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SIXTEENTH ANNUAL EUROPEAN PRESSURE ULCER ADVISORY PANEL MEETING

Theme:
Enthusiasm complements Experience and Evidence in Pressure Ulcer Management

Austria Center, Vienna
28th to 30th August 2013
European Pressure Ulcer Advisory Panel

Mission Statement (Founded 1997)

“The European Pressure Ulcer Advisory Panel’s objective is to provide the relief of persons suffering from, or at risk of pressure ulcers, in particular through research and education of the public”

EPUAP Scientific Committee

Trudie Young, UK
Amit Gefen, Israel
Paulo Alves, Portugal
Nils Lahmann, Germany
Marco Romanelli, Italy
Dan Bader, UK
Geert Vanwalleghem, Belgium

Executive Committee

Michael Clark, President, UK
Trudie Young, Recorder, UK
Amit Gefen, Chair Scientific Committee
Amit Gefen, Deputy Recorder, Israel
George Cherry, Vice-chair Scientific Committee
Christina Lindholm, Chair PR Membership Committee Sweden
Paulo Alves, Vice-chair PR Membership Committee Portugal
Lisette Schoonhoven, Chair Guideline Committee, Netherlands
Jan Kottnert, Joint-chair Guideline Committee, Germany
Zita Kis Dadara, Local organiser, Austria

Trusted

Dan Bader, UK
Dimitri Beeckman, Belgium
Guido Ciprandi, Italy
Eric De Laat, Netherlands
Jeanne Donnelly, UK
Lena Gunningberg, Sweden
Hide Heyman, Belgium
Nils Lahmann, Germany
Pablo Lopez, Spain
Esther Meesterebends, Netherlands
Elia Ricci, Italy
Jos Schols, Netherlands
Marco Romanelli, Italy
Geert Vanwalleghem, Belgium
Jose Verdu, Spain

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Board of Directors  Austrian Pressure Ulcer Prevention Society (APUPA)

Zita Kis Dadara, President
Mag. Dr. Alfred Steininger, Deputy President
Eva Knotek, Treasurer
Elfriede Binder, Association Secretary

EPUAP Commercial Sponsor and Exhibitors 2013

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Nutricia
Parafricta
Polymem
Smith & Nephew
Stryker
Texisense
Tomorrow-Options
Welcome to Vienna!

It is a true pleasure to welcome you to the 16th Annual European Pressure Ulcer Advisory Panel (EPUAP) meeting in Vienna - the largest city in and the capital of Austria. The theme for this meeting, “Enthusiasm Complements Experience and Evidence in Pressure Ulcers” nicely reflects the essential mixture of devotion and passion that are needed for treating difficult wounds, and the level of knowledge in basic as well as clinical sciences that is required from us, as a community, to prevent, diagnose or treat such wounds successfully.

The Scientific Committee and local organizers have worked very hard to develop a programme that brings to you the cutting-edge in developments at research laboratories and in clinics worldwide. With well-known international speakers from across Europe, the US and Canada, free papers, student papers and poster sessions, as well as several industry-supported symposia, one can in fact enter the breadth and depth of the pressure ulcer problem over the three days of the conference. We are again thankful to our industry partners for their long-time support of our conferences, and as always, you will have a chance to hear about the latest developments at their end at the exhibition and during our “meeting the industry” sessions. The outstanding collaboration with our industry partners would not have been made possible without the hard work of the EPUAP Business Office, which raised the funds through industry contacts and advertised the meeting as they have done for the last sixteen years.

Apart from the excellent scientific program, the industry exhibition and the informal discussions with colleagues, we very much hope that you will find the time to enjoy the city of Vienna. Vienna has some exceptionally unique medical as well as musical legacies. For example, it is the city where geniuses like Sigmund Freud and Alfred Adler have sowed the seeds for modern clinical psychology, psychotherapy and psychoanalysis, and Wolfgang Amadeus Mozart, Joseph Haydn, Ludwig van Beethoven, Franz Schubert and Johannes Brahms created music that will likely accompany the human kind forever. Indeed, there could be something in the city of Vienna which inspired all of this creation – and hopefully will also inspire our joint work as we gather together to celebrate our 16th EPUAP annual meeting.

The 16th EPUAP meeting is held in close collaboration with the APUPA organization in Austria. The APUPA team was considerably involved in the development of the scientific programme, and hence the inclusion of German lectures with simultaneous English translations which describe, in the spirit of the theme of this meeting, the enthusiasm in German-speaking countries and the achievements that they have made in the prevention and treatment of pressure ulcers. The EPUAP and APUPA cordially welcome you to this year’s meeting, and wish you a fruitful and enjoyable conference, and a great stay in Vienna!

With very best wishes,

Amit Gefen, PhD
President Elect, EPUAP
EPUAP

Michael Clark, PhD
President, EPUAP

Trudie Young, MSc
Chair, Scientific Committee, EPUAP

Zita Kis Dadara, MSc
Präsidentin Österreichische Gesellschaft für Dekubitusprävention, APUPA
Austrian Pressure Ulcer Prevention Association, local organiser of 16th EPUAP meeting in Vienna, was founded 2008 in Vienna as a non profit organisation, by an expert group and with interested individuals.

Member of Executive Board

President                      Deputy President               Association Secretary        Association Secretary
Zita Kis Dadara, MSc      Mag. Dr. Alfred Steininger        Eva Knotek                   Elfriede Binder

Aims

- To bring the issue of pressure ulcer prevention to the attention of the Austrian public.
- To fund and support the development of effective methods for pressure ulcer prevention
- To promote multidisciplinary collaboration
- To initiate research and the transmission of knowledge
- To unite practical experience and scientific research
- To instigate and support quality improvement programmes
- To form national and international collaborative partnerships.

