

Developing early detection methods to assess the risk of pressure ulcers in individuals with mental illness

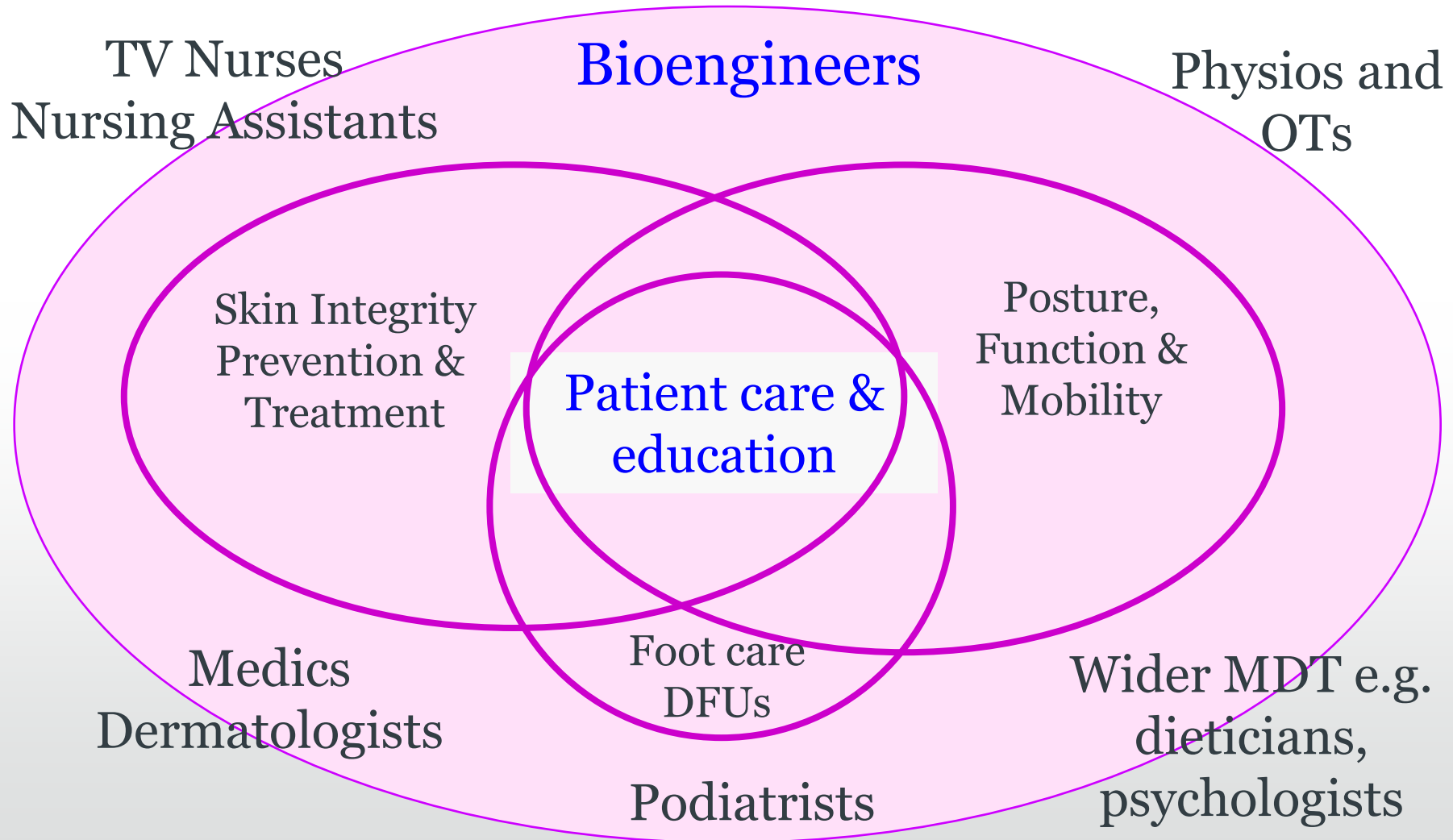
Prof Dan Bader, Dr Peter Worsley, Dr Luciana Bostan, James
Wilson and Francine Jury (Univ. of Manchester)

