The past, the present and the future for skin integrity

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Skin Integrity – what do we mean?

- Defined as a state in which an individual's skin is at risk of being adversely altered

- A nursing diagnosis – REALLY
Challenges

- Nursing resource
- Nursing education
- Obesity
- Aging population
- Diabetes
- Cost

![Challenges Diagram](image-url)
Population

• In mid-2014, the average age exceeded 40 for the first time

• By 2040, nearly one in seven people is projected to be aged over 75

• 2015 -2020, the general population is expected to rise 3%
  – Over 65 are expected to increase by 12% (1.1 million)
  – Over 85 by 18% (300,000)
  – The number of centenarians by 40% (7,000)
Population - 2017

United Kingdom - 2017
Population: 65,511,097

Australia - 2017
Population: 24,641,661

Inspiring tomorrow’s professionals
UK Distribution of 2.2 million wounds

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open wound</td>
<td>11%</td>
</tr>
<tr>
<td>Surgical wound</td>
<td>11%</td>
</tr>
<tr>
<td>Leg ulcer (mixed)</td>
<td>1%</td>
</tr>
<tr>
<td>Leg ulcer (venous)</td>
<td>13%</td>
</tr>
<tr>
<td>Leg ulcer (arterial)</td>
<td>1%</td>
</tr>
<tr>
<td>Leg ulcer (unspecified)</td>
<td>18%</td>
</tr>
<tr>
<td>Pressure ulcer</td>
<td>7%</td>
</tr>
<tr>
<td>Trauma</td>
<td>7%</td>
</tr>
<tr>
<td>Abscess</td>
<td>7%</td>
</tr>
<tr>
<td>Burn</td>
<td>4%</td>
</tr>
<tr>
<td>Diabetic foot ulcer</td>
<td>1%</td>
</tr>
<tr>
<td>Unspecified</td>
<td>12%</td>
</tr>
</tbody>
</table>

Guest et al., 2015
Skin Integrity
Past
Wound Irrigation
Future – Wound products?

70’s

TRADITIONAL
- Gauze
- Bandages

80’s

WOUND HEALING
- Hydrocolloids
- Hydropolymers
- Collagen Dressings
- Gels
- Saline/iodine soaked gauze

90’s

ADVANCED THERAPIES
- Antimicrobials
- Biopolymers
- Growth Factors
- NPWT
- Tissue Engineering

00’s

10’s

20’s

Increased Costs

Improved Outcomes
Future: Compression Therapies

- **70’s**
  - Traditional
    - Crepe Bandages

- **80’s**
  - Compression Bandages
    - Charing Cross
    - Ulna boot
    - Non Elastic bandages
    - Elastic Bandages
    - Multi layer systems

- **90’s**
  - Compression Systems
    - 4 layer kits
    - 2 Layer kits
    - Short stretch Bandages
    - Compression Hosier kits
    - Leg wraps

- **00’s**

- **10’s**

- **20’s**

**Future?**

**Improved Outcomes**

**Improved Patient Choice**

**University of Huddersfield**
Developing Practice

• MDT working
• Nurse led
• Evidence
• Research
• SR and MA
Advances

• Regenerative therapy -
  – mainly focuses on stem cells that have the ability to self-renew
    and differentiate into multiple cell types

• Growth therapies - promote the chemotactic recruitment
  and proliferation of cells in wound repair

• Smart dressings -
  – ability to detect and report pathogenic bacteria colonization. The
    dressings are also capable of sensing the wound infection
Education & Safe Clinical Interventions

Education is the key to safe clinical interventions

- University modules
- Degree, Masters, PhD
- Study days
- Conferences
- Societies

• Barriers:
  - Cost
  - Time away
  - Level of staff undertaking education updates
  - Reality in clinical practice
  - Safe environment
Education

- Clinicians can find it difficult to access education
- Prevents diagnosis skills developing
- Longer healing times
- Inappropriate care interventions
- Increased cost and decreased QoL
Is wound care education a priority?

- There is a gap in wound care education in US dermatology residency training. This translates to a low percentage of dermatology residents planning to care for wounds in future practice (Ruiz et al., 2015).

- Yin et al., (2014) reported that only 7 US medical schools offer formal wound healing electives.

- In Western Europe, a range of educational opportunities are available to become a wound care nurse at the postgraduate level.

- UG nurses receive between 3 – 24 hours of wound care education.

- UK wound care is becoming prominent – NHS England and NHSi initiatives.
How can we make education accessible for all?

• Can VR, AR and AI assist?

• AR differs from Virtual Reality (VR) in that the user interaction provides a more realistic environment compared to a virtual one.
Virtual Reality
Not a reality yet…

Peripheral technologies are not yet at a stage where vital treatments such as compression can be gauged in a meaningful way.

Bespoke hardware presents a potential route for development in future – however the necessary R&D is expensive.

The virtual reality hardware is still in a state of rapid change. Equipment is restricted by high price points and ongoing development.

An effective training experience requires an immersive design, this would require the work of at least one full-time 3D artist.
AUGMENTED REALITY

- We are looking at combining an AR user interface (on a device such as a mobile phone/tablet using the built-in camera) with an AI-based wound classifier.
- This provides a platform to not only diagnose a wound accurately, but to then overlay that diagnosis with effective treatment guidance.
- A developed app able to detect a wide array of wounds could be utilised not simply to address training deficiencies within the NHS, but could be most effective when applied to developing world scenarios.
ARTIFICIAL INTELLIGENCE

- Using machine learning techniques, we have already been able to demonstrate an AI’s capability in detecting ulceration on a leg.
- Further to this, we are exploring building a new AI model capable of distinguishing between different wound types.
- Initially, looking at expanding the existing AI to be able to tell the difference between venous & arterial leg ulcers as a proof of concept.
- Going beyond that, there is scope to include more wound types – the emphasis must, however, be on an accurate diagnoses.
Where is the Patient?
What patients want......

**Communication:**
Patients need to know the care they can get
Good wound care should start with the patient’s goal, not the doctors/nurses goal - Ask the patient/Involve in planning

**Quality of life:**
“I don’t like laying in bed and I want to live life fully.”
“Should we heal the wound when treatment may be worse than the wound”?  
“Will my wound heal?”
No decision about me without me

We want patients to be fully involved in their own care, making decisions in partnership with doctors and other clinical staff. For patients and service users, there should be no decision about me without me. Patients and service users should have more say and choice in decisions about their care and treatment in primary care, before diagnosis, when referred to secondary care and after a diagnosis is made. These are the types of services where we would expect you to have more choice.

To find out more go to: www.cdh.gov.uk/consultations
Future

Involving patients is becoming a reality:

- PPI forums
- No decision about me – without me
- Care closer to home
- Choosing health care providers
- Friends and family
Can we meet the challenges?
How it started

[Image of people]
• Thank You for Listening