Activities

- National and international networking
- Public relations
  - Event organisation and management: Round tables, congresses, further education seminars, lectures
- Professional publications

Membership

All individuals, industry, corporations and institutions who support the concept and aims of the Association are welcome members.

More detailed information at: www.apupa.at

Enjoy the 16th EPUAP meeting in the best City in the World, Vienna

(Research by Mercer Consulting 2011 and 2012)

Austrian Pressure Ulcer Prevention Association- APUPA is a registered by Budespolizeidirektion of Vienna/ Austria ZVR-Nr.158282981 Postfach18, A- 1022 Vienna
# Programme at a glance

**Enthusiasm complements Experience and Evidence in Pressure Ulcer Management**

<table>
<thead>
<tr>
<th>Time</th>
<th>Location/Activity</th>
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<tbody>
<tr>
<td>09.00-13.00</td>
<td>Registration and Poster set-up, power point presentation loading</td>
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<td>Stop pressure ulcer day organizations meeting</td>
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<td>12.00</td>
<td>Exhibition open</td>
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<tr>
<td>13.00</td>
<td>Opening address - Michael Clark – President of EPUAP, UK</td>
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<tr>
<td>13.10</td>
<td>Welcome to Vienna – Zita Kis Dadara, President of APUPA, Austria</td>
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<td>13.15</td>
<td>APUPA presentation</td>
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<td>13.40</td>
<td>Central European pressure ulcer experience – Zita Kis Dadara, Austria</td>
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<td>Stop pressure ulcer day 2012 – a European success Christina Lindholm, Sweden</td>
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<td>International pressure ulcer prevention and treatment guideline update</td>
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<td>PUCLAS launch of 2013 version</td>
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<td>Pressure ulcer prevention: an economic perspective</td>
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<td>Meet the industry session</td>
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<td>Introduction to experienced and novice investigator awards</td>
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<td>Novice investigator</td>
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<td>17.45</td>
<td>Experienced investigator lecture</td>
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<td>Pain and pressure ulcers</td>
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<td>Paulo Alves, Portugal</td>
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<td>Micro-climate management</td>
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<td>Steelandt, Austria</td>
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<td>Elfriede Binder, Austria</td>
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<td>EPUAP AGM</td>
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<td>Lunch and Exhibition</td>
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<td>13.30</td>
<td>Eliminating Hospital acquired pressure ulcers: If not now, then when?</td>
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<td>Nancy Donaldson, USA</td>
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<td>14.00</td>
<td>Workshop</td>
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<td>The management of deep pressure ulcers</td>
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<td>Delic Javorka, Serbia</td>
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<td>Specific Nutritional support for faster wound healing</td>
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<td>13.30</td>
<td>15.00                      Nutricia symposium</td>
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<td>13.30</td>
<td>15.00                      Free paper 3</td>
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<tr>
<td>14.00</td>
<td>German Stop Pressure Ulcer Day report - Madeleine Gerber, Germany</td>
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<tr>
<td>14.45</td>
<td>A new European debridement initiative - Trude Young, UK</td>
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<td>15.00</td>
<td>Tea and Exhibition</td>
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<td>15.00</td>
<td>The heel - why it is so vulnerable to pressure damage - Peter Vowden,</td>
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<td>UK</td>
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<tr>
<td>15.30</td>
<td>Student paper competition</td>
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<td>15.30</td>
<td>Friction and shear - in the real world</td>
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<td></td>
<td>Michael Clark, UK, Amit Gefen, Israel</td>
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<td>15.30 – 16.30               Parafricta Symposium</td>
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<td>15.30</td>
<td>Free paper 4</td>
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<tr>
<td>16.00</td>
<td>Assessment of the foot - Kathryn Vowden, UK</td>
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<tr>
<td>16.30</td>
<td>19.30 Gala Dinner</td>
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# 16th EPUAP Open Meeting, Vienna, Austria

**Friday August 30th**

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<th>Time</th>
<th>Auditorium (Room B)</th>
<th>Exhibition area</th>
<th>Room L/M</th>
<th>Room N</th>
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<tr>
<td>8.40</td>
<td>Focus meeting, Southampton, UK Lisette Schoonhoven, Dan Bader</td>
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<td>Nursing tools for the risk assessment and classification of incontinence associated dermatitis Dr Margareta Jukic-Puntigam, Austria</td>
<td>Oral poster session</td>
<td>8.30 – 9.30 Free paper 5</td>
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<td>8.50</td>
<td>17th Annual EPUAP, Stockholm, Christina Lindholm</td>
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<td>09.00</td>
<td>Ageing skin - Prof. Terence Ryan, UK</td>
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<td>09.30</td>
<td>Topical enzymatic treatments for debridement and wound maintenance</td>
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<td>09.30 Workshop How to teach pressure ulcer management</td>
<td>09.30 Molnlycke workshop Joyce Black, USA 9.30 – 10.30 Free paper 6</td>
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<td>Prof. Amihay Freeman, Israel</td>
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<td>10.00</td>
<td>Ergonomics – how individuals move in bed – Richard Goossens, The Netherlands</td>
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<td>Nicola Waters, Canada</td>
<td>Barbara Fohsl Grande, Vienna</td>
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<td>Tod Brindle, USA</td>
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<td>10.30</td>
<td>Skin integrity, ageing and biomechanical factors Dr Georges Limbert, UK</td>
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<td>Josipa Bišcan, Croatia</td>
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<td>11.30</td>
<td>Patient as partner in care: An overview of successful initiatives</td>
<td>Erik de Laat, The Netherlands</td>
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<td>11.30</td>
<td>PUCLAS workshop</td>
<td>Dimitri Beeckman, Belgium</td>
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<td>Free paper 7</td>
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<td>12.00</td>
<td>Self-management in prevention of pressure ulcers in patients with spinal cord injury</td>
<td>Anne Mulder, The Netherlands</td>
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<td>Translating enthusiasm into clinical practice – a research perspective,</td>
<td>Nils Lahmann, Germany</td>
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<td>Translating enthusiasm into clinical practice – an industrial perspective –</td>
<td>Martin Abel, Germany</td>
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<td>Translating enthusiasm into clinical practice – an educational perspective,</td>
<td>Nicola Waters, Canada</td>
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<td>15.30</td>
<td>Close of conference – Prof Amit Gefen, Israel, President Elect of EPUAP,</td>
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Programme

