EVIDENCE FOR THE PREVENTION OF WOUNDS – THE SSKIN BUNDLE

Nursing & Midwifery – April 2016

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Professor, Head of the School of Nursing & Midwifery
Outline

• Pressure ulcers & Ireland
• Risk Assessment
• SSKIN
Epidemiology - Ireland


- The **mean prevalence of pressure ulcers** is 18% (Median 13%; SD 11%; Min 6%; Max 37%)
Epidemiology - Ireland

- Lowest mean prevalence, 6%, is seen in the community setting
- Highest prevalence, 37%, is in spinal cord injury services
- Prevalence in older person services, 9%
- In acute care mean prevalence, 18.9%
- No published prevalence figures from paediatrics, hospice or obstetric services are available for Ireland

Reportable Adverse Event: Stage 3 or 4 pressure ulcers acquired after admission to a health and social care facility
HSE Focus

• 20 (19%) of the 103 care management events reported relate to category 4i “a Stage 3 or Stage 4 pressure ulcer acquired after admission to a healthcare and social care residential facility”

• In 3 cases it was confirmed that a person had died
HSE – Service Plan 2016

• Provide leadership and support to enable the services develop capacity and capability to deliver on key national patient safety programmes ............... to address internationally recognised causes of harm to people (.............., pressure ulcers, ........................).

• Support the PCTs participating in the Pressure Ulcer to Zero Collaborative.

• Provide awareness training to senior public health nurses on the management and prevention of pressure ulcers within primary care.
Risk Assessment Tools

**BRADEN SCALE FOR PREDICTING PRESSURE SORE RISK**

**Name:** Edwards, Jack C  
**Room:** 108-2  
**MRN:** 1265  
**Date:** 09/05/2001

**MOISTURE:** Occasionally moist - Skin is occasionally moist, requiring an extra linen change approx. once a day.  
**FRICITON/SHEAR:** Potential problem - Moves within assist. Some sliding repositioning. C slides down in bedchair.  
**ACTIVITY:** Walks occasionally - Walks occ. during day, very short dist. w/o assist. In bed most of the time.  
**MOISTURE:** Occasional moist - Skin is occasionally moist, requiring an extra linen change approx. once a day.  
**NUTRITION:** Adequate - Eats > 1/2 meals. Eats 4 protein/day. Occ. refuses a meal, usually takes supplement.  
**SENSORY PERCEPTION:** Slightly limited - Some sensory impairment limits ability to feel pain/discomfort in 1 or 2 extremities.

<table>
<thead>
<tr>
<th>Mobility</th>
<th>Friction</th>
<th>Activity</th>
<th>Nutrition</th>
<th>Sensory</th>
<th>Moisture</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.00</td>
<td>2.00</td>
<td>3.00</td>
<td>1</td>
<td>1</td>
<td>3.00</td>
<td>13.00</td>
</tr>
</tbody>
</table>

16 or less indicates risk of pressure sore development  
15-16 = low risk  
13-14 = moderate risk  
12 or less = high risk

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**TABLE 4**  
AGREEMENT OF EXPERT NURSES ON RELEVANCE AND CLARITY OF QUESTIONS REGARDING DEVICES AND METHODS TO PREVENT PRESSURE ULCERS (PHASE TWO)

<table>
<thead>
<tr>
<th>Device</th>
<th>Relevance</th>
<th>Clarity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical devices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synthetic sheepskin or sheepskin slippers</td>
<td>43/79%</td>
<td>35/80%</td>
</tr>
<tr>
<td>Genuine sheepskin or sheepskin slippers</td>
<td>38/74%</td>
<td>32/78%</td>
</tr>
<tr>
<td>Skin foams (eg. Dacoderm® Extra Thin)</td>
<td>43/98%</td>
<td>40/87%</td>
</tr>
<tr>
<td>Positioner pillow (eg. under the calf)</td>
<td>41/88%</td>
<td>39/76%</td>
</tr>
<tr>
<td>Hydraulic hoisting</td>
<td>38/92%</td>
<td>35/97%</td>
</tr>
<tr>
<td>Transfer sheet</td>
<td>43/98%</td>
<td>39/90%</td>
</tr>
<tr>
<td>Silk sheet</td>
<td>41/88%</td>
<td>40/85%</td>
</tr>
<tr>
<td>Dow sheet as a lifting sheet</td>
<td>40/100%</td>
<td>37/90%</td>
</tr>
<tr>
<td>Transfer board</td>
<td>40/100%</td>
<td>36/88%</td>
</tr>
<tr>
<td>Beds</td>
<td>39/99%</td>
<td>37/81%</td>
</tr>
<tr>
<td>Special bed for pressure ulcers</td>
<td>39/99%</td>
<td>37/81%</td>
</tr>
</tbody>
</table>

