The Reliability of the NDNQI® Pressure Ulcer Indicator

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Las Vegas, NV

Background

- NDNQI participating hospitals submit data on the rate and stage of hospital acquired pressure ulcer occurrence.
- Summarized reports are returned for internal review and comparison to like units and size hospitals.
- It is important that the reliability of the pressure ulcer indicator among NDNQI hospitals be established to provide the basis for quality improvement initiatives and external comparisons.
Study I

The Reliability of the NDNQI Pressure Ulcer Indicator

A Web Based Approach
Sarah Hart, RN, PhD
Sandra Bergquist, RN, PhD, CWCN
Byron Gajewski, PhD
Nancy Dunton, PhD

Purpose
• Develop and test a rater-to-standard criterion referenced web based test
• Determine the reliability of pressure ulcer identification and staging from web based photographs
• Determine how well raters differentiate between nosocomial and community acquired pressure ulcers (source)
Rater to Standard Reliability Using a Criterion-Referenced Test

- Agreement between a rater and expert panel opinion.

- Expert panel opinion based on criteria for staging established by NPUAP and AHRQ Guidelines.

The Web Based Test

- Three Parts
  - Part I - Pressure Ulcer Identification
    - 7 Pictures of ulcerous wound
    - Participant identification of wound type (pressure, venous, arterial, or diabetic ulcer)
  - Part II – Pressure Ulcer Staging
    - 17 Pictures of pressure ulcers
    - Participant classification of Stage (Stage I, II, III, IV or Unstageable)
  - Part III – Pressure Ulcer Source
    - 5 scenarios for determining community acquired vs hospital acquired pressure ulcers
The Web Based Test

• **Two versions**
  – Picture Only
  – Wound description of each pressure ulcer in Part II pictures

• Randomization of test version by hospital

• Pilot tested with 15 wound care nurses

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Example of Pressure Ulcer Picture with Wound Description

Area of tissue loss over the ischial tuberosity extends to muscle. Wound measures 5 cm in length, 4 cm in width, and is 2.5 cm deep. Visible wound base. Wound bed contains a small amount of slough. Rolled wound edge.

Identify the stage of this pressure ulcer.

1. Stage I
2. Stage II
3. Stage III
4. Stage IV
5. Unstageable

Used with permission NPUAP
### Hospital Characteristics (N = 48)

<table>
<thead>
<tr>
<th>Size (number of beds)</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;200</td>
<td>15</td>
<td>32</td>
</tr>
<tr>
<td>200-299</td>
<td>11</td>
<td>23</td>
</tr>
<tr>
<td>300-399</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>400-499</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>500+</td>
<td>10</td>
<td>21</td>
</tr>
</tbody>
</table>

**Magnet Status**
- Magnet Hospitals: 16 (33%)
- Non-Magnet Hospitals: 32 (67%)

### Participant Rater Characteristics (N=256)

<table>
<thead>
<tr>
<th>Job Title</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Practice/CNS</td>
<td>20</td>
<td>8</td>
</tr>
<tr>
<td>Nurse Manager/Educator</td>
<td>74</td>
<td>29</td>
</tr>
<tr>
<td>Wound/Skin Care Nurse</td>
<td>41</td>
<td>16</td>
</tr>
<tr>
<td>Staff Nurse</td>
<td>120</td>
<td>47</td>
</tr>
</tbody>
</table>

**Certification**
- Certified in wound/continence/ostomy: 44 (17%)
- Not certified in wound/continence/ostomy: 212 (83%)
## Reliability of Pressure Ulcer Identification and Source

<table>
<thead>
<tr>
<th>Source</th>
<th>Kappa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Ulcer Identification</td>
<td></td>
</tr>
<tr>
<td>Certified Nurses</td>
<td>0.92</td>
</tr>
<tr>
<td>Not Certified Nurses</td>
<td>0.82</td>
</tr>
<tr>
<td>Pressure Ulcer Source</td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>0.80</td>
</tr>
</tbody>
</table>

## Reliability of Pressure Ulcer Staging

![Graph showing Kappa values for different categories](image)

- Overall: 0.66
- Wound Description: 0.72
- Certification: 0.66
- Photograph Only: 0.56
- Certified: 0.64
- Non-Certified: 0.54

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Reliability of Pressure Ulcer Staging

Kappa

Test with Wound Description

Certified Nurse  0.83
Non-Certified Nurse  0.71

Interclass Correlation Coefficient

- Identification  - 0.19
- PU Staging  - 0.09
- PU Source  - 0.16 to 0.21

Translation: Variation in kappa values within hospitals not between hospitals
Conclusion

- Nurses can accurately differentiate pressure ulcers from other ulcerous wounds
- Nurses have moderate to near perfect reliability in pressure ulcer staging
  - Additional training in pressure ulcer staging for nurses not certified in wound, ostomy and continence nursing is warranted
- NDNQI data on pressure ulcers are comparably reliable across facilities

Study II

The Reliability of the NDNQI Pressure Ulcer Indicator

A Triangulation Approach

Sandra Bergquist, RN, PhD, CWCN
Nancy Dunton, PhD
Byron Gajewski, PhD
Susan Klaus, RN, PhD
Sarah Hart, RN, PhD
Purpose

• Determine the reliability of pressure ulcer staging from bedside evaluation of pressure ulcers