Faculty of Health Sciences

South Academic Block

Southampton General Hospital

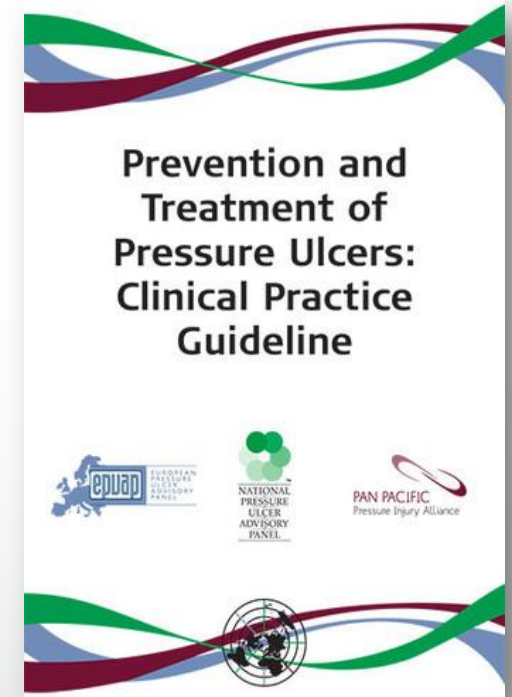
Multidisciplinary Team Approach



The clinical context

‘A pressure ulcer is localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear.’
EPUAP, NPUAP (2014)

There are many situations where vulnerable individuals are exposed to pressure/shear forces both in the acute and community clinical settings.



Pressure Ulcers

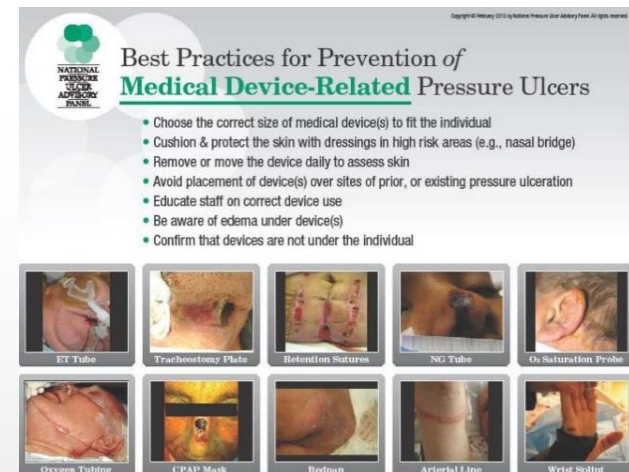


Medical Devices and Vulnerable Skin Network and Network^{Plus} (2014-19)

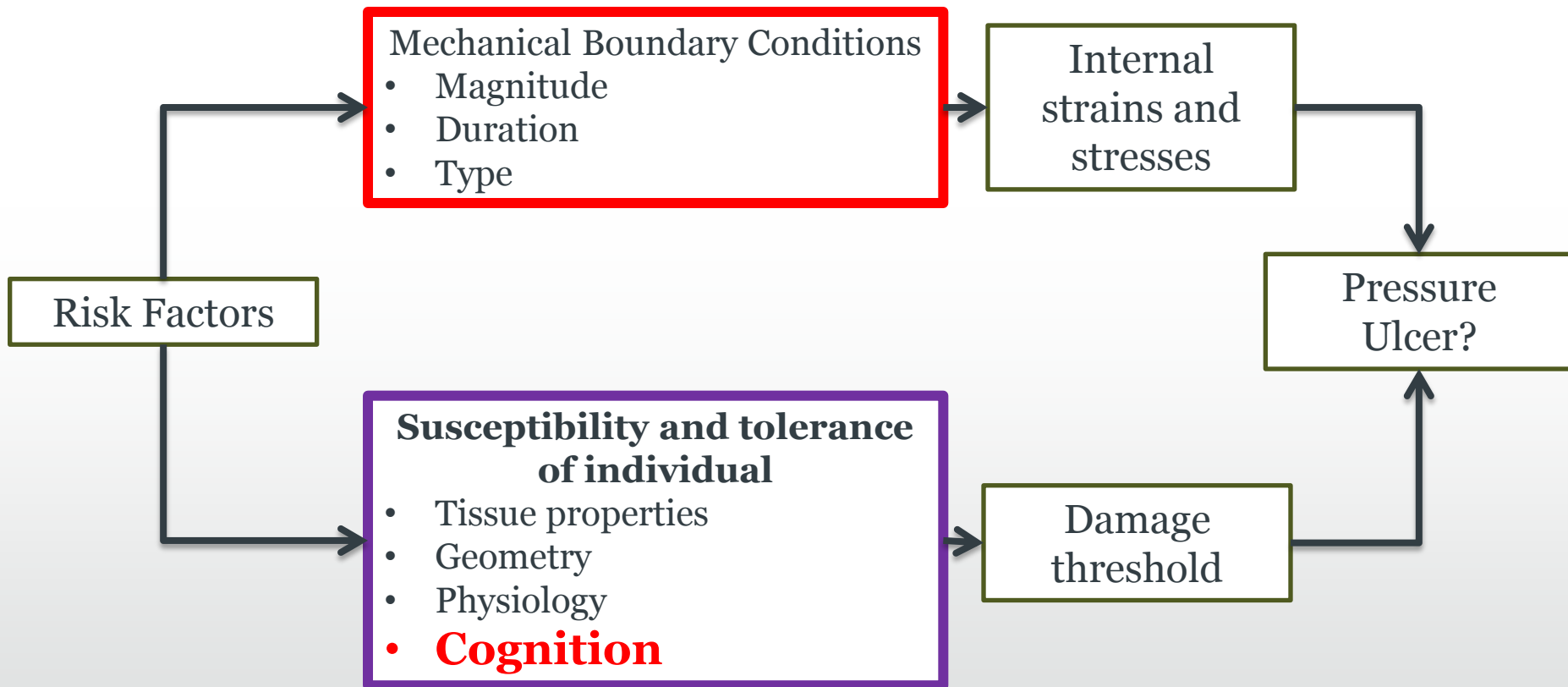
MOTIVATION - Over 33% of pressure ulcers that occur in hospitals are related to medical devices
(Black et al, 2010)

