Vital Signs are Vital in Identifying High-Risk Postoperative Patients

Eric Bhaiamia, DO;1;2;3 Urmila Ravichandran, MS;1; Elias Baied, DO;1; Frances Lahman, DO;1; Huma Saeed, MD;1; Katherine Kaplan, DO;1; Ronak Parikh, DO;2; Jennifer Paruch, MD;1; Rema Padman, PhD;1; Jennifer Grant, MD;3; Nirav Shah, MD, MPH

1NorthShore University HealthSystem, Chicago, IL; 2University of Chicago Medicine, Chicago, IL; 3Carnegie Mellon University, Pittsburgh, PA

Background

• Changes in vital signs are frequently the first sign to point to pathology in the postoperative setting
• Physiologic perturbation in the postoperative setting is common given the iatrogenic trauma of surgery
• Postoperative fever, tachycardia and tachypnea are common findings that may not reflect underlying pathologic conditions
• There is no prediction model that evaluates risk of postoperative complication in real time
• Group Based Trajectory Modeling is an unsupervised modeling technique that identifies unique clusters of an event with similar trajectories
• This technique may assist with predicting postoperative complications

Methods

• Study design and population: Retrospective study of patients ≥ 10 years undergoing pancreatectomy at NorthShore University Health System from 01/2015-02/2018
• Data collection: Data from index hospitalization and within 30 post-op days collected via National Surgical Quality Improvement Program (NSQIP) definitions. Chart abstraction conducted by RN quality team
• Temperature, heart rate, systolic blood pressures and pain scores (vital signs) extracted from the Electronic Data Warehouse
• Group-Based Trajectory Modeling (GBTM): A technique used to identify distinct clusters of trajectories of patients in the postoperative setting was used to group patients into low and high trajectories for the 4 vital signs of interest.
• Stata used for development of GBTM
• Statistical analysis: χ² or Fisher’s Exact test (baseline categorical).

Results

• In total, 195 patients underwent pancreatectomy
• The NSQIP complications rate (total) was 35.4%
• Patients clustered into two distinct pools for temperature, heart rate, blood pressure and pain score (see Figure 1a-d)
• All four of these vital signs were able to stratify infectious and inflammatory complications between low and high risk groups (Table 1)
• Only systolic blood pressure was significant in stratifying readmission risk, and heart rate for stratifying sepsis risk

Discussion

• Certain vital signs may be better predictors for specific inflammatory and infectious complications
• Interestingly, out of the 4 traditional SIRS criteria, heart rate is the only vital sign that significantly stratified patients at risk of sepsis
• Only systolic blood pressure was significant in stratifying readmission risk and interestingly, the higher the blood pressure the more likely a patient was to be readmitted
• Pain score trend was able to risk stratify complications, an infrequent covariate
• More work is required to understand if different covariates within trajectory analysis can be combined to further enhance risk stratification for any and specific postoperative complications

Conclusion

Trends of vital signs may be important predictors of complications. More work is required to understand if different covariates within trajectory analysis can be combined to further enhance risk stratification for any and specific postoperative complications.

Table 1: Complication rates by trajectory analysis; significant at p<0.05 and at p<0.10

<table>
<thead>
<tr>
<th>Trajectories</th>
<th>Temperature Trajectory</th>
<th>Heart Rate Trajectory</th>
<th>Systolic Blood Pressure Trajectory</th>
<th>Pain Score Trajectory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>115 (60.65%)</td>
<td>109 (57.67%)</td>
<td>87 (46.03%)</td>
<td>115 (60.65%)</td>
</tr>
<tr>
<td>High</td>
<td>74 (39.15%)</td>
<td>80 (42.33%)</td>
<td>102 (53.97%)</td>
<td>74 (39.15%)</td>
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</tbody>
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References