

Does exceeding the Surgical Booking Priority Target Time predict adverse events in Emergency Spine Surgery?

DR. MICHAEL BOND¹, DR. RAPHAELE CHAREST-MORIN¹, DR. ALANA FLEXMAN², DR. T. AILON¹, DR. M. BOYD¹, DR. N. DEA¹, DR. M. DVORAK¹, DR. C. FISHER¹, DR. B. KWON¹, DR. S. PAQUETTE¹ & DR. JOHN STREET¹

1. COMBINED NEUROSURGICAL AND ORTHOPEDIC SPINE PROGRAM, UNIVERSITY OF BRITISH COLUMBIA, VANCOUVER, BC.
2. DEPARTMENT OF ANESTHESIA, UNIVERSITY OF BRITISH COLUMBIA, VANCOUVER, BC.



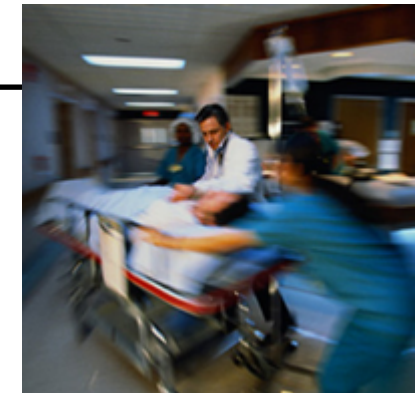
VANCOUVER SPINE SURGERY INSTITUTE
Specialized care for the spine and spinal cord

Background

- Patients benefit from improved outcomes and lower complications rates with timely access to emergency surgical intervention.
- In order to help facilitate timely access to care and triage surgical cases, most institutions implement a Booking Priority Target Time (BPTT) system.
- Delays in achieving transfer to operating rooms and meeting target time can be for a number of reasons:
 - Restricted access to surgical suites due to limited resources
 - Understaffing of emergency operating room
 - Cases with higher priority are booked
 - Patient is deemed unstable for surgery

Booking Priority Target Time (BPTT)

Booking Priority	Description
<1 hour	STAT
< 4 hour	Emergency
< 8 hour	Urgent
< 24 hour	Semi-Urgent



Objectives

To determine in a group of patients booked for emergency spine surgery, if not meeting BPTT is associated with an increased incidence of intraoperative and postoperative adverse events.

It is hypothesized that those patients who do not meet BPTT are more likely to have increased complications and mortality.

- An ambispective study was performed over a four-year time period between January 1, 2009 to December 31, 2013 on a total of 1378 patients.
 - Included all admissions booked for emergency or urgent spine surgery over the four-year time period
 - Patients were then divided into two distinct groups, meeting BPTT and those not meeting BPTT.



Vancouver General Hospital
Emergency Spine Surgery: Jan 2009 – Dec 2013

Follow Course in Hospital:

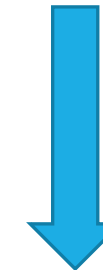


Hospital Electronic Charts, SAVESV2,
Spine Surgical Invasiveness Index (SSI)

Assessment Spine Team



**Booked for Surgical
Intervention
Vancouver Spine
Surgery Team**



Standard admission forms,
Adverse Event forms, and
Operating Room Management
Information System (ORMIS)



