Repositioning as a Pressure Ulcer Prevention Strategy: A Multi-site Clinical Trial
Nancy Bergstrom, PhD, RN, FAAN, Trumble Professor of Aging Research, Associate Dean for Research (Interim)

Faculty Disclosure
Dr. Nancy Bergstrom
Dr. Bergstrom has listed no financial interest/arrangement that would be considered a conflict of interest.

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Dr. Nancy Bergstrom
Dr. Bergstrom has listed an affiliation with:
Prevention Plus, LLC, a company providing materials to educate users about the Braden Scale and to provide permission to use the tool.
However, no conflict of interest exists for this research.
Turning for Ulcer Reduction

- Nancy Bergstrom, UTH
- Susan D. Horn, ISIS, ICOR
- Mary Pat Rapp, UTH
- Anita Stern, UT, THETA
- Recognizing the 967 participants and many dedicated nurses and CNAs

Funding and Colleagues

- 4 year, multi-site, multidisciplinary
- [NIH, NINR & NIA]
- Ontario Ministry of Health
- 20 study sites in the US and 7 in Canada
- 8 Disciplines: Nursing; Medicine; Bioengineering; Physics; Health Services Research; Health Economists; Wound Care Specialists; & Health Department Regulators

Background
Background

- Turning Q 2 H is practiced widely in NH
- Net result
  - Turn 12 X a day X 365 days = 4380 times/year
  - 4380 turns X 5 minutes = 21,900 minutes or 365 hours or 15.2 days/year/resident of turning
  - Awaken residents, deprive of sleep
  - Decrease quality of life
  - Impossible standard
  - NH staff at increased risk of injury

Background

- Evidence supporting turning is old, but tradition keeps the recommendation in place
  - (Norton & Exton Smith, 1960s) 2-3 hr turning
  - (Kosiak, 1962) pressure/length of exposure
- Newer technology opens the door for consideration of different turning schedules

Current practice

Bates-Jensen asked
- What are nursing homes doing to prevent pressure ulcers?
  - In 16 nursing homes and 329 residents, no one was being turned every two hours
  - Turning was measured by observing AND activity monitors
  - Nurses aides DOCUMENTED every two hours turning

TURN

TURN

TURN
Previous studies

Defloor asked

- What happens when we turn participants every 2 or 3 hours on a standard mattress or every 4 or 6 hours on a visco-elastic mattress?
  - Participants [N = 66] who slept on visco-elastic mattresses and were turned every 4 hours had the fewest pressure ulcers.
  - Participants at any level of risk

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Previous studies

Vanderwee asked

- What happens if we turn participants on foam overlays 2 hours on their side and 4 hours on the back versus just turning every 4 hours?
  - Sixteen NF, 235 participants
  - It made no difference!
Purpose of TURN Study

- To determine the efficacy of three repositioning schedules (2-, 3-, or 4-hour) for PrU prevention among NH residents cared for on high density foam mattresses

Methods

- Study design
  - Randomized, controlled trial
  - Stratification by risk
  - Random allocation in blocks
  - Allocated to 2-, 3-, or 4-hour turning
  - Repositioned while in bed
  - Ongoing treatment fidelity and safety
  - Outcome PrU at coccyx/sacrum, trochanter and heels
  - Outcome assessed by nurse blinded to allocation group

- Methods
  - Ongoing treatment fidelity and safety
  - Outcome PrU at coccyx/sacrum, trochanter and heels
  - Outcome assessed by nurse blinded to allocation group
Study design

- Stratified by risk
  - High risk (Braden scale scores 10-12)
  - Moderate risk (Braden scale scores 13-14)
- Random allocation (blocks of 6; 2 for each turning schedule)
  - High risk (2-, 3-, or 4-hour turn)
  - Moderate risk (2-, 3-, or 4-hour turn)

Participant Recruitment Criteria

- Newly admitted (within 7 days), or
- Long term (> 90 days)
- Age > 65 years
- At risk for pressure ulcers
  - Moderate risk (scores 13-14)
  - High risk (scores 10-12)
  - Mobility subscale (score 1-3)
- No pressure ulcers at outset
- High density foam mattress