**Technical devices**  
**Mattress**  
Air-filled                      | 40/100%   | 39/87%  |
Granule-filled                  | 35/91%    | 34/73%  |
Down-filled                     | 36/89%    | 34/62%  |
Foam gel-filled                 | 37/77%    | 35/60%  |
Water-filled                    | 36/75%    | 36/77%  |
Get-filled                      | 37/62%    | 30/80%  |
Regular hospital mattress       | 39/84%    | 38/99%  |

**Mattress pad**  
Air-filled                       | 33/88%    | 31/87%  |
Granule-filled                  | 32/91%    | 30/87%  |
Down-filled                     | 31/64%    | 28/86%  |
Foam gel-filled                 | 31/84%    | 30/87%  |
Water-filled                    | 31/74%    | 30/73%  |
Get-filled                      | 31/64%    | 31/77%  |

**Cushions**  
Air-filled                       | 35/94%    | 36/86%  |
Granule-filled                  | 32/81%    | 31/87%  |
Down-filled                     | 32/70%    | 31/87%  |
Foam gel-filled                 | 32/67%    | 30/80%  |
Water-filled                    | 33/70%    | 29/79%  |
Get-filled                      | 33/80%    | 29/79%  |

**Methods**  
Diet                             | 39/95%    | 36/78%  |
Dietary supplements              | 40/97%    | 39/87%  |
Massage                          | 38/63%    | 36/91%  |
Pain counseling                  | 42/68%    | 39/77%  |
Counseling of significant others | 41/76%    |         |

* Dacoderm, ConsaRe, a Bristol-Myers Squibb Company, Princeton, NJ
Pressure Ulcer Risk Assessment

**Two Current Problems**

1. **Failure to focus on primary cause of Pressure Ulcers**
   - The focus is here but should be higher up the pyramid.

2. **Reliance on visual skin assessment**
   - Pressure ulcers occur from inside out; damage like this cannot be detected visually until the skin is broken, when it is already too late to prevent the damage to the deeper layers.

*Hierarchy of Risk Factors, Moore et al. (2011)*

Prime cause of PU
Results

Mean Braden Scores

Results

Mean Waterlow Scores

Which Risk Factors?

Mobility and activity highest predictors of pressure ulcer development
(Beta = -.246, 95% C.I. = -.319- -.066; p=.003); (Beta = .227, 95% C.I. = .041-.246; p=.006), respectively.

Pressure & Shear

Immobility

Age, Incontinence, Malnutrition, General Health

Prime cause of pressure ulcers

Prime factor exposing individual to pressure & shear

Factors influencing tolerance of pressure & shear

Hierarchy of Risk Factors Moore et al (2011)
Below the skin surface

Visible tissue changes e.g., rubor

Epidermal tissue rupture e.g. Stage II-IV PU

Tactile tissue changes e.g., calor, tumor

Subepidermal tissue damage

Interstitial fluid accumulation

Hypoxia

Vascular permeability

Apoptosis/necrosis

Inflammatory Processes

Oxidative Stress

Toxic metabolites

Nutrient depletion

Ischemia

Lymphatic dysfunction

Reperfusion injury

Ischemia

Deformation

Mechanical loading and tissue compression
SSKIN

- Skin assessment
- Surface
- Keep moving
- Incontinence
- Nutrition

Skin Assessment
Are We Assessing Correctly?
Pressure Ulcer Development

Classification has its origins in the classification of burn injuries.
Pressure Ulcer Development

But pressure ulcers develop from the inside out
Pressure Ulcers

4 mechanisms that result in pressure ulcers

- Local ischemia
- Reperfusion injury
- Impaired interstitial fluid flow
- Sustained cell deformity

Cell Deformation

Cell deformation can be extreme; when the muscle cells are stretched around the bony tuberocities (shear strain) changes in the cell membrane and nucleus membrane occur leading to permanent destruction of the muscle cell, resulting in deep tissue injury.

