

# Pressure ulcer risk assessment: risk factors and risk screening in older persons - a pilot study

Aglécia M. V. Budri<sup>1,2</sup>, Zena Moore<sup>1</sup>, Declan Patton<sup>1</sup>, Tom O'Connor<sup>1</sup>

<sup>1</sup> School of Nursing & Midwifery, RCSI, Dublin, Ireland; <sup>2</sup> Science Without Borders Programme, Brazil

## BACKGROUND

Using novel movement sensor technology, in addition to subepidermal moisture (SEM) measurement\*, the present study aims to determine the contribution of mobility, activity, nutritional status and incontinence on the development of PUs and to identify how these risk factors are actually related to the pathology underlying the development of PUs.

## RESEARCH QUESTION

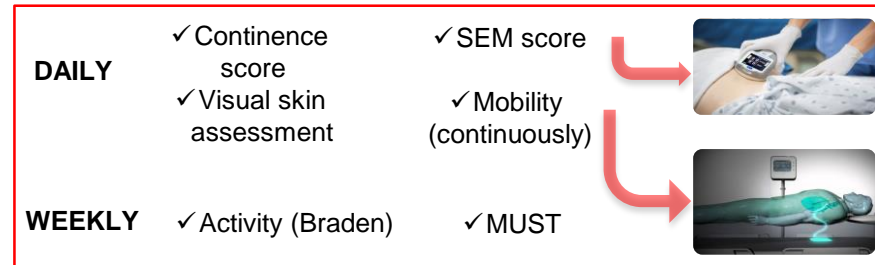
What is the relationship between mobility, incontinence and malnutrition and PU development?

## DATA ANALYSIS

The purpose of the pilot study was to assess the feasibility of the study protocol for the main study. Therefore, data analysis involved descriptive statistics to describe the population being studied.

## METHODS

- A quantitative, prospective, non-experimental study among the elderly population cared for in a long stay setting;
- Following ethical approval and consent, 48 patients were recruited;
- Weekly MUST and Braden scores;
- Daily continence observation, visual skin assessment (VSA) and SEM score;
- Patient movement in the bed recorded using a movement sensor, placed under the patients' mattress;
- Participants were followed up for 20 days or until a pressure ulcer developed.



\* Using the SEM Scanner manufactured by Bruin Biometrics, LLC.

# Pressure ulcer risk assessment: risk factors and risk screening in older persons - a validation study

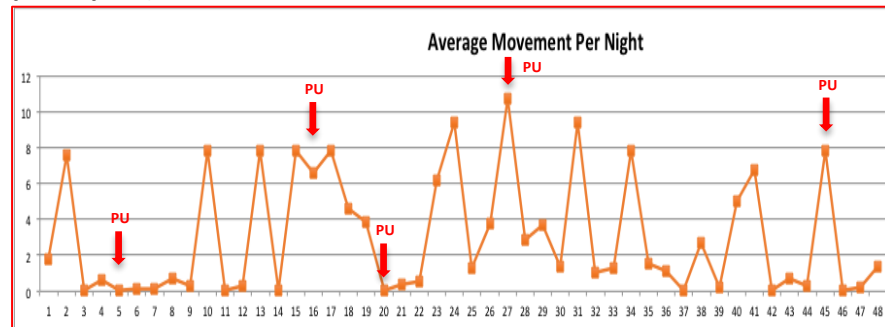
Aglécia M. V. Budri<sup>1,2</sup>, Zena Moore<sup>1</sup>, Declan Patton<sup>1</sup>, Tom O'Connor<sup>1</sup>

<sup>1</sup> School of Nursing & Midwifery, RCSI, Dublin, Ireland; <sup>2</sup> Science Without Borders Programme, Brazil

## RESULTS

- 77.1% (N=37) females;
- Mean age 85.6 years (range 60 to 104);
- Activity: 45.8% (N=22) chairfast, 31.3% (N=15) bedfast, 18.8% (N=9) walked occasionally and 4.2% (N=2) walked frequently;
- 85.4% (N=41) incontinent, with 52.1% (N=25) of these doubly incontinent; Incontinence status did not change over 20 days;
- 89.6% (N=43) were at risk of developing PU; mean scores did not change over 20 days;
- Mean MUST score was: 1.52 (SD: 1.73; min 0, max 5); mean scores did not change over 20 days;
- Mean number of movements per hour, per night, was 182.25 (SD: 199.14, min 1.10, max 641.30).

**Graph 1. Average movement score per night for each participant during the pilot study (number of movements per minute X each participant)**





# Pressure ulcer risk assessment: risk factors and risk screening in older persons - a validation study

Aglécia M. V. Budri<sup>1,2</sup>, Zena Moore<sup>1</sup>, Declan Patton<sup>1</sup>, Tom O'Connor<sup>1</sup>

<sup>1</sup> School of Nursing & Midwifery, RCSI, Dublin, Ireland; <sup>2</sup>Science Without Borders Programme, Brazil

## RESULTS

- PU incidence on sacrum and heels: 10,4%;
- PU incidence on all sites: 14,6%;
- Grade of pressure ulcer: 100% stage 1;
- Anatomical Location of pressure ulcer
  - Sacrum: (n=3; 60%);
  - Right heel: (n=1; 20%);
  - Left heel: (n=1; 20%);
- There is no relationship between patient own movement, the Braden score and the repositioning frequency undertaken by nursing staff ( $p>0.05$ ).
- 2 PU developed in patients with low mobility, but 3 were in agitated patients;
- No association between Braden, Incontinence, MUST, Mobility and PU development  $p>0.05$ ;
- For all persons with PU, the SEM scores were above 0.5 and had been abnormal at least for 3 days;
- There is a statistically significant difference in the time to PU detection using **SEM score** rather than the visual skin assessment ( $p=0.0001$ ). **SEM** detects PU on average **7.5 days** earlier than visual skin assessment.

