Development and Validation of the Integrated Positioning Index™ for Pressure Injury Prevention

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INTRODUCTION

• Patient immobility has been linked to a number of serious and costly hospital complications. One of the most common complications of immobility is hospital-acquired pressure injuries (HAPI), which affect 2.5 million patients each year and cost the U.S. healthcare system up to $11B annually.

• Pressure injuries can be prevented by ensuring that patients are repositioned with sufficient frequency and quality.

• To help address the need for improved pressure injury prevention methods, a wireless patient monitoring system was developed that continuously monitors the position, movement, and activity of hospitalized patients in order to guide repositioning efforts.

The Leaf Patient Monitoring System consists of a wearable sensor that continuously monitors patient position/movement and provides staff with notifications when patient repositioning is required to prevent pressure injuries.

METHODS

• The Leaf Patient Monitoring System detects every patient turn (including unobserved self-turns), the magnitude of each of those turns, and the amount of time between clinically significant turns (reperfusion time).

• An algorithm was developed that integrates turn frequency, turn magnitude, and reperfusion time into a single index value (the Integrated Positioning Index™) to give a simplified assessment of a patient’s position distribution history.

• The Integrated Positioning Index (IPI) ranges from 0-100, with higher numbers reflecting a higher level of in-bed mobility/movement.

• The IPI metric was clinically validated by correlating Leaf sensor data and clinical outcome data from 4 acute care hospitals.

• In ~15% of patients monitored for this study, the Leaf sensor was used to collect IPI data but was not used to guide clinical care.

RESULTS

• 4,029 patients were monitored for 351,987 hours

• The Integrated Positioning Index (IPI) was correlated to the incidence of pressure injuries

  • Higher IPI = Decreased Pressure Injury Incidence

  • The average IPI was 34 points higher in patients having their care coordinated by Leaf.

  • In patients with an IPI < 85, HAPI rates were 5x higher


Integrated Positioning Index vs. Incidence of Pressure Injuries

Integrated Positioning Index (IPI) as a Clinical Metric

<table>
<thead>
<tr>
<th>IPI</th>
<th>Status</th>
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<tbody>
<tr>
<td>&gt;90</td>
<td>Normal</td>
</tr>
<tr>
<td>80-90</td>
<td>Borderline</td>
</tr>
<tr>
<td>&lt;80</td>
<td>Below normal range</td>
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The Integrated Positioning Index (IPI) is a patient positioning index which uses information from a patient wearable sensor to provide a single value that describes a patient’s positioning status. The IPI incorporates three patient parameters (turn frequency, turn magnitude, and reperfusion time) into a single value that ranges from 0-100.

CONCLUSION

• The Integrated Positioning Index (IPI) correlates to pressure injury rates.

• IPI provides a comprehensive assessment of the quality of a pressure injury prevention program.

• The IPI is significantly higher in patients who are having their care coordinated by Leaf.

• The IPI metric can be used as a tool to help guide clinical care, identify high-risk patients, and mitigate the risk of pressure injuries.

Components of the Integrated Positioning Index (IPI)

<table>
<thead>
<tr>
<th>Turn Frequency</th>
<th>Ensure that turns are provided as often as necessary, but not more often than necessary</th>
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<tbody>
<tr>
<td>Turn Angle</td>
<td>Ensure that turns are of sufficient magnitude in order to provide adequate pressure offloading</td>
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<tr>
<td>Reperfusion Time</td>
<td>Ensure that pressure-affected tissues are given enough time for reperfusion between turns</td>
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REFERENCES