Pressure Ulcer Development
Furthermore

- Reliability of pressure ulcer grading using different grading systems among nursing students, clinical, education and research staff (n=2,480)

- Overall, mean reliability across the 6 studies is $k = 0.60$

- Thus, there is only moderate agreement among this large number of participants

Skin Assessment

**Figure 1.** SEM Scanner Top View Showing Display and Action Button

**Figure 2.** The electrode on the bottom of the SEM Scanner
Relationship between Nurses’ Visual Assessment of the Skin and Sub-Epidermal Moisture Measurement

- Acute care – general; at risk adults (n=47)
- Data collected daily for 20 days
- 372 Nurses assessment of patient’s skin condition and 372 researcher led SEM measurement over the sacrum and both heels
- 62% female
- Mean Age: 74.7 years; (SD 14.2; Min 34; Max 95)
- 34% (n=16/47) developed 18 signs of early pressure ulcer damage

Results

Mean SEM Readings For the 16 patients with 18 PU

Results

• Relationship between nurses’ assessment of at risk patients’ skin and the assessment of skin using sub epidermal moisture measurement

• 47 patients, 38.3 % (n=18) male and 61.5% (n=29) female, with a median age of 74.7 years

• 34% (n=16) developed signs of early pressure ulcer damage

• The mean number of days for nurses to detect this damage was 5.0 (SD 5.15; max 11, min 3), the mean number of days that it took sub epidermal moisture measurement to detect damage was 1.1 (SD 0.75; max 2, min 1)

• Sub epidermal moisture measurement identified early damage, on average, 3.9 days earlier than nurses’ assessment

Pressure Ulcer Development
Role of Dressing for Prevention of Pressure Ulcers

Six Studies: 4% PU (19/522) experimental group vs 13% PU (65/512) control (RR 0.29, 95% CI: 0.18 to 0.47; I² =0%; \( p=0.00001 \))

Role of Topical Agents for Prevention of Pressure Ulcers

Five Studies: **18%** PU (85/461) experimental group vs **25%** PU (120/479) control (RR 0.78, 95% CI: 0.47 to 1.31; $I^2 = 72%$; $p=0.35$)

Surface
Five Studies: 8% PU (100/1240) experimental group vs 16% PU (123/776) control (RR 0.40, 95% CI: 0.21 to 0.74; I² = 77%; p=0.004)
Two Studies: 6% PU (13/221) experimental group vs 16% PU (31/188) control (RR 0.31, 95% CI: 0.17 to 0.58; I² =0%; p=0.0002)
Keep Moving
Repositioning – Summary

Seven Studies: 17% PU (235/1364) experimental group vs 30% PU (531/1760) control (OR 0.55, 95% CI: 0.43 to 0.71; I² =56%; p=0.00001)
Incontinence
## Incontinence Associated Dermatitis

<table>
<thead>
<tr>
<th>Clinical presentation</th>
<th>Severity of IAD</th>
<th>Signs**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No redness and skin intact (at risk)</td>
<td>Skin is normal as compared to rest of body (no signs of IAD)</td>
</tr>
<tr>
<td></td>
<td>Category 1 - Red* but skin intact (mild)</td>
<td>Erythema</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+/- oedema</td>
</tr>
<tr>
<td></td>
<td>Category 2 - Red* with skin breakdown (moderate-severe)</td>
<td>As above for Category 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+/- vesicles/bullae/skin erosion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+/- denudation of skin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+/- skin infection</td>
</tr>
</tbody>
</table>

* Or paler, darker, purple, dark red or yellow in patients with darker skin tones
**If the patient is not incontinent, the condition is not IAD

**Prevalence:** 5.6% - 50%; **Incidence:** 3.4%-25%

Eight Studies: 8% PU (246/2990) experimental group vs 11% PU (335/3072) control (RR 0.86, 95% CI: 0.73 to 1.00; I² =13%; p=0.05)
In the End

“Prevention avoids the labour of being sick”

Thomas Adams, 1618
Evidence for the Prevention of Wounds – The SSKin Bundle

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