The intervention

- Bedside folder with dial with fixed indicator for turning frequency
- Large clock in room
- Documentation forms (24 hour) folder
- CNA told when to start protocol
- Shift handoff
- Turn on time schedule and check briefs when in bed
- Record time in chair & brief changes
Intervention

- Documentation at each episode
- Also documented dietary intake, and more
- Care according to facility interpretation of best practices and regulatory requirements

Study outcome

- Weekly and final skin assessment (masked)
- Outcome is number of participants with PrU on coccyx, sacrum, heels, trochanter
- Stage 1 present on 2 days

Setting Preparation
Setting identification

- Previous work with NNHIC or NPULS and demonstrated good practice and documentation
- QIO recommendations
- Advancing Excellence Campaign
- THETA

Setting Selection

- Use high density foam mattresses
- Willingness to provide staff time to participate
- Initial screening of at risk resident to verify number of eligible

Settings Prepared for Participation (Initial and Later)

- IRB or Federal Wide Assurance
- Protection of Human Subjects training for Recruiter and other selected staff done by project staff
- NH agreed to provide staff to fill project roles, later listed project staff by name in preparation for training
Site Orientation

- Overview
- Training for specific roles
- Mock trial (Mock participants)
- Mock data collection
- Launch study

Nursing Facility Team

- Site Coordinator
- Site Supervisor or Unit Manager
- Recruiter
- Assessor
- Charge Nurses
- Certified Nurses Aides
- Data Collector
- Faxing Coordinator

CNA Repositioning Expectations

- Turn participants on the assigned schedule
- Continue all other pressure ulcer prevention care
- Document care procedures
  - Turning
  - Skin observations
  - Continence care
  - Bathing
  - Meal intake
Patient Safety

- CNA observes skin at every turn and documents (normal, red, open, bruised)
- Nurse assessor does weekly skin assessment
- Red areas reported to nurse by CNA
- Assessed, dressed, and reported
- Adverse event reporting upon discovery
- Data and Safety Monitoring Board

CNA Shift Documentation

- Document using Supervisor Repositioning Checklist
- Coach CNA in completing the Shift Documentation
- Initiate treatment for Stage 1 or 2 pressure ulcer (Pre-approved protocol)
- Report Adverse Events to Nurse Managers and/or Supervisors and COA

Charge Nurse Expectations
Outcome Assessors

- Braden Scale
  - Trained using video, vignettes, observation
  - Prior to study to determine selection and risk
- Skin Assessment
  - Trained using video, observation, IRR
  - Prior to study to determine eligibility
- Assessment
  - Masked
  - Weekly outcome assessment throughout study
  - Quarterly IRR reliability

Assessors

- Masked to turning frequency
  - Documentation in a folder at participant’s bedside
  - No visible cues in room
  - Assessor is licensed nurse from one unit who goes to another just to assess skin, or
  - Is designated to assess skin on all residents
  - Asked monthly, “Can you guess the turning schedule of any participants?”
How will we know……..
(Treatment fidelity)

- If participants are being turned?
  - CNA documentation (on time turning, time in position)
  - Supervisor Repositioning Checklist (% agreement with CNA)

Treatment fidelity
On-Time Turning

- CNA repositioning
  - % time CNA repositioned resident on time schedule ± 30 minutes
  - Reported by am, pm, and turning schedule
  - Calculated and reported monthly with goal of 80% on time turning
  - Sent bar graphs to share with staff for staff feedback and training

Treatment fidelity (continued)

- Supervisor/CNA Agreement
  - CNA documented position/time
  - Supervisor observed position at next 1-3 hours
  - % agreement between observations
  - Reviewed with each facility monthly
Sample Size

- Assuming a change from 4% incidence to 8% would be considered significant, a one-tailed test, and an alpha of .05, the power to detect such a difference is 0.82 for 900 participants.

