

#### Introduction

The differential diagnosis of post-operative complications using common dictum "wind, water, wound, walk" is supported by the timing and frequency of pneumonia, urinary tract infection, wound infection and deep vein thrombosis. We retrospectively analyzed a dataset of different 30-day post-operative complications in neurosurgical patients.

#### Methods

In total, we studied 89003 patients who underwent neurosurgical procedures identified from 2009 to 2013 in the American College of Surgeons' National Surgical Quality Improvement Program database (ACS NSQIP). Pattern of 30- day complications were analyzed by type of complications and date of occurrence. To determine the applicability of ACS NSQIP dataset complications prediction, occurrence of complications were compare between the first, second, third and fourth post-operative weeks.

## Results

Of the 89003 patients, 7638 developed complications (8.58%), 565 wound infection (0.63%), 1197 pneumonia(1.34%), 969 unplanned intubation(1.08%), 532 pulmonary embolism(0.59%), 973 deep vein thrombosis(1.09%), 1007 sepsis (1.13%) and 1055 urinary tract infection (1.18%). The mode of post-operative occurrence of wound infection was 14th day, pneumonia was 2nd day, unplanned intubation was 2nd day, pulmonary embolism was 2nd day, deep vein thrombosis was 3rd day, sepsis was 2nd day and urinary tract infection was 7th day. Within the first post-operative week, statistical analysis identified the incidence of pneumonia, unplanned intubation, pulmonary embolism and sepsis at post-operative day 2 (p<0.05). There was a statistically significant increase of deep vein thrombosis at post operative day 3 (p<0.05) and urinary tract infection at post operative day 7 (p<0.05). Occurrence of wound infection was significant at second week post- operative (day 7-14, p<0.05).

Complication	N	Median Days (25 <sup>th</sup> , 75 <sup>th</sup> Percentile)	Median Significantly		P value <sup>A</sup>			
			Greater Before	Less After	<7d	<14d	<21d	<28d
Superficial Wound	752	15 (10, 22)	Day 15	Day 17	NA	NA	<0.001	< 0.001
Deep Wound	1206	15 (11, 22)	Day 15	Day 17	NA	NA	< 0.001	< 0.001
Pneumonia	1197	5 (2, 10)	Day 5	Day 6	0.017	< 0.001	< 0.001	< 0.001
Unplanned Intubation	969	3 (1, 9)	Day 3	Day 6	<0.001	<0.001	<0.001	<0.001
PE	532	10 (5, 19)	Day 10	Day 13	< 0.001	< 0.001	< 0.001	< 0.001
DVT	973	10 (5, 16)	Day 10	Day 12	NA	< 0.001	< 0.001	< 0.001
Sepsis	1007	8 (3, 15)	Day 8	Day 11	NA	< 0.001	< 0.001	< 0.001
UTI	1655	9 (5, 15)	Day 9	Day 11	NA	< 0.001	< 0.001	< 0.001

# Conclusions

Our study can be used to predict the occurrence pattern of post-operative neurosurgical complications, based on NSQIP registry data. The differential diagnosis for post-operative complications in neurosurgical patients should be "wind, walk, water, wound" and can potentially be used as an adjunct in decision-making for quality improvement. Further study is needed to clarify the implications of the early onset of deep vein thrombosis and pulmonary embolism regarding the post- operative course.

### **Learning Objectives**

Analyze neurosurgical complications from national dataset (ACS NSQIP) to improve quality of patient care.

### References