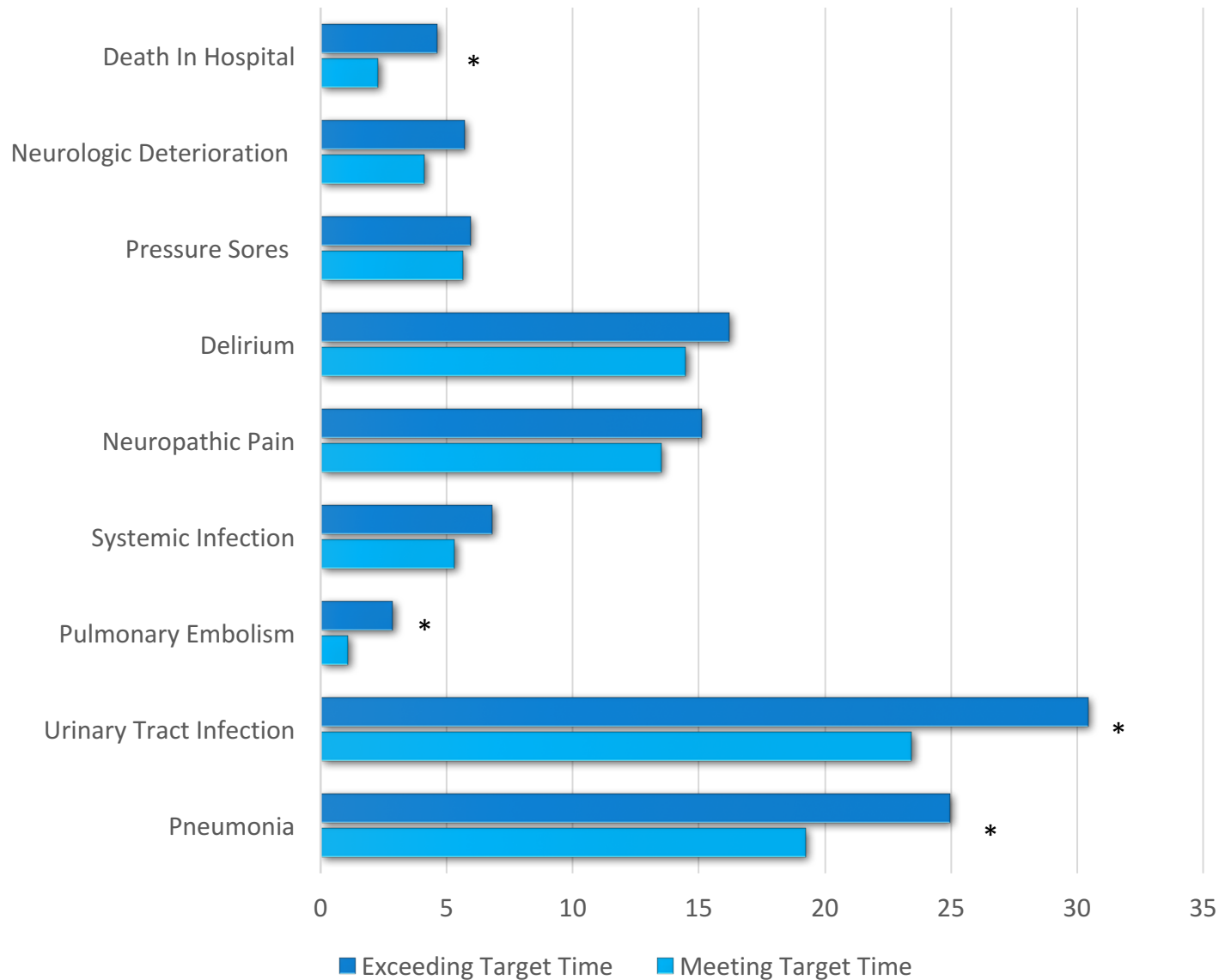
Results

- Mean age of the patient group was 50.6 (SD 18.4) and 64.8% of the group were male.
- Groups sorted by BPTT compliance did not differ with respect to age, gender, ASA score, smoking status, comorbidities, locations of surgery, diagnosis category or SSI score ($p > 0.05$).
- There was a difference between these groups with respect to neurologic status with a significantly higher ASIA A/B category in those not meeting target time (20.6% vs. 12.8%, $p < 0.01$).

Total N = 1378	Meeting Target Time N = 922	Not Meeting Target Time N = 456	p-value
Age (mean, SD)	50.57 (18.5)	50.67 (18.1)	0.928
Male (%)	605 (65.6%)	288 (63.2%)	0.401
Smoker (%)	147 (15.9%)	74 (16.2%)	0.954
ASA Score	2.7 (0.88)	2.8 (0.93)	0.267
Length of Stay in days (mean, SD)	23.3 (29.4)	25.7 (28.8)	0.153
Operative time minutes (mean, SD)	174.7 (107.9)	157.7 (100.2)	0.004
Comorbidity (%)			
Cardiac	152 (16.4%)	82 (17.9%)	0.535
Pulmonary	78 (8.5%)	49 (10.7%)	0.200
Diabetes	103 (11.1%)	52 (11.5%)	0.874
Obesity	17 (1.8%)	8 (1.8%)	1.000
Neurologic Status			
ASIA A / B	118 (12.8%)	94 (20.6%)	<0.01
ASIA C / D	291 (31.6%)	165 (36.2%)	
ASIA E	400 (43.4%)	137 (30.0%)	
Cauda Equina	72 (7.8%)	46 (10.1%)	
SSI (mean, SD)	8.9 (7.0)	9.1 (7.2)	0.625

