1 Mortality by Gender and Race

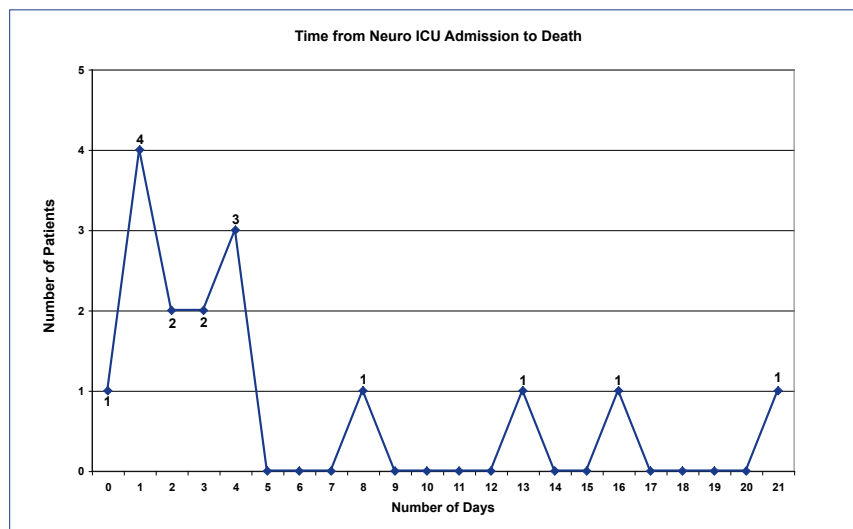
Demographic Category	N	Mortality	P-value
Female	87	10 (11.5%)	0.99
Male	53	6 (11.3%)	
Caucasian	126	14 (11.1%)	0.66
Non-Caucasian	14	2 (14.3%)	

*Asian (n=8), African American (n=4), Hispanic (n=1), Native American (n=1)

Table 2 Mortality by Medication Use

Medication Category	N	Mortality	P-value
ICP Control – Yes	43	9 (20.9%)	0.04
ICP Control – No	97	7 (7.2%)	
Hypertension Control - Yes	132	14 (10.6%)	0.23
Hypertension Control - No	8	2 (25.0%)	
Hypertonic Saline – Yes	121	13 (10.7%)	0.46
Hypertonic Saline – No	19	3 (15.8)	
Sedation - Yes	110	13 (11.8%)	0.99
Sedation - No	30	3 (10.0%)	
Anti-Epileptic - Yes	117	7 (6.0%)	< 0.001
Anti-Epileptic - No	23	9 (39.1%)	

The range of time to death was 0 to 21 days with an average of 5.3 days. Seven patients died within the first 48 hours of admission to the ICU with a dedicated NCT.



CONCLUSIONS

The mortality rate with a dedicated NCT in our hospital was lower than the commonly reported rate. Our intracranial hemorrhage in-hospital mortality rate was 11.4%. Our approach to neurocritical care focuses on early surgical intervention, cerebral perfusion pressure monitoring, hypertension control protocol using Nicardipine and strict critical care protocols.

REFERENCES

1. McGuire AJ, Raikou M, Whittle I, Christensen MC. *Long term mortality, morbidity, and hospital care following intracerebral hemorrhage: an 11-year cohort study.* Cerebrovasc Dis. 2007; 23(2-3):221-8.
2. Lee WC, Joshi AV, Wang Q, Pashos CL, Christensen MC. *Morbidity and mortality among elderly Americans with different stroke subtypes.* Adv Ther. 2007; 24(2):258-68.
3. Russell MW, Boulanger L, Joshi AV, Neumann PJ, Menzin J. *The economic burden of intracerebral hemorrhage: evidence from managed care.* Managed Care Interface. 2006; 19(6):24-8, 34.
4. Reed SD, Blough DK, Meyer K, Jarvik JG. *Inpatient costs, length of stay, and mortality for cerebrovascular events in community hospitals.* Neurology. 2001; 57(2):305-14.
5. Russel MW, Joshi AV, Neumann PJ, Boulanger L, Menzin J. *Predictors of hospital length of stay and cost in patients with intracerebral hemorrhage.* Neurology. 2006; 67(7):1279-81.