Hand-held Device to Decrease Hospital Acquired Pressure Injuries: From Theory to Practice

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504 beds
2 site community hospital
130,606 ER visits

<table>
<thead>
<tr>
<th>Department</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical</td>
<td>133</td>
</tr>
<tr>
<td>Complex continuing care</td>
<td>74</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>46</td>
</tr>
<tr>
<td>Cardiac</td>
<td>28</td>
</tr>
<tr>
<td>Critical care</td>
<td>22</td>
</tr>
<tr>
<td>Surgery</td>
<td>62</td>
</tr>
<tr>
<td>Women's health</td>
<td>48</td>
</tr>
<tr>
<td>Children's health</td>
<td>35</td>
</tr>
<tr>
<td>Mental health</td>
<td>56</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>504</strong></td>
</tr>
</tbody>
</table>
Organisational interventions

1. Provider-orientated (e.g. changes to professional roles, multidisciplinary teams, integration of services, and inter-professional communication)

2. Patient-orientated (e.g. changes with regards to patient involvement in healthcare governance and mechanisms by which patient feedback is integrated into care delivery)

3. Structural (e.g. changes in organisational structure, facilities, resources, records, ownership, or nature of services)

4. Regulatory (e.g. changes to healthcare delivery or costs by legislation or regulation).

Key Strategies

- Investment of the Save Our Skin (SOS) Team
- Enterostomal Wound Specialist Nurse (ET nurse)
- Hospital wide investment of new beds and surfaces & Specialty Mattresses
- Roll out of the use of the Braden Assessment Scale
- Roll out of the BWAT wound assessment documentation
- Addition of pressure ulcers (nursing sensitive adverse events-NSAE) on quality improvement plan and corporate score card
- In-house comprehensive data collection
- Online learning modules
- Meditech enhancements for pressure ulcer
- Introduction of turning clocks
- Introduction of heel boots
Other Initiatives

- **Ongoing education** for all staff
- Pillow Task/working Group
- Focus on Heel protector boot education
- Algorithms for bed surface, PIP dressings and devices
- SOS intranet site
- Electronic documentation and eWard board
- Patient Rounds on Wheel – NP ET invited-teaching moments
- Standardizing supplies/locations/ordering
- Working on prevention/strategies care plan for patients/families in conjunction with the patient/family handbook.
The overall RVHS incidence rate is trending downwards.
Subepidermal moisture (SEM) and bioimpedance: a literature review of a novel method for early detection of pressure-induced tissue damage (pressure ulcers)

International Wound Journal
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3-10 days prior
What is Sub-Epidermal Moisture?

- Sub-epidermal moisture (SEM) is a biophysical marker associated with localised oedema in the inflammatory phase.
- Surface electrical capacitance of the skin is determined by the impedance of the skin to electrical forces, and thus can reflect oedema and fluid content of the epidermal and sub-epidermal tissues.
- SEM is related to skin and tissue fluid, and this can be measured through the use of surface electrical capacitance.

BATES-JENSEN et al., 2009. Moore et al., 2016.
## Comparison of Risk Assessment Tools

<table>
<thead>
<tr>
<th>Assessment Tool</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Odds Ratio</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Braden Scale</td>
<td>57.1%</td>
<td>67.5%</td>
<td>4.08</td>
<td>2.56 – 6.48</td>
</tr>
<tr>
<td>Norton Scale</td>
<td>46.8%</td>
<td>61.8%</td>
<td>2.16</td>
<td>1.03 – 4.54</td>
</tr>
<tr>
<td>Waterlow Scale</td>
<td>75.8%</td>
<td>27.4%</td>
<td>2.05</td>
<td>1.11 – 3.76</td>
</tr>
<tr>
<td>Clinical Judgment</td>
<td>50.6%</td>
<td>60.1%</td>
<td>1.69</td>
<td>0.76 – 3.75</td>
</tr>
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</table>

There are significant challenges with current detection modalities.
The scanner uses bioimpedance technology to assess changes in SEM.