Patients with medical devices were 2.4 times more likely to develop a Pressure Ulcer

- Optimising Safety in Design (2014-2017)
- Intelligent Sensing to Promote Self-Management (2016-19)

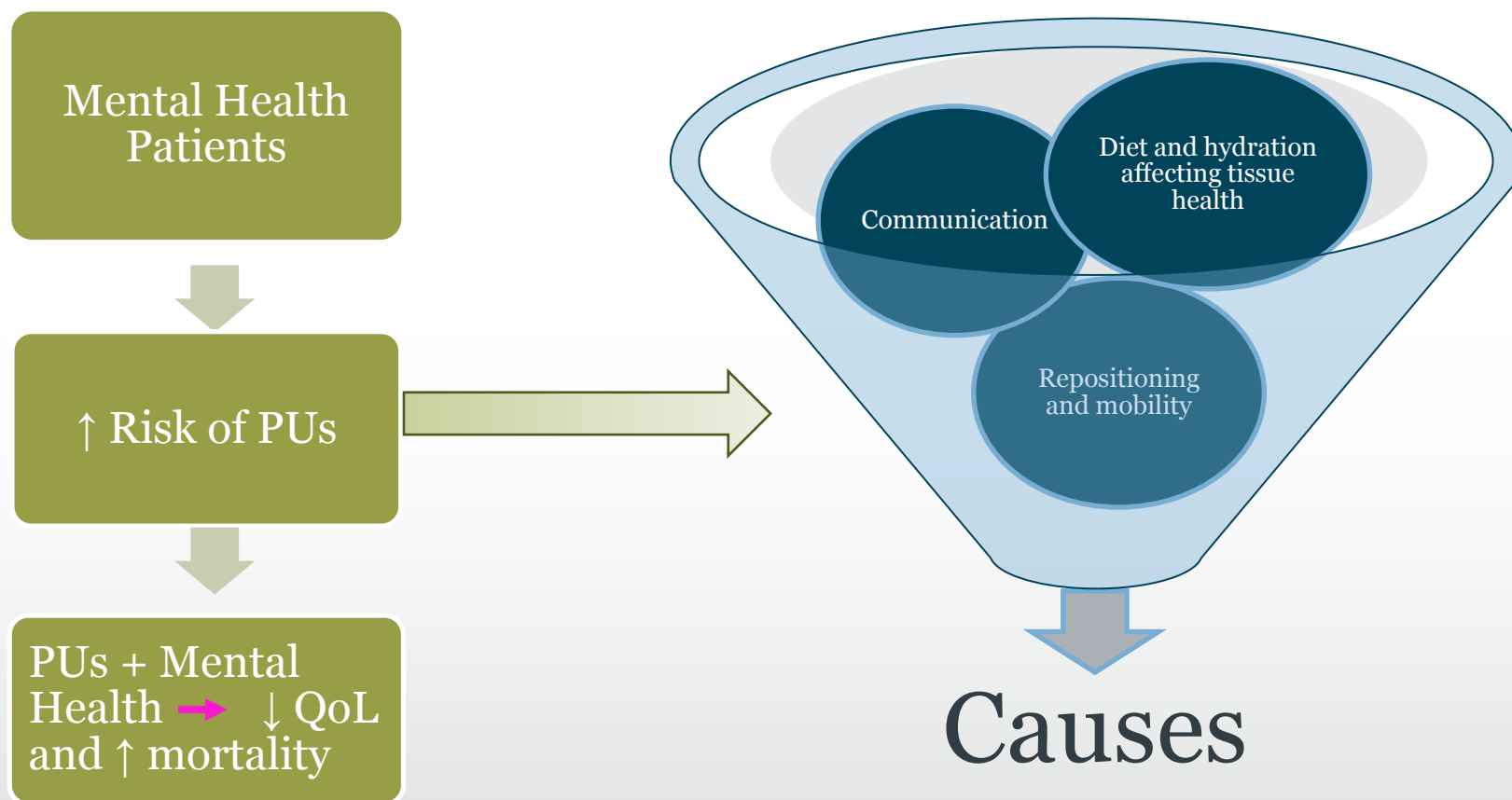


Factors that influence susceptibility for pressure ulcer development



Coleman S, Nixon J, Keen J, et al. (2014) A new pressure ulcer conceptual framework. *Journal of Advanced Nursing*. 70(10):2222-34