Table 1: Patient characteristics for Booking Priority Target Compliance

Adverse Event by Target Compliance (%)



- A total of 873 patients experienced at least one AE, which is an AE event rate of 63.3%.
- In the group that met target time there were 572 (62.0%) adverse events and in those that did not meet target time there were 301 (66.0%) adverse events (p=0.168).
- Urinary tract infections, pneumonia, in-hospital mortality, and pulmonary embolism were all significantly associated with not meeting BPTT (p<0.05)

Multivariate Model

- Not meeting target time was found to not significantly predict adverse events ($p = 0.216$).
- However, predictors of adverse events in the final model were:
 - ASA score
 - SSI score
 - Age
 - ASIA impairment classification
 - Diagnosis category

Variable	Odds Ratio	Confidence Interval	p-value
Not Meeting BPTT	1.22	0.89 – 1.66	0.216
ASA Score *	1.50	1.26 – 1.78	<0.001
SSI Score *	1.07	1.05 – 1.10	<0.001
Wait Time Hours*	0.99	0.98 – 0.99	0.045
Age			
< 50 years old	Reference		
50 – 64 years old	1.68	1.22 – 2.31	0.001
65 – 69 years old	2.49	1.45 – 4.38	0.001
70 – 75 years old	2.41	1.37 – 4.37	0.002
> 75 years old	3.14	1.82 – 5.58	<0.001
Diabetes	1.45	0.91 – 2.36	0.120
Neuro Status			
ASIA A/B	10.45	5.70 – 20.81	<0.001
ASIA C/D	1.61	1.15 – 2.26	0.006
ASIA E	Reference		
Cauda Equina	1.66	0.98 – 2.82	0.061
Diagnosis Category			
Degenerative	Reference		
Infection	3.78	2.21 – 6.56	<0.001
Trauma	2.40	1.64 – 3.54	<0.001
Oncology	2.67	1.51 – 4.80	<0.001
Other	6.51	1.60 – 34.04	0.0136
Location			
Cervical	Reference		
Thoracic	0.66	0.45 – 0.95	0.027
Lumbar	1.18	0.83 – 1.69	0.354
Combined	1.95	0.47 – 13.3	0.408

Table 2: Predictive Model for Any Adverse Events

Individual Adverse Events

Adverse Event	OR	P-value
Pneumonia	1.55	<0.01 *
Urinary Tract Infection	1.72	<0.02*
Pulmonary Embolism	3.64	<0.002 *
Systemic Infection	1.02	> 0.05
Neuropathic Pain	1.46	<0.05*
Delirium	1.14	> 0.05
Pressure Sores	1.44	<0.003 *
Neurologic Deterioration	2.15	<0.01*
In Hospital Mortality	1.77	< 0.05 *

Table 3: Individual Adverse Events by Target Time Compliance

Individual adverse events were evaluated for all those that were significant on bivariate analysis or had a incidence of 5% in our sample

Using multivariate logistic regression to look at individual adverse events in the urgent/emergency spine surgery patient population including:

- Pneumonia
- Urinary Tract Infection
- Pulmonary Embolism
- Neuropathic Pain
- Pressure Sores
- Neurologic Deterioration
- In Hospital Mortality

Conclusions

Emergency surgical cases that did not meet booking priority times are associated with a significant increase in major postoperative adverse events

- Including pulmonary embolism, urinary tract infections, and in-hospital mortality

A dedicated trauma room has the capacity to allow access to care for patients presenting with emergency conditions requiring urgent surgical management and may be a solution to achieving target times

Disclosures

The authors have no conflicts or disclosures for this research.