# Web-based Vital Signs Monitoring and Early Warning/Detection System for Hospitalised Older Adult Patients

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## 1 Wireless Medical Devices

1. **Set-top-box:** Receives and transmits over a secure internet connection.
2. **Bluetooth BP monitor:** Measures BP and pulse rate.
3. **Bluetooth Pulse Oximeter:** Nonin’s Onyx II records SpO2 and HR.
4. **Wireless Blood glucose meter:** Accu-Chek Compact plus records glucose level.
5. **Ear temperature:** Omron’s instant ear temperature measurement device.
6. **Wireless Body temperature:** G-plus for continues temperature measurement.
7. **Wireless infrared Spirometer:** nSpire’s Piko-6 measures forced expiratory volume.
8. **Accelerometer/Magnetometer:** Gulf Coasts Data Concept’s X8M-3mini.

## 2 Proposed System Highlights

- **Wireless Vital Signs Data Collection**
  Collects data using latest, wireless, off-the-shelf medical devices.
- **Connecting Patients and Clinicians**
  Provides a user friendly software application, which can be installed on any PC or laptop with audio and video links, for connecting with medical professionals.
- **Access to Medical Record**
  Incorporates current data with electronic medical records.
- **Portability and Compatibility**
  The diagnostic module reads data file, converts to a readable format for batch processing.
- **Early Warning/alert Classifier**
  Interprets and classifies data in association with a diagnosis concept such as: ‘Hypertension’ and ‘Hypotension’.

## 3 Vital Signs & Relationship

<table>
<thead>
<tr>
<th>Physical Signs/Parameters</th>
<th>Heart Rate</th>
<th>Blood Pressure</th>
<th>Pulse Rate</th>
<th>Oxygen Saturation</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bradycardia</td>
<td>L</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>H</td>
<td>N/A</td>
<td>N/A</td>
<td>N or L</td>
<td>N/A</td>
</tr>
<tr>
<td>Hypotension</td>
<td>N/A</td>
<td>L</td>
<td>L or N</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Hypertension</td>
<td>N/A</td>
<td>H</td>
<td>Usually N</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Hypoxaemia</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Often L</td>
<td>N/A</td>
</tr>
<tr>
<td>Fever</td>
<td>H or N</td>
<td>N/A</td>
<td>N or L</td>
<td>N/A</td>
<td>H</td>
</tr>
<tr>
<td>Hypothermia</td>
<td>L</td>
<td>N or L</td>
<td>L</td>
<td>N/A</td>
<td>L</td>
</tr>
</tbody>
</table>

**Normal Range**

- 60-90 bpm
- 100-140/60-80 mm/Hg
- 60-100 bpm
- 94%-99%
- 36.5-37.5 °C

## 4 Conclusion

- The results show high acceptance of the proposed solution among the users.
- The system was validated with different set of collected data from 20 hospitalised older adults.
- Achieved an accuracy of 95.83%, sensitivity of 100%, specificity of 93.15%, and predictability of 90.38% in compare with a clinician assessment for tachycardia, hypertension, hypotension, hypoxemia and hypothermia.