Sixteenth Annual European Pressure Ulcer Advisory Panel Meeting
28th-30th August, 2013
Austria Center, Vienna

Theme: Enthusiasm complements Experience and Evidence in Pressure Ulcer Management

Wednesday, August 28th

Level 01 (Reception)
9.00 – 13.00 Registration
Coffee available

Level 02
9.00 – 13.00 setting up of posters: to be left up throughout meeting

Location: Registration desk
9.00 – 13.00 check in Powerpoint presentations to Audio Visual staff and to translators

12.00 – 13.00 Exhibition open

Auditorium Level 02 Room B
13.00 – 13.10 Opening address
Michael Clark, UK, President of EPUAP.

13.10 – 13.15 Welcome to Vienna
Zita Kis Dadara, Austria, President of APUPA

13.15 – 13.40 APUPA Presentation

13.40 – 13.50 Central European Pressure Ulcer Experience
Zita Kis Dadara, Austria

13.50 – 14.00 Stop Pressure Ulcer Day 2012 – a European success
Christina Lindholm, Sweden

14.00 – 14.20 International pressure ulcer prevention and treatment guideline update
Lisette Schoonhoven, The Netherlands

14.20 – 14.40 PUCLAS launch of 2013 Version
Dimitri Beeckman, Belgium
Wednesday, August 28th

14.40 – 15.00  Pressure ulcer prevention: an Economic perspective  
                Peter Makai, The Netherlands

Level 01
15.00  Tea and coffee. Opening of Exhibition viewing

Auditorium, Room B, Level 02
15.30 – 17.00  Meet the industry Session  
                Chair: Trudie Young  
                Exhibitors give brief Industrial introductions

17.00 – 17.15  Introduction to the investigator awards  
                Amit Gefen, Israel

17.15 – 17.45  EPUAP Novice Investigator Award Lecture  
                Research on pressure ulcer risk assessment: Three pieces of a challenging jigsaw of evidence  
                Katrin Balzer, Germany

17.45 to 18.15  EPUAP Experienced Investigator Award Lecture  
                One Person’s Journey in Pressure Ulcer Research  
                Carol Dealey, UK

Free evening
Thursday, August 29th

Morning sessions

07.30  Registration
       Coffee & exhibition viewing

Room L/M (Level 01)

8.30 – 10.00  Molnlycke symposium
Can dressings prevent pressure ulcers? The NEW standard of practice.
Chair: Joyce Black, USA

An introduction to the issue of pressure ulcer and in vitro work on shear, friction and microclimate
Evan Call, USA

A hypothesis, a case study and an RCT: a pathway to creating clinical effectiveness in the use of a silicone border sacrum dressing to reduce pressure ulcer formation in critically ill patients
Tod Brindle, USA

Innovations in the reduction of ulceration and pain in critical care
Alison Johnstone, UK

A change in practice: preliminary results from the Border Trial
Nick Santamaria, Australia

A new standard of practice
Paulo Alves, Portugal

Room N (Level 01)

8.30 – 9.30  Breakfast session – Hartmann
Hartmann advances in technology for Pressure Ulcer care

Auditorium (Room B Level 02)

Chair: Dan Bader

9.30 – 10.00  State-of-the-art bioengineering technologies for evaluating support surfaces
Amit Gefen, Israel

10.00 – 10.30  The role of electrical stimulation in pressure ulcer management
Thomas Wild, Germany

10.30 – 11.00  Pressure ulcers in the paediatric population
Guido Ciprandi, Italy
Room 0 (Level 01)
9.00 – 10.00    Free Paper Session 1

Chairs: Jos Schols
Pressure ulcer prevention – is nursing knowledge appropriate or not? A descriptive multi-center study in Sweden
Carina Bååth

The current state of pressure ulcer prevention research: “RCT” evidence-based?
Dimitri Beeckman

Nurses’ pressure ulcer related judgements and decisions in clinical practice: a systematic review.
Ray Samuriwo

Prevalence and prevention of pressure ulcers in malnourished and non-malnourished Austrian hospital patients and nursing home residents.
Silvia Schönherr

Establishing the Roles of Allied Health Professionals in Pressure Ulcer prevention
Peter Worsley

Room N (Level 01)
9.30 – 11.00    Workshop
Have we been successful? How to compare pressure ulcer frequencies within quality improvement contexts
Jan Kottner, Germany

11.00 – 11.30    Coffee and exhibit viewing (Level 01)

Auditorium (Room B Level 02)
11.30    Chair: Jose Verdu Soriano

11.30 – 12.30    EPUAP/EWMA joint session
Experience and evidence in pressure ulcer prevention and management’
EPUAP: Geert Vanwalleghem, Belgium
EWMA: Zena Moore, Ireland