EARLY PREVENTION

Early detection of tissue damage to enable intervention and reversal of damage.

MONITORING

Real-time tissue health status to monitor patients throughout care.

Wound definition using SEM Scanner at the sacrum.

Wound definition using SEM Scanner at the heel.
Aim

To evaluate feasibility of hand-held skin tissue assessment device (the scanner) in preventing incidence of pressure injuries (PI) in the community hospital and to implement on selected ward

**PHASE 1**
Establishe baseline incidence using standardized protocols for prevention & intervention (Hawthorne effect)

**PHASE 2**
Assess impact of SEM Scanner on incidence

**PHASE 3**
Monitor clinical implementation outcomes
Methodology Phase 1

- To control for Hawthorne effect
- All newly admitted patients on medical/stroke unit for the length of stay OR for one month
- Standard intervention protocol was implemented
- Device was used to scan.
Methodology Phase 2

A) - First 30 patients admitted to ALC unit were scanned from admission for up to 14 days

B) - First 100 newly admitted patients to the hospital were scanned from admission day for 3 days

• Interventions were based on scanner reading and standard protocol
• Pressure ulcer development, scanner readings, standard assessment and intervention (Braden score based protocol) were recorded using data collection tool
Results

A total of 235 patients were scanned:

**Phase 1** - 89 patients scanned and 13.4% incidence was found.

**Phase 2** - 146 patients scanned and 1.3% incidence found. 

Data suggests that intervention according to the scanner reading decreased incidence 10 times (90% reduction).

<table>
<thead>
<tr>
<th>Department</th>
<th>SEM Readings</th>
<th>N of Pt</th>
<th>N of PI</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>From ER</td>
<td>Yes</td>
<td>126</td>
<td>1</td>
<td>0.8%</td>
</tr>
<tr>
<td>ALC</td>
<td>Yes</td>
<td>29</td>
<td>1</td>
<td>1.3%</td>
</tr>
<tr>
<td>From ER (RVA)</td>
<td>Yes</td>
<td>40</td>
<td>1 questionable</td>
<td>2.5%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>Yes</td>
<td>195</td>
<td>3/2</td>
<td>1.5%/1%</td>
</tr>
<tr>
<td>4MBW</td>
<td>No</td>
<td>89</td>
<td>12</td>
<td>13.4%</td>
</tr>
</tbody>
</table>

Incidence rates decreased 75-94% where the SEM Scanner was included in the risk assessment and intervention process.
Methodology Phase 3

Incorporation as standard practice by SOS team from admission to the hospital

Incorporation to standard practice of medicine/stroke unit
Introduction of SEM Scanner into Clinical Workflow

On Admission
In ER OR on the floor

During Stay
SEM Scanner Measurements at Regular Intervals per Patient Risk Level

Validation during P&I studies
Results **Phase 3**

- **Average on hospital wards**
  Consistent decrease of incidence of PI FROM 4.3% Feb 16 to 1.4% Feb 17

- **Medicine /stroke floor**
  0% incidence in first month of implementation; 11.5% and 7.6% incidence the following 2 months

When checked, scanner was in use only the first month of implementation, the following 2 months the practice of scanning was not sustained.
Key Metrics Doing Well

Pressure Ulcer Prevalence & Incidence


% of Ulcers (Prevalence) % of Ulcers (Incidence)
Conclusions

- Current practice misses opportunities for early detection and early intervention.
- When visually evident, significant tissue damage has already occurred and opportunity for prevention is already missed.
- In our pilot study the scanner has been successfully used in practice to generate real-time insight to confirm early detection of tissue damage and to target interventions, leading to lower incidence, earlier recovery and lower costs of care.
- However, implementation of the device into consistent practice should incorporate regular monitoring to ensure sustainability.
Thank you for your attention!