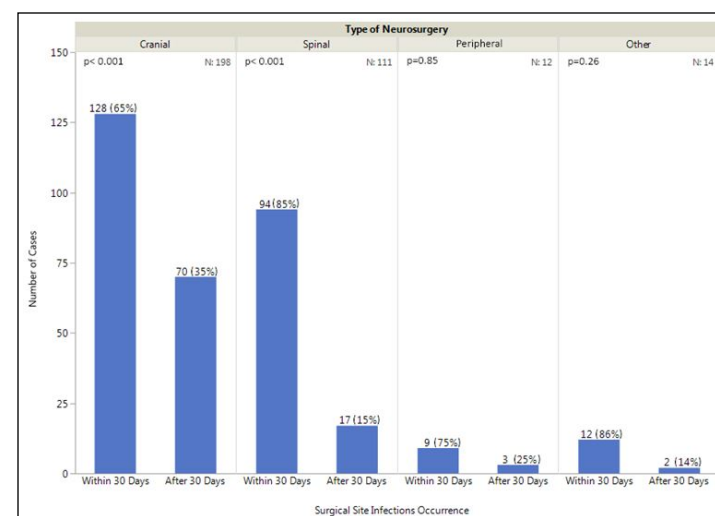


## Introduction

Surgical site infection (SSI) is a common postoperative complication that increases postoperative morbidity and economic burden. As we move further towards value-based purchasing models, hospitals and physicians have been particularly interested in decreasing incidence of preventable complications such as SSI to ensure optimum patient outcomes and hence less reimbursement cuts. In this manuscript, we sought to investigate the differences between early (<30 days) and late (>30 days) SSI.

## Methods

Patients undergoing neurosurgical procedure and having a subsequent diagnosis of SSI were abstracted from an institutional prospective database of SSI. Patient demographics, preoperative, perioperative and postoperative variables of interest were collected from medical records.



## Multivariable Regression

	Odds Ratio	Lower 95%	Upper 95%	P-Value
<b>Age</b>	1.03	1.01	1.04	<0.001
<b>Neurosurgery type</b>				
Cranial	Ref	Ref	Ref	Ref
Spinal	0.29	0.14	0.59	<b>0.001</b>
Peripheral	0.47	0.11	2.08	0.32
Other	0.17	0.03	0.87	<b>0.033</b>
<b>Surgery type</b>				
Open	Ref	Ref	Ref	Ref
Minimally Invasive	0.27	0.03	2.62	0.26
Endoscopic	4.92	0.67	35.83	0.12
Microscope used	0.35	0.17	0.72	<b>0.004</b>
<b>Peri-operative antibiotics used</b>				
Bacitracin	2.42	1.35	4.33	<b>0.003</b>
Gentamicin	1.72	0.65	4.56	0.28
<b>SSI Class Primarily by Depth</b>				
Organ/Space	Ref	Ref	Ref	Ref
Superficial Incisional	1.02	0.52	1.97	0.98
Deep Incisional	0.83	0.36	1.88	0.65
<b>SSI Pathogen</b>				
Gram +ve	Ref	Ref	Ref	Ref
Gram -ve	0.30	0.12	0.74	<b>0.009</b>
Other	0.68	0.28	1.65	0.39

## Results

A total of 335 patients fit the inclusion criteria. Two hundred and forty-three (72.5%) contracted SSI within the first 30 days of operation while 92 (27.5%) patients had an SSI after 30 days. More cranial patients were found to have a late SSI (76.1%, n= 70) vs early SSI (52.7%, n= 128), whereas spinal patients were more likely to have an early SSI (38.7%, n= 94 vs after 30 days 18.5%, n= 17, (OR: 0.29, 95% CI: 0.14 to 0.59, p<0.001). Older patients were found to be more likely to have an SSI after 30 days (OR: 1.03, 95% CI: 1.02 to 1.04, p<0.001). Gram negative organisms were associated with significantly more Early SSI (OR: 3.3 95% CI: 1.35 - 8.3, p=0.009).

## Conclusions

Investigating the risk factors for SSI developing beyond 30 days time point can be critical to understand the pattern of SSI after neurosurgery and the factors implicated in the development of this preventable complication. We found that older patients, open surgery, cranial surgery and Gram positive bacteria as the causative pathogen were all associated with higher risks of developing surgical site infections beyond 30 days.

## Patient Demographics

	SSI within 30 days (n=243)	SSI >30 days (n=92)	p-value
Age, mean (SD)	42.7 (24.0)	48.8 (24.3)	<b>0.04</b>
Age, categorical, n (%)			<b>0.11</b>
0-18	51 (20.9)	16 (17.4)	
19-65	144 (59.3)	48 (52.2)	
65+	48 (19.8)	28 (30.4)	
Female sex, n (%)	103 (42.6)	34 (36.0)	<b>0.35</b>
CCIScore, n (%)			<b>0.29</b>
0	83 (34.2)	27 (29.4)	
1-2	71 (29.2)	23 (25.0)	
3-4	63 (25.9)	33 (38.7)	
5-6	17 (7.00)	8 (10.9)	
6+	9 (3.70)	1 (1.09)	
BMI, mean (SD)	28.4 (9.22)	28.0 (7.76)	0.64
<b>Neurosurgery type, n (%)</b>			
Cranial	128 (52.7)	70 (76.1)	< <b>0.001</b>
Spinal	94 (38.7)	17 (18.5)	< <b>0.001</b>
Peripheral	9 (3.70)	3 (3.26)	0.85
Other	12 (4.94)	2 (2.17)	0.26
<b>Surgery type, n (%)</b>			
Open	166 (68.3)	73 (80.2)	<b>0.02</b>
Minimally Invasive	11 (4.53)	1 (1.10)	
Endoscopic	2 (0.82)	3 (3.30)	
Microscope used	64 (26.3)	14 (15.4)	
<b>If Spinal (n=111)</b>			
<b>Approach, n (%)</b>			
Anterior	2 (2.13)	1 (5.88)	0.41
Posterior	87 (92.6)	14 (82.4)	
Circumferential	1 (1.06)	1 (5.88)	
<b>Surgical Drain(s) Left, n (%)</b>			
	62 (25.5)	16 (17.4)	0.12
<b>Surgical Wound(s) Closure, n (%)</b>			
	239 (98.4)	92 (100.0)	0.22
<b>Emergency Case, n (%)</b>			
	26 (10.7)	14 (15.4)	0.24
<b>ASA Class, n (%)</b>			
0	14 (5.76)	6 (6.52)	
I	11 (4.53)	2 (2.17)	
II	112 (46.1)	38 (41.3)	
III	101 (41.6)	44 (47.8)	
IV	4 (1.65)	1 (1.09)	
V	1 (0.41)	1 (1.09)	
<b>Peri-operative antibiotics used, n (%)</b>			
Bacitracin	67 (27.6)	41 (44.6)	<b>0.003</b>
Gentamicin	12 (4.94)	13 (14.13)	<b>0.004</b>