12.30
Pain and Pressure Ulcers
Paulo Alves, Portugal

13.00
EPUAP AGM

Room L/M (Level 01)
11.30 – 12.30    Workshop: Best practice in pressure ulcer prevention
Chair: Alfred Steininger
11.30 – 11.45  Best practice of Industry in Austria
Torsten van Steelandt, Austria

Education of Patients and Carers
Elfriede Binder, Austria

Room N (Level 01)
11.30 – 13.00  ArjoHuntleigh Symposium
Micro-climate management a new approach to improve skin integrity; what is the clinical relevance
Chair: Amit Gefen, Israel

Microclimate management and tissue integrity; research leading to evidence-based results
Dan Bader, UK

The science behind a novel approach to microclimate management
Angel Delgado, USA

Microclimate management approach to improve clinical outcomes
Jean M de Leon, USA

Room O (Level 01)
Free Paper Session 2
Chair: Lisette Schoonhoven

The Use of Hemoglobin Saturation Ratio as a Means of Measuring Tissue Perfusion in the Development of Heel Pressure Sores
Kristen Aliano, USA

Multi-Modal Framework for Subject-Specific Finite Element Modeling of the Buttocks
Marek Bucki, France.

External Force Depression and External Force Undermining in Pressure Ulcers Caused by Nursing Care -The Mechanism and Evidence in Histological Findings-
Takehiko Ohura, Japan

Two Types of Undermining in Pressure Ulcers - Classification and Mechanism -
Takehiko Ohura, Japan

Evaluation of a Prototype Turning Mattress for the Prevention of Pressure Ulcers.
Peter Worsley, UK

13.00 – 14.00  Lunch and exhibition viewing (Level 01)
**Auditorium (Room B Level 02)**

Chair: Marco Romanelli

14.00 – 14.30  
Eliminating hospital-acquired pressure Ulcers: If not now, then When?  
Nancy Donaldson, USA

14.30 – 14.45  
German Stop Pressure Ulcer day report  
Madeleine Gerber, Germany

14.45 - 15.00  
A new European debridement initiative  
Trudie Young, UK

**Room L/M (Level 01)**

14.00 – 15.00  
**Workshop – The management of deep pressure ulcers**  
Chair: Zita Kis-Dadara, Austria

14.00 – 14.30  
The management of deep pressure ulcers  
Delic Javorka, Serbia

14.30 – 15.00  
Enthusiasm in the management of deep pressure ulcers  
Markus Duft, Austria

**Room N (Level 01)**

13.30 – 15.00  
**Nutricia Symposium**  
Specific Nutritional Support for Faster Wound Healing  
Chair: Jos Schols, The Netherlands

13.30 – 13.35  
Opening.  
Jos Schols, The Netherlands

13.35 – 14.00  
Nutritional Support in the treatment and prevention of pressure ulcers:  
an overview of studies with an arginine-enriched Oral Nutritional  
Supplement  
Jos Schols, The Netherlands

14.00 – 14.30  
Disease-specific nutritional support in malnourished pressure ulcer  
patients: A randomised, controlled trial  
Emanuele Cereda, Italy

14.30 – 14.50  
Effects of a specific arginine-enriched oral nutritional supplement on  
the healing process of chronic wounds in non-malnourished patients  
Jacques Neyens, The Netherlands

14.50 – 15.00  
Closing Q&A
Room O (Level 01)
14.00 – 15.00  **Free Paper Session 3**  
**Chair: Jan Kottner**

Pressure RElieving Support SURfaces: a Randomised Evaluation 2 (PRESSURE 2)  
Jane Nixon, UK

Internal strains in sacral area of human subjects in supine position on a bed  
C.W.J.Oomens, The Netherlands

High Voltage Pulsed Current in Pressure Ulcer Healing; Preliminary Study  
Anna Polak, Poland

A virtual procedure and its requirements to optimize supporting structures with respect to pressure ulcers by numerical simulation  
Alexander Siefert, Germany

Level 01
15.00 15.30  **Tea and Exhibition viewing**

Auditorium (Room B Level 02)

**Chair: Guido Ciprandi**

15.30 – 16.00 The Heel – why is it so vulnerable to pressure damage?  
Peter Vowden, UK

16.00 – 16.30 Assessment of the Foot  
Kathryn Vowden, UK

Room L/M (Level 01)
15.30 – 17.00  **Student paper competition**  
**Chairs: Michael Clark & Amit Gefen**

Translation and Psychometric Properties of the Dutch National Prevalence Measurement of Care Problems to Measure Quality of Pressure Ulcer Care in Indonesian Hospitals  
Yufitriana Amir, The Netherlands

The use of support surfaces and repositioning for patients with reduced mobility in a sample of Norwegian hospitals  
Ida Marie Bredesen, Norway

Improving Wound Healing In Pressure Sore Reconstruction: Our Protocol And The C.O.P. (Cone Of Pressure) Flap  
Francesco Gargano, USA

DTI Risk Assessment in Heel and Sacrum Regions using Finite Element Analysis  
Takuma Kitagawa, Japan
Modeling the Supported Heel: Towards Understanding Risk Factors for Heel Ulcers
Ayelet Levy, Israel

Patient-Specific Posture Scheduling for Pressure Ulcer Prevention
Sarah Ostadabbas, USA

Room N (Level 01)
15.30 – 17.00
Parafricta Symposium
Friction and shear - in the real world