Nursing Home Characteristics

- Location
  - 20 US
  - 7 rural
  - 7 suburban
  - 6 urban
  - 7 Greater Toronto area
- Profit status
  - Profit = 16
  - Not for profit = 11
- Size (62 to 556 licensed beds; 5 <100 beds)

CMS Ratings of US Nursing Homes

<table>
<thead>
<tr>
<th>Overall Rating Stars</th>
<th>US Nursing Homes (No,%)</th>
<th>TURN US Homes (No,%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2362 (15%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>2</td>
<td>3132 (20%)</td>
<td>4 (0%)</td>
</tr>
<tr>
<td>3</td>
<td>3201 (20%)</td>
<td>9 (4%)</td>
</tr>
<tr>
<td>4</td>
<td>4174 (27%)</td>
<td>5 (25%)</td>
</tr>
<tr>
<td>5</td>
<td>2663 (17%)</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>Sum of 2 to 3</td>
<td>8715 (58%)</td>
<td>13 (65%)</td>
</tr>
<tr>
<td>Sum of 4 to 5</td>
<td>6837 (44%)</td>
<td>7 (35%)</td>
</tr>
</tbody>
</table>
Results

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>All (N=942)</th>
<th>Moderate Risk (N=617)</th>
<th>High Risk (N=325)</th>
<th>P = (t-test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>85 (7.7)</td>
<td>85 (7.7)</td>
<td>85 (7.7)</td>
<td>0.36</td>
</tr>
<tr>
<td>Braden</td>
<td>12.8 (1.1)</td>
<td>13.6 (0.5)</td>
<td>11.4 (0.7)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Canada vs US</td>
<td>505 (53.6)</td>
<td>336 (54.4)</td>
<td>169 (52.0)</td>
<td>0.49</td>
</tr>
<tr>
<td></td>
<td>437 (46.4)</td>
<td>281 (45.5)</td>
<td>156 (48.0)</td>
<td></td>
</tr>
</tbody>
</table>
### Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>All (N=942)</th>
<th>Mod Risk (N=617)</th>
<th>High Risk (N=325)</th>
<th>P = (Chi-square test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female # (%)</td>
<td>731 (77.6)</td>
<td>464 (75.2)</td>
<td>267 (82.2)</td>
<td>0.017 Fisher’s exact</td>
</tr>
<tr>
<td>Race # (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>758 (80.5)</td>
<td>506 (82.0)</td>
<td>252 (77.5)</td>
<td>0.056</td>
</tr>
<tr>
<td>Black</td>
<td>55 (  5.8)</td>
<td>37 (  6.0)</td>
<td>18 (  5.5)</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>101 (10.7)</td>
<td>59 (  9.8)</td>
<td>42 (12.8)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>22 (  2.3)</td>
<td>14 (  2.3)</td>
<td>8 (  2.5)</td>
<td></td>
</tr>
</tbody>
</table>

### Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>All (N=942)</th>
<th>Mod Risk (N=617)</th>
<th>High Risk (N=325)</th>
<th>P = (Fisher’s exact test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis # (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dementia</td>
<td>672 (73.5)</td>
<td>421 (69.0)</td>
<td>251 (79.2)</td>
<td>0.001</td>
</tr>
<tr>
<td>Cerebro</td>
<td>341 (36.8)</td>
<td>216 (35.4)</td>
<td>125 (39.4)</td>
<td>0.211</td>
</tr>
<tr>
<td>Diabetes</td>
<td>252 (27.2)</td>
<td>173 (28.4)</td>
<td>79 (24.0)</td>
<td>0.277</td>
</tr>
<tr>
<td>Cardio</td>
<td>713 (76.9)</td>
<td>491 (80.5)</td>
<td>222 (70.0)</td>
<td>0.001</td>
</tr>
<tr>
<td>Musculo</td>
<td>506 (54.6)</td>
<td>333 (54.8)</td>
<td>173 (54.0)</td>
<td>0.999</td>
</tr>
<tr>
<td>Thyroid</td>
<td>167 (18.0)</td>
<td>111 (18.2)</td>
<td>56 (17.7)</td>
<td>0.838</td>
</tr>
<tr>
<td>Nutrition</td>
<td>18 (  1.9)</td>
<td>5 (  0.82)</td>
<td>13 (  4.1)</td>
<td>0.003</td>
</tr>
<tr>
<td>LOS Group # (%)</td>
<td></td>
<td></td>
<td></td>
<td>0.231</td>
</tr>
<tr>
<td>Long</td>
<td>814 (86.4)</td>
<td>527 (85.4)</td>
<td>287 (88.3)</td>
<td></td>
</tr>
<tr>
<td>Short</td>
<td>128 (13.6)</td>
<td>90 (14.6)</td>
<td>38 (11.7)</td>
<td></td>
</tr>
</tbody>
</table>

