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The future of wound measurements - 3D printing and scanning

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The future of wound measurements

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Overview

- Technologies
  - Textiles
  - Multi-disciplinary Innovation
  - 3D printing product
- Innovation – prototypes, innovation, projects/research
  - Wiggle bag
  - Paxman cooling cap
  - 21st Century Medical Bag
- TSB project (Orthox, 3T, Cardiff University)
- The challenge of measurement

Technologies

3D Printing and knitting ADA

• 10gg Shima 550i FIRST (wholegarment knitting machine)
• ZCorp 650
• ZBuilder Ultra
• Stratasys Fortus 360
• Projet 5500x – prints flexible materials

3D visualisation software

• Computed Tomography Scan (CT), Infinite focus Microscopy (IFM)
• X-Ray Florescence (XRF) – chemical composition (Calvet, Power, Ryall, Bills - 2014)

Harness to improve well-being of children with cancer

“Wigglebag”

- Ergonomically designed
- Comfort / functionality/ dignity
- Stylish
- Antibacterial

Cartilage repair

TSB project (Orthox, 3T, Cardiff University)

“Development of single protein fibre matrix composites for high performance cartilage repair devices” Silkworm silk technologies for cartilage repair

The knitted structure lays in the device to enable sutures to be anchored through the textile structure to the bone.

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Why is measurement important?

- Assessing functionality and performance
  - Wound healing
  - Integrity
  - Risk
  - Device development

- Barrier
- Contact
- Support
- Delivery

Measurement of Skin Integrity

- Contact – Pressure, area
- Condition – Texture, moisture, temperature, integrity
- Performance – Hydration, absorption, elasticity, strength
- Interaction – Pressure, shear, friction, temperature

Measurement of skin texture

- Adult female
  - Average roughness: Sr = 92um
  - Functional pore volume: Vvc = 42mL/m²
- Female child
  - Average roughness: Sr = 65um
  - Functional pore volume: Vvc = 25mL/m²

Assessing Pressure Care

- Stiletto vs Elephant
  - (80kg/2) / 0.001m² = 3,000,000 N/m²
  - (3,000kg/4) / 0.1m² = 125,000 N/m²
Challenges of measurement for Skin Integrity

- Integrity of the system
- Scale of the accuracy
- Repeatability
- Reliability
- Non-standard geometry (free form surfaces)
- Varying textures
- Hydrated surfaces
- Infection prevention
- Standardisation
- ...........etc