Relation between pressure, friction and pressure ulcer categories: a secondary data analysis of hospital patients using CHAID methods
Nils Lahmann, Germany

Implementation of new friction reducing technology in clinical practice – challenges and implications
Glenn Smith, UK

Heel Pressure Ulcers: Where now?
Deborah Gleeson, UK

Room O (Level 01)
15.30 – 16.30 Free Paper Session 4
Chair: Christina Lindholm

The incidence of pressure ulcers on a static air mattress: A multi-centre cohort study in Belgian nursing homes
Dimitri Beeckman, Belgium

Cost-effectiveness analysis of 3-in-1 disposable wash cloths impregnated with dimethicone 3% compared with standard care in the prevention and treatment of IAD in older patients
Dimitri Beeckman, Belgium

Comparison of the characteristics of pressure ulcers between Austrian hospitals and nursing homes in 2012
Manuela Mandl, Austria

Comparison of the characteristics of pressure ulcers between incontinent and continent patients in Austrian hospitals and nursing home residents
Manuela Mandl, Austria

Micro-training for Micro-support
Romana Jurkowitsch, Elisabeth Enengl, Austria

19.30 Gala dinner, Rathauskeller, Vienna
Presentation of poster winner, novice and established investigator awards by the President of EPUAP.
Friday, August 30th

07.30  Registration
Coffee & exhibition viewing

Auditorium (Room B Level 02)

8.40 – 8.50  Introduction to the 2014 Focus Meeting on Skin Health and the Microclimate, Southampton, UK
Lisette Schoonhoven, Dan Bader

8.50 – 9.00  Introduction to the 17th Annual EPUAP meeting, Stockholm, Sweden
Christina Lindholm

9.00 – 10.00  Chair: Amit Gefen

9.00 – 9.30  A Review of the Ageing Skin as a Determinant of Pressure Ulcers
Terence Ryan, UK

9.30 – 10.00  Topical enzymatic treatments for debridement and wound maintenance
Amihay Freeman, Israel

10.00 – 11.00  Chair: Jeannie Donnelly

Ergonomics - how individuals move in bed
Richard Goossens, The Netherlands

Skin integrity, ageing and biomicromechanical factors
Dr Georges Limbert, UK

Room N (Level 01)

8.30 – 9.30  Oral poster session

Room L/M (Level 01)

9.00 - 10.30  Chair: Elfriede Binder

9.00 - 9.30  Nursing tools for the risk assessment and classification of incontinence-associated dermatitis
Margareta Jukic-Puntigam, Austria

9.30 – 10.30  Workshop – How to teach pressure ulcer management

9.30 – 9.50  Teaching programme of nursing – perspective of Canada
Nicola Waters, Canada

9.50 – 10.10  Medical perspective of pressure ulcer prevention
Barbara Fohsl Grande, Austria

10.10 – 10.30  How to teach pressure ulcer management – perspective of Croatia
Josipa Biscan, Croatia
Room O (Level 01)
8.30 – 9.30  **Free Paper Session 5**  
**Chair: Lena Gunningberg**

Journey to Zero  
Elaine Bethell, UK

Why Do Patients Develop Severe Pressure Ulcers?  
Carol Dealey, UK

Lessons Learnt from Root Cause Analysis Investigation of Severe Pressure Ulcer Incidents  
Clare Greenwood, UK

Suspected Deep Tissue Injuries or Unstageable Pressure Ulcers – What & How to Report?  
Clare Greenwood, UK

Pressure ulcer prevalence and incidence – an integrative review exploring the scope of the problem across Scandinavia and Ireland  
Zena Moore, Ireland

Pressure ulcer risk assessment and prevention strategies across Scandinavia and Ireland – an Integrative Review  
Zena Moore, Ireland

Room N (Level 01)
9.30 – 10.30  **Molnlycke workshop**

Medical device-related pressure ulcers – practical tips to presentation  
Joyce Black and Tod Brindle, both USA

Room O (Level 01)
9.30 – 10.30  **Free Paper Session 6**  
**Chair: Dimitri Beeckman**

CPI™ Wound Therapy Used in the Treatment of Complex MRSA Wounds in High-Risk Surgical Patients  
Patrick V. Marasco, USA

Laboratory values alterations in geriatric patients with pressure ulcers  
Lenche Neloska, Macedonia

Pressure ulcer treatment in hospitalized pediatric patients  
Anna-Barbara Schlüer, Switzerland

Pressure ulcer in Austrian nursing home residents with and without dementia  
Sandra Schüssler, Austria
Spinal Cord Injury: using functional activity in pressure relief
May Stinson, UK

Pressure ulcer incidence and risk factors for patients undergoing surgery that lasts more than three hours
Adinda Toppets, Belgium

11.00 – 11.30 Coffee and exhibit viewing (Level 01)

Auditorium (Room B Level 02)

Chair: Hilde Heyman

11.30 – 12.00 Patient as partner in care: An overview of successful initiatives
Erik de Laat, The Netherlands

12.00 – 12.30 Self-management in the prevention of pressure ulcers in patients with spinal cord injury
Anne Mulder, The Netherlands

Room N (Level 01)

11.30 – 12.30 PUCLAS workshop
Dimitri Beeckman, Belgium

Room O

11.30 -12.30 Free Paper Session 7
Chair: Nils Lahmann

Is pain a predictor of Category 2 pressure ulcers? Results of the PURPOSE Pain Cohort Study
Jane Nixon, UK

From systematic review to clinical practice: Using consensus methods to develop a Pressure Ulcer Risk Assessment Framework (PURAF)
Susanne Coleman, UK