• Determine the reliability of pressure ulcer staging from web based photographs

• Examine the association between bedside and web-based reliability assessments

Methodology

• Convenience Sample of 31 U.S. Hospitals

• Participant Raters – The “Pressure Ulcer Team”
  – Up to 10 possible team participants
    • Team Leader – Agency Identified Skin Care Expert

  – One team per hospital
First Approach

• Bedside Evaluation of Pressure Ulcers

Bedside Evaluation of Pressure Ulcers

• Total team rounding to the bedside of hospitalized patients with pressure ulcers

• Concurrent and independent assessment of each pressure ulcer
  – Pressure Ulcer Stage
  – Pressure Ulcer Location
Bedside Evaluation of Pressure Ulcers

- Documentation to individual data collection form
  
  Unique Non-Identifiable Rater Number

<table>
<thead>
<tr>
<th>Patient #</th>
<th>Ulcer</th>
<th>Ulcer Stage</th>
<th>Ulcer Location</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Submission of data collection forms via mail or fax

Approach Two and Three

- Evaluation of Pressure Ulcers from Web Based Photographs
Evaluation of Pressure Ulcers from Web Based Photographs

- Three part web based test on pressure ulcers
  - Part I – Pressure Ulcer Identification
  - Part II – Pressure Ulcer Staging
  - Part III – Pressure Ulcer Source

- Competed after bedside evaluation of pressure ulcers

- Access to test through unique non-identifiable number

Evaluation of Pressure Ulcers from Web Based Photographs

- Two test versions
  - No wound description
  - Wound description of each pressure ulcer in Part II pictures

- Random assignment of test version to participant rater
### Participant Rater Characteristics (N=180)

<table>
<thead>
<tr>
<th>Role</th>
<th>Frequency</th>
<th>Percent</th>
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</thead>
<tbody>
<tr>
<td>Certified Wound Care Nurse</td>
<td>47</td>
<td>22.9</td>
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<tr>
<td>Staff Nurse</td>
<td>98</td>
<td>47.8</td>
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<tr>
<td>Advanced Practice Nurse</td>
<td>35</td>
<td>17.1</td>
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<tr>
<td>Nurse Management</td>
<td>12</td>
<td>5.9</td>
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<tr>
<td>Other</td>
<td>13</td>
<td>6.3</td>
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### Hospital Characteristics (N = 31)

<table>
<thead>
<tr>
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<tbody>
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<td>3</td>
<td>9.7</td>
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<tr>
<td>200-299</td>
<td>4</td>
<td>12.9</td>
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<tr>
<td>300-399</td>
<td>16</td>
<td>51.6</td>
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<tr>
<td>500+</td>
<td>8</td>
<td>25.8</td>
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<table>
<thead>
<tr>
<th>Magnet Status</th>
<th>Frequency</th>
<th>Percent</th>
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</thead>
<tbody>
<tr>
<td>Magnet Hospitals</td>
<td>11</td>
<td>35.5</td>
</tr>
<tr>
<td>Non-Magnet Hospitals</td>
<td>20</td>
<td>64.5</td>
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Pressure Ulcer Characteristics (N=591)

<table>
<thead>
<tr>
<th>Location</th>
<th>Frequency</th>
<th>Percent</th>
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</thead>
<tbody>
<tr>
<td>Pelvic Area</td>
<td>354</td>
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<tr>
<td>Heels</td>
<td>172</td>
<td>28.4</td>
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<table>
<thead>
<tr>
<th>Stage</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
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<td>Stage II</td>
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<td>Stage III</td>
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<tr>
<td>Stage IV</td>
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<tr>
<td>Unstageable</td>
<td>11</td>
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</tr>
<tr>
<td>Other</td>
<td>8</td>
<td></td>
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</tbody>
</table>

Reliability of Pressure Ulcer Staging
Bedside Evaluation

<table>
<thead>
<tr>
<th></th>
<th>Kappa Value</th>
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<tbody>
<tr>
<td>Overall</td>
<td>0.60-0.68</td>
</tr>
<tr>
<td>Teams Led by CWCNs</td>
<td>0.76</td>
</tr>
<tr>
<td>Teams Led by Non-Certified Nurses</td>
<td>0.54</td>
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</tbody>
</table>
Reliability of Pressure Ulcer Identification Web Based Testing

Kappa Value
Overall 0.84

Reliability of Pressure Ulcer Staging Web Based Testing

Kappa Value
Overall 0.70
- No Wound Description 0.58
- Wound Description 0.81
- Certified Wound Care Nurses 0.74
- Non-Certified Nurses 0.68
Conclusions

• Substantial reliability in pressure ulcer staging overall
• Near perfect reliability in pressure ulcer identification

– Translation: Provides evidence for the reliability of NDNQI® data on pressure ulcer staging and identification

Conclusions

• Certified wound care nurses and teams led by certified wound care nurses have higher reliability in pressure ulcer staging than nurses not certified in wound care

– Translation: Certified wound care nurses should lead and train teams for collecting data on pressure ulcers
Conclusions

• Kappa values on pressure ulcer staging from web based testing with and without wound descriptors bracket kappa values from bedside evaluation

  – Translation: Web based testing may be useful for estimating the reliability of pressure ulcer staging from bedside evaluation of these wounds