Innovation in compression based on interface pressure measurement

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Challenges with Compression Bandages

Consistent & accurate application
Sustained dose of pressure
Monitoring compression status
Variability in effectiveness
Application of reduced compression
Achieving application consistency

• **Shape change indicators**
  – Ovals → circles; Rectangles → squares
    • Subjective interpretation
    • No calibration for reduced compression
    • Subjective interpretation of impaired dose
  – Markings on device matched to a scale

• **Application at full stretch**
  – More consistent
  – No calibration for reduced compression
  – Subjective interpretation of impaired dose

• **Compression dose varies**
The Technical Solutions

• Monitor interface pressure
  – Pneumatic transducers
  – Electromechanical sensors
  – Printed ink
  – Piezoelectric
  – Capacitive sensors (surfaces)

• Compute from tension and radius: Laplace
• Easy to understand and use system needed
A New System: Operating Principle

- Objectively measure extension in elastic material with known properties
- Measure the radius of application
- Use algorithm based on Laplace’s Law
- Compute interface pressure
- Report to user interface
Measuring bandage tension

Operating Principle

• Measure stretch
  – Analogue: strain gauge plethysmography

• Integrated transducer technology
  – Sensor knitted into bandage structure
  – Electrical signal proportional to extension
  – Report signal to digital “brain”
Smart Bandage: Technical

- Functional demonstrator: Smartlifeinc Limited
- Elastic bandage with integrated silver sensor
- Electronic “brain”
- App on user interface; Smartphone, tablet
- User-defined parameters inputted
- Real-time display of application efficiency
- Real-time display of bandage status
Smart Bandage Prototype

Resistance

Interface pressure (Picopress)
Smart Bandage: Benefits

- Higher quality bandage application / dose
- Monitor compression during clinic visits
- Improved healing through greater accuracy of compression dose
- Adaptation for low compression dose
- Washable

- Subject to development agreement with a wound management company
Smart Bandage: Summary

• Challenges with bandages application reduce effectiveness

• Need for improved application and in-use monitoring

• Smart Bandage with integrated sensor and algorithm is in development
  – Real-time feedback on accuracy of application
  – Real-time monitoring of compression in-use
  – Facilitates application of reduced compression
  – Possibility of remote monitoring