The Design and Pre-executing of a Pressure Ulcer Risk Assessment Framework (PURAF)
Susanne Coleman, UK

The Modified Jackson/Cubbin – Risk Scale’s Predictive Value in the PU Development at ICU
Maarit Ahtiala, Finland

Factors predicting the development of pressure ulcers in an at risk population receiving prevention: a multicenter cohort study
Liesbet Demarré, Belgium

Pressure ulcer risk assessment and preventive care in Norway and Ireland – what difference does a risk scale make?
Edda Johansen, Norway
12.30 – 13.30  Lunch and exhibition viewing (Level 01)

Room L/M (Level 01)

13.30 – 15.30  Chair: Michael Clark

13.30 – 14.00  Translating enthusiasm into clinical practice - a research perspective
Nils Lahmann, Germany

14.00 – 14.30  Translating enthusiasm into clinical practice - an industrial perspective
Martin Abel, Germany

14.30 – 15.00  Translating enthusiasm into clinical practice - a clinical perspective
Zita kis Dadara

15.00 – 15.30  Translating enthusiasm into clinical practice - an educational perspective
Nicola Waters, Canada

15.30  – Amit Gefen, incoming president of EPUAP
Wednesday
28th August

ABSTRACTS
STOP PRESSURE ULCER DAY 2012- a European success
Christina Lindholm
Sophiahemmet University/Karolinska University hospital, Sweden email c.lindholm@telia.com

Introduction
STOP PRESSURE ULCER DAY 2012
This initiative by Spanish- and Italian-speaking countries in Rio de Janeiro during a conference in 2011 was adopted by EPUAP in 2012. During the Rio-conference, the excellent Declaration of Rio comprising standards for prevention and care of patients with pressure ulcers, education and organizational and economic issues was developed. The day was set to November 16, 2012.

Methods
EPUAP PR-committee developed a logotype for the day as well as a 5-minute film which was translated into nine languages and distributed throughout Europe. This film was also available on youtube. A patient guide, a fact-sheet and a press-release was developed and translated into several languages. The Declaration of Rio was also available in different languages.

Results
Almost all countries in Europe participated in the STOP PRESSURE ULCER DAY, and reports back to the PR-committee were overwhelmingly positive. The film was shown to approximately 15,000 persons, among them many politicians, decision-makers in health care, health care staff and patients, and extremely well received. The printed material was distributed widely to all countries who had an interest in participating in the activities during November 16. Many Journals, daily papers and TV-programs exposed the pressure ulcer problem and how prevention can stop it. Numerous activities like lectures, symposia, were initiated all over Europe. To summarize the experiences of the first EPUAP European stop pressure ulcer day- it was a true success. Next year the STOP PRESSURE ULCER DAY will be on November 21, and thereafter every year on the third Thursday of November. At the EPUAP website, further information regarding the next STOP PRESSURE ULCER DAY November 21 will be available during the fall.

Acknowledgements
EPUAP PR-committee would like to thank council and all members and enthusiasts all over Europe for their support and efforts to make the day a success, which we hope will be repeated in 2013 as well.
**Wednesday August 28th**

**International Pressure Ulcer Prevention and Management Guidelines – progress update**

Lisette Schoonhoven$^{1,2}$ on behalf of the international guideline development group

$^1$ IQ Scientific Institute for Quality of Healthcare, Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands; L.Schoonhoven@iq.umcn.nl

$^2$ Faculty of Health Sciences, University of Southampton, Southampton, UK

**Introduction**

In 2009 the National Pressure Ulcer Advisory Panel (NPUAP) and the European Pressure Ulcer Advisory Panel (EPUAP) published the international guidelines for the prevention and treatment of pressure ulcers. The guidelines contain evidence-based recommendations for the prevention and treatment of pressure ulcers that could be used to guide decision making by health care professionals and individuals throughout the world.

Currently the NPUAP, EPUAP, and Pan Pacific Pressure Injury Alliance (PPPIA) are working on an update, which is scheduled for 2014. The Japanese Society of Pressure Ulcers sends an observer to the meetings.

This presentation will give an update on the progress of the International Pressure Ulcer Prevention and Management Guidelines.

**Literature**

We included approximately 700 papers in the update of the guideline. The search strategy can be found at [http://internationalguideline.com](http://internationalguideline.com)

**Small Working Groups**

There are 26 small working groups (SWGs) assessing literature, making evidence tables and writing draft recommendations. In total 142 experts are involved in this process.

**Draft recommendations**

The next step for each SWG is to write a first draft of the guideline recommendations for their topic. After feedback from the GDG, the level of evidence of the recommendations will be added using the GRADE methodology.

The first sections with draft recommendations have been submitted to the Guideline Development Group (GDG) in June 2013.

**Stakeholder review**

It is possible to register as a stakeholder on the website: [http://internationalguideline.com](http://internationalguideline.com)

We kindly invite you to comment on the search strategy, the list of included and excluded papers and to send us papers we may have missed.

We will add the draft recommendations as soon as possible and invite you to comment on them too.
Wednesday August 28th

**PUCLAS launch of 2013 version**

Dimitri Beeckman¹, Lisette Schoonhoven²

¹ Ghent University, Belgium, Dimitri.Beeckman@UGent.be

² IQ Scientific Institute for Quality of Healthcare, Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands

**Background**

Studies indicate that pressure ulcer classification is difficult [1-6] and that misclassification between pressure ulcers and incontinence-associated dermatitis (IAD) frequently occurs. [2,3,7] This results in inadequate preventive and therapeutic measures. Education and training are important to optimize classification skills. While the e-learning tool PuClas2 was able to improve classification skills, [8,9] classification skills were not optimal. PuClas2 was developed in 2005 by an EPUAP international working group.

