

Seasonal Variation of Subarachnoid Hemorrhage Severity

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Introduction

Aneurysmal subarachnoid hemorrhage (aSAH) is a potentially life threatening neurosurgical emergency. It has been previously believed and taught that subarachnoid hemorrhage has a seasonal variation, with a higher incidence in winter months. Several institutional studies have also demonstrated this to be true¹. However, recent analysis of the healthcare utilization project (HCUP) national inpatient sample (NIS) did not demonstrate any variation with seasons². Other work has utilized the HCUP database to determine aSAH severity and outcomes of aSAH at initial presentation³, and created a metric called the Subarachnoid Stroke Severity Scale (SAH-SSS). Our investigation is the first to the authors' knowledge to study how the severity of subarachnoid hemorrhage varies with the season.

Methods

The HCUP database was queried in New York, Iowa, California, and Washington in order to capture a broad base of the American population. Patients were selected if they had an aSAH as their primary admitting diagnosis. The SAH-SSS was calculated using the prior work from Washington et al. Statistical analysis was conducted in Python 2.7 and R 3.3.0, using Pandas and Matplotlib to process, subset, and visualize the data.

Results

The SAH-SSS was calculated for the four states for each season. The average score was 2.9 in the fall, 2.96 in the spring, 2.97 in the summer, and 3.01 in the winter. A one-way ANOVA did not reveal any statistical difference in mean scores ($p=0.04$). The incidence of scores also did not vary significantly across the season. In state by state analysis, there was also no variance by season.

Conclusions

While the debate regarding the seasonal incidence of aSAH may remain unresolved, there appears to be no seasonal variation in the clinical severity based on national inpatient registry data.

Learning Objectives

Seasonal variation of aneurysmal subarachnoid hemorrhage

References

- Inagawa T. Seasonal variation in the incidence of aneurysmal subarachnoid hemorrhage in hospital- and community-based studies. *J Neurosurg.* Mar 2002;96(3):497-509.
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- Washington CW, Derdeyn CP, Dacey RG, Jr., Dhar R, Zipfel GJ. Analysis of subarachnoid hemorrhage using the Nationwide Inpatient Sample: the NIS-SAH Severity Score and Outcome Measure. *J Neurosurg.* Aug 2014;121(2):482-489.

ScoreTable

Season	FALL	SPRING	SUMMER	WINTER
Score				
0.298197	105	130	103	129
0.463013	1	2	4	2
0.774142	0	3	0	0
0.932394	4311	4364	4059	4288
1.447735	64	72	56	64
1.750672	1	1	1	0
2.225541	45	45	37	42
2.420563	14	11	9	7
3.455614	0	1	0	0
5.473947	104	94	99	88
6.958751	2145	2204	2042	2216
8.499436	3	1	2	1
10.804901	33	25	17	25
13.065824	18	9	8	11
14.210769	0	0	0	1
18.065428	5	3	6	6

The incidence of each score for each season. There is no significant variation of the scores as the seasons progress