Table 1. Time to PU Detection (SEM vs. VSA)

Mode of Assessment	Mean (days)	St. Deviation (Days)
SEM	5.9	3.5
Visual Skin Assessment	13.4	6.4

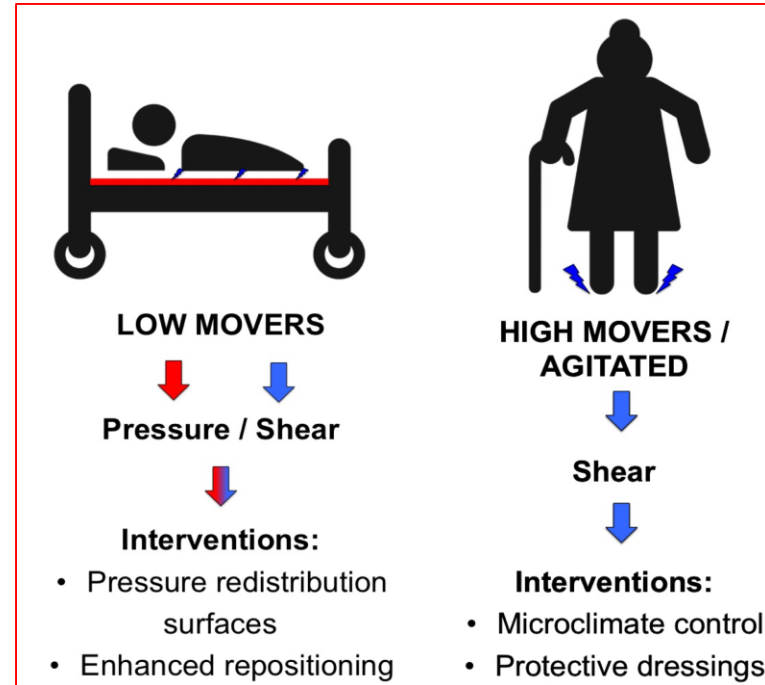
# Pressure ulcer risk assessment: risk factors and risk screening in older persons - a validation study

Aglécia M. V. Budri<sup>1,2</sup>, Zena Moore<sup>1</sup>, Declan Patton<sup>1</sup>, Tom O'Connor<sup>1</sup>

<sup>1</sup> School of Nursing & Midwifery, RCSI, Dublin, Ireland; <sup>2</sup> Science Without Borders Programme, Brazil

## DISCUSSION

- Braden score/activity, incontinence status and MUST scores remained static during the study follow up;
- SEM scores and movement readings vary reflecting changes in the patients' actual movements and responses to pressure and shear forces;
- 2 PUs developed in individuals with very little movements, 3 PUs developed in individuals with a lot of movement;
- Those with high movement, are consistently rubbing their skin off the bed, may be giving rise to the superficial PUs;
- Conversely, given the work of Oomens et al, it is likely that those with little movements are at risk of developing deeper PUs;
- Different preventative strategies may be required for these 2 cohorts of patients.





# Pressure ulcer risk assessment: risk factors and risk screening in older persons - a validation study

Aglécia M. V. Budri<sup>1,2</sup>, Zena Moore<sup>1</sup>, Declan Patton<sup>1</sup>, Tom O'Connor<sup>1</sup>

<sup>1</sup> School of Nursing & Midwifery, RCSI, Dublin, Ireland; <sup>2</sup>Science Without Borders Programme, Brazil

## CONCLUSION

- SEM Scanner detects pressure ulcers, on average **7.5 days** earlier than VSA;
- Braden scores are not changing for patients, however, movement scores and SEM scores are variable;
- This stimulates questions pertaining to the most accurate method of risk assessment.
- Because of the variability in movement, the main data analysis will focus more on mobility;
- There seems to be 2 types of movers, too high (agitated) and too low;
- These questions are being addressed in the full prospective study.

### ACKNOWLEDGEMENT

- Science without Borders Programme, CNPq, Brasilia, Brazil.
- Bruin Biometrics, LLC manufacturer of the SEM Scanner.

### REFERENCES

- Moore, Z., Patton, D., Rhodes, S. L. & O'Connor, T. Subepidermal moisture (SEM) and bioimpedance: a literature review of a novel method for early detection of pressure-induced tissue damage (pressure ulcers). *Int Wound J*, doi:10.1111/iwj.12604 (2016).
- Braden, B. & Bergstrom, N. A conceptual schema for the study of the etiology of pressure sores. *Rehabilitation Nursing* 12, 8-16 (1987).
- Stratton, R. J., Longmore, D. & Elia, M. Concurrent validity of a newly developed malnutrition universal screening tool (MUST). *Clinical Nutrition* 22, S10 (2003).
- Oomens, C. W. J., Bader, D. L., Loerakker, S. & Baaijens, F. Pressure Induced Deep Tissue Injury Explained. *Annals of Biomedical Engineering* 43, 297-305, doi:10.1007/s10439-014-1202-6 (2015)