**What this presentation will cover**

This presentation will be the official international launch of PuClas3. The aim of the new tool is to support clinical teaching and learning about pressure ulcer classification and incontinence-associated dermatitis (IAD) differentiation. It has been developed as an answer for the ongoing major difficulties experienced by healthcare professionals when classifying pressure ulcers and making a distinction between pressure ulcers and skin lesions caused by urinary and fecal incontinence.

The content is based on the EPUAP position statement on pressure ulcer classification and IAD differentiation, and provides an overview of causative factors and of typical wound-related characteristics including location, shape, depth, necrosis, edges and color [3].

The newly developed PuClas3 tool includes an update of the classification system according to the 2009 EPUAP/NPUAP international guideline, an updated terminology for incontinence-associated dermatitis, high quality photographs, an assessment module for basic level and advance level, and a separate assessment module including cases and photographs.

**References**

Research on pressure ulcer risk assessment: 
Three pieces of a challenging jigsaw of evidence 

Katrin Balzer
Institute for Social Medicine and Epidemiology, University of Lübeck, Germany, katrin.balzer@uksh.de

Introduction
Information on the reliability and diagnostic accuracy of standardised pressure ulcer risk assessment scales (PURASs) is not sufficient to draw firm conclusions on the tools’ clinical efficacy [1]. To allow better assessment of their relative merits in clinical practice, following research questions were targeted:
(1) What is the accuracy of PURASs in identifying patients at risk of pressure ulcers (PU) compared to a generic tool measuring patients’ care dependency?
(2) Which patient characteristics do guide nurses’ unaided clinical judgement (CJ) on PU risk?
(3) What are the effects of use of PURASs on the PU incidence in hospital patients compared to nurses’ CJ?

Methods

Research question 1: Two diagnostic accuracy studies were carried out, drawing on cross-sectional data of two hospital samples (n=754, n=1,053) [2, 3]. In both studies, several PURASs and the Care Dependency Scale (CDS) were applied. PU status was used as reference standard for accuracy estimates.

Research question 2: A mixed methods study was conducted. Quantitative data on predictors of nurses’ CJ on PU risk in 106 trauma patients were triangulated with qualitative (interview) data on nurses’ reasoning during the unaided assessment of PU risk [4].

Research question 3: Available randomised-controlled trials (RCTs) evaluating the effects of PURASs on the PU incidence compared to nurses’ CJ were reviewed. Based on this review, a cluster-RCT (cRCT) was planned to compare the Braden Scale to nurses’ CJ with regard to the impact on PU incidence [1].

Results

Research question 1: In both studies, the CDS was found to have similar diagnostic accuracy in identifying patients at PU risk as the best discriminating PURASs either [table 1].

Research question 2: For their CJ, nurses seem to draw on well-established PU risk factors, but also on protective conditions (e.g. patients’ self-care abilities). Some uncertainties among nurses’ interpretation of risk factors were noted, particular with regard to conditions affecting the tissue tolerance [4].

Research question 3: Two RCTs were eligible for review. Both trials show no between-group differences in the PU incidence, but the validity and precision of these results are prone to serious threats, precluding firm conclusions. Planning of a cRCT with low risk of bias and sufficient statistical power revealed that such a trial is infeasible due to an extremely high sample size needed (>1,000 clusters, >100,000 patients). Alternatively, the inventory of evidence linkages seems to be a promising way for evaluation of PURASs’ clinical efficacy, but more robust empirical data on single attributes of the risk assessment-prevention pathway are required for this purpose [1].

Table 1: Key findings on the diagnostic accuracy

<table>
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<tbody>
<tr>
<td>BS</td>
<td>NS</td>
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<tr>
<td>Sensitivity %</td>
<td>84</td>
</tr>
<tr>
<td>Specificity %</td>
<td>62</td>
</tr>
<tr>
<td>AUROC</td>
<td>ND</td>
</tr>
</tbody>
</table>

AUROC, area under the receiver-operating characteristic curve. BS, Braden Scale. CDS, Care Dependency Scale. ND, not determined. NS, Norton Scale. WS, Waterlow Scale.

Discussion

In short, the questions can be answered as follows:
- The CDS shows similar diagnostic accuracy in assessing PU risk as widespread PURASs.
- During their unaided CJ on PU risk, nurses consider a variety of risk and protective factors, going beyond those covered by PURASs.
- The direct impact of PURASs on the PU incidence compared to nurses’ CJ remains unclear and is apparently not amenable to direct evaluation by the current repertoire of experimental research.

Clinical relevance

The findings contest the assumption that PURASs are likely to improve PU prevention in clinical practice. To prove this assumption more robustly, e.g. by means of evidence linkages, the complex jigsaw of evidence on the downstream effect of PU risk assessment needs to be completed further.

Conflict of Interest

This research was partly supported by a grant of the B. Braun foundation, Germany. The foundation did not have any role in study design, conduct and reporting.

References
Introduction
Economic evaluation can aid decision-makers in the adoption of different evidence-based treatment methods, and a number of health systems use the results of economic evaluations to publicly fund or not to fund various healthcare interventions. Economic evaluation compares the difference in costs and the benefits (ideally measured with Quality Adjusted Life Years) between interventions and standard care [1]. This is also true for interventions aimed to prevent PUs. However, there are number of issues related to PU prevention programs which pose challenges to the standard techniques of economic evaluations. The aim of this talk is to highlight these issues based on recent evidence on economic evaluations of PU prevention, and to give suggestions how economic evaluations can be incorporated into pressure ulcer prevention studies in the future.