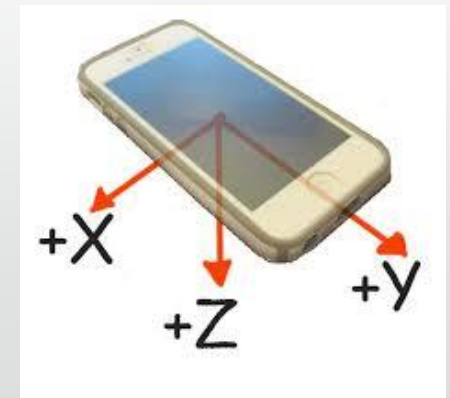
Pressure Ulcers in Vulnerable populations



Can the clinical management of vulnerable individuals with mental illness benefit from technologies which can monitor PU risk ?

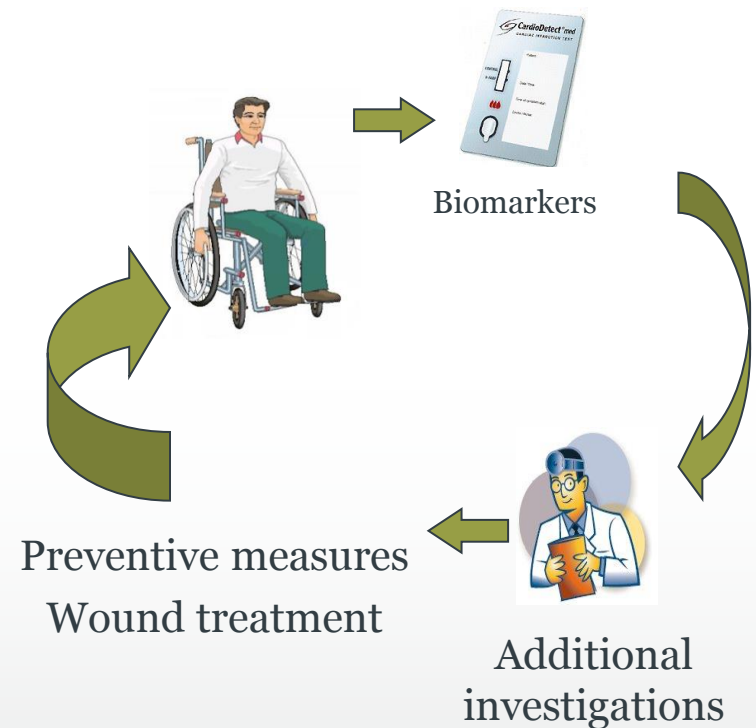
Measurement of Mobility

- Pressure mapping can be used as a surrogate for posture and movement tracking
- Measurements can also be recorded from locations on the body using accelerometers