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## Incidence of PrU by Risk and Turning Group

<table>
<thead>
<tr>
<th>Group</th>
<th>Ulcers/Group % Ulcers</th>
<th>Ulcers 2-hour % Ulcers</th>
<th>Ulcers 3-hour % Ulcers</th>
<th>Ulcers 4-hour % Ulcers</th>
<th>(p&lt;) Wilcoxin-ordered categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>All subjects</td>
<td>19/942 (2.02%)</td>
<td>8/321 (2.49)</td>
<td>2/326 (0.61)</td>
<td>9/395 (3.05%)</td>
<td>0.68</td>
</tr>
<tr>
<td>Moderate Risk</td>
<td>13/817 (2.05%)</td>
<td>6/210 (2.86%)</td>
<td>0/209 (0%)</td>
<td>7/199 (3.54%)</td>
<td>0.68</td>
</tr>
<tr>
<td>High Risk</td>
<td>6/325 (1.81%)</td>
<td>2/111 (1.80%)</td>
<td>2/117 (1.71%)</td>
<td>2/97 (2.06%)</td>
<td>0.90</td>
</tr>
<tr>
<td>Moderate vs. High</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.79</td>
</tr>
</tbody>
</table>

## Discussion

### Differences in at risk participants

- Participants at moderate and high risk studied since both may require repositioning, but interval may be different
- Participants at two Braden Scale risk levels are different in important ways previously associated with risk
- High risk are older, lower BMI, ate less, more brief changes, more females
**Regarding nursing homes**

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**Comparison with relevant studies**

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**Evidence for Turning**

<table>
<thead>
<tr>
<th>Study</th>
<th>Braden Scale Score</th>
<th>Support Surface</th>
<th>2-hour</th>
<th>3-hour</th>
<th>4-hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defloor et al. 2005</td>
<td>Mean: 13.0 (2.2)</td>
<td>Visco-elastic mattress</td>
<td>0/207 (0.00%)</td>
<td>2/117 (1.75%)</td>
<td>0/184 (0.00%)</td>
</tr>
</tbody>
</table>

**TURN Study**

<table>
<thead>
<tr>
<th>Braden Risk</th>
<th>Support Surface</th>
<th>Moderate: 6/210 (2.86%)</th>
<th>High: 2/111 (1.83%)</th>
<th>2/164 (1.22%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate: 7/100 (3.50%)</td>
<td>High: 2/97 (2.06%)</td>
<td>Moderate: 7/100 (3.50%)</td>
<td>High: 2/97 (2.06%)</td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

In this population of NH residents at moderate and high risk for pressure ulcers and cared for on high density foam mattresses there was no difference in pressure ulcer outcome when participants were turned at 2-, 3-, or 4-hour intervals when accompanied by ongoing observations.

Future studies

This study may serve as the foundation for translational studies since
- Instruments were developed and tested in nursing homes with nursing home staff
- Training manuals and utilization of training content was developed and used effectively in clinical settings
- Protocols for facility and subject recruitment are developed
### Implementation should be done cautiously...

1. Using high density foam mattress
2. Resident in NH only at moderate or high risk for PrUs (Braden risk scores 10 – 14)
3. Using best evidence based care: (chair cushions, nutrition, vigilant incontinent care)
4. Using documentation to prompt and verify care (PU prevention checklist)
5. Monitor outcomes