Biomarkers

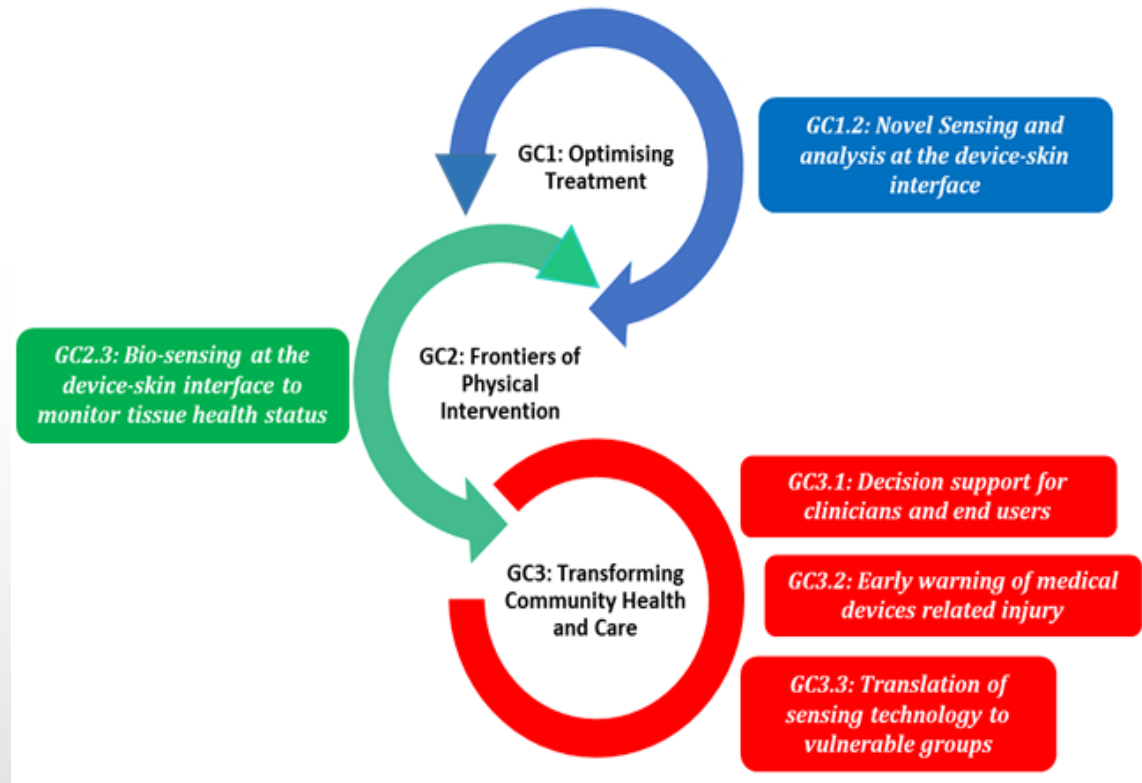
- The barrier function of skin is compromised by mechanical irritation
- This leads to an upregulation of pro-inflammatory cytokines
- Cytokines can be collected on the skin surface using Sebutape (*Perkins et al., 2001*).
- Several studies have shown prolonged pressure or pressure in combination with shear at the skin surface results in a substantive up-regulation of these cytokines (*Hemmes et al., 2016, De Wert et al., 2015, Worsley et al., 2016*)



EPSRC Grand Challenges

- Co-develop technologies with PPI
- Using technologies to predict temporal trends in behaviour and health status
- Create a minimal data set for pressure ulcer risk in vulnerable groups
- Translate the technology into meaningful applications e.g. traffic light system

- High risk
- Moderate risk
- Low Risk



Stage 1 Feasibility Study

PHASE 1



10 healthy elderly individuals



Activities

sitting in a leisure chair and
periods of ambulation.

PHASE 2



5 individuals with dementia



Activities

Before and after a focus group
(sitting for 1 hour)

Monitoring:

Accelerometers
(Axivity and Shimmer)

Sampling:

Biomarkers will be collected from
the skin surface using Sebutape

Axivity



Shimmer



Sebutape



Deliverables

- **Ethics application (months 1-4)**
- **Phase One (months 4-7)**
 - Define a protocol for sampling biomarkers from vulnerable skin sites
 - Determine the feasibility of monitoring posture and mobility with body worn sensors in healthy elderly individuals.
- **Phase Two (months 6-9)**
 - Determine the feasibility of the measurement protocol in a small cohort of individuals with dementia
- **Future Work**
 - Establish trends between activity levels and biomarker expression.
 - Early indication of pressure ulcers risk in this vulnerable population

Funding Agencies and Partners



*National Institute for
Health Research*



Engineering and Physical Sciences
Research Council



Devices for Dignity

WOUNDTEC HTC

Wound Prevention and Treatment Healthcare Technology Co-operative

MRC

Medical
Research
Council

<http://www.southampton.ac.uk/mdvsn/index.page>

Twitter @MDVSNetwork

Questions