Methods
The literature since 2008 was searched in Pubmed. The literature was assessed according to the following criteria: therapies compared, degree of intervention complexity, type of economic evaluation, adequacy of cost assessment, and outcomes used. The keywords used were “pressure ulcer”, “pressure ulcers”, “cost-effectiveness”, “economic evaluation”, “economics”, “economic”.

Results
The search resulted in 153 titles and 66 abstracts. From 66 abstracts 30 articles were retrieved, of which 13 contained complete cost-effectiveness analysis. Additionally, 2 methodological papers were identified. Of complete cost-effectiveness analyses, 8 studies were model-based analyses, with 2 performing a cost-effectiveness analysis on a clinical trial, and 3 studies performing a combination of the two. Only two trial-based studies used QALYs as an outcome, while from the modeling studies 5 studies used QALYs. Additionally, PUs prevented were also often used as primary outcomes. The interventions compared were a quality collaborative, multifactorial PU prevention program, multifactorial prevention plan to prevent PUs in hospitals, nutritional interventions, electrical stimulation vs. normal wound care, low-friction garments, support surfaces, foam mattresses, hyperoxygenated fatty acid regimen, foam cleansing, and advanced vs. simple dressings.

Table 1: Summary of the most important data

<table>
<thead>
<tr>
<th>Study type</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>Integral assessment of costs and effects (N=30)</td>
<td>13</td>
<td>19</td>
</tr>
<tr>
<td>Modeling (N=13)</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Adequate assessment of costs</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>QALY as outcome (N=13)</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>High degree of intervention complexity (N=13)</td>
<td>4</td>
<td>9</td>
</tr>
</tbody>
</table>

Discussion
To date there are a small number of economic evaluations of interventions preventing PUs. In addition, only one study compares costs to quality of life outcomes. The majority of the studies use modeling. In order to demonstrate the added value of new PU prevention strategies, there is an urgent need for more cost-effectiveness studies in PU prevention alongside clinical trials. Such trials should incorporate (1) newly developed outcomes for quality of life in order to capture the full benefits of PU prevention and care, as well as (2) recent methods of economic evaluations of complex interventions. Based on such results, decision-makers can be assisted to adopt PU preventing interventions which give the most value for money.

Clinical relevance
Cost-effectiveness studies can be incorporated into guidelines in order to provide the most effective and efficient PU prevention strategy.

Conflict of Interest
There are no conflicts of interest in the carrying out of this study.

References
Wednesday August 28th

One Person's Journey in Pressure Ulcer Research

Carol Dealey

University Hospital Birmingham NHSFT and University of Birmingham, UK,

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Introduction
This paper will explore some of the developments in pressure ulcer research since the 1980’s. It will reflect my personal journey in research and include both mistakes and successes. It must be acknowledged that some of my early ‘research’ was really audit or product evaluation and even if some of it was novel, it showed a lack of sophistication in research methods.

Education
In order to undertake high quality research, it is essential to have a good understanding of research methodology. The key to this is education. I believe that education is not just in terms of academic achievement, although that is important, but also by learning from others. Attending conferences is a good source of learning, so too is working with other researchers. Many of my early research was of poor quality because of lack of education and because I was working as a lone researcher.

Teamwork
These days we are much more aware of the value of working in a research team, but when I started out there were very few clinical nurses involved in undertaking research and sadly, very few medical doctors were interesting in pressure ulcers or pressure ulcer research. So, even when I recognized the need for research partners, it was difficult to find anyone locally with an interest in my topic – especially when there was no real funding for pressure ulcer research. Today, that has changed and I now work within a research team currently completing a 5-year £2 million programme grant funded by the National Institute for Health Research.

Clinically Relevant Questions
Despite some of its shortcomings, my research has always been focused on the patient and I believe that it is important that pressure ulcer research should aim to answer clinically relevant questions. Even when research is undertaken in the laboratory, it is possible to identify benefits to patients.

Conclusions
As I look back over my journey in research I can see that I have come a very long way from small beginnings. However, I am pleased that there are much greater opportunities for young researchers starting out today.
Thursday
29th August

ABSTRACTS
Thursday, 29th August, 8.30 – 10.00
Room L/M, level 01

Molnlycke Symposium

Can dressings prevent pressure ulcers?
The NEW standard of practice
Can dressings prevent pressure ulcers?
The NEW standard of practice

Mölnlycke Health Care presents a symposium on pressure ulcer prevention where, our chair, Dr Joyce Black, of University of Nebraska in the USA, will create debate and lead the speakers to answer some regularly asked questions:

• What causes pressure ulcers? Is it just pressure?
• How do dressings work in prevention?
• Do all dressings perform in the same way?
• Is the strategy of using Mepilex® Border for prevention clinically effective?
• How cost effective is this?
• Is the quality of the available evidence, in relation to other evidence for preventive care, sound?
• Can the use of dressings be a NEW standard of care?

1. An introduction to the issue of pressure ulcers and in vitro work on shear, friction and microclimate

Evan Call MS, CSM (NRM)
Weber State University, Ogden UT, United States of America

The prevention of hospital acquired pressure ulcers in critically ill patients remains a significant clinical challenge. This seminar will present our current understanding of the protective mechanisms offered by soft silicone multilayered dressings, and will also provide an overview of recent research evidence into the prevention of pressure ulcers in the acute hospital setting.

One unaddressed guideline topic is the appropriate, prophylactic use of dressings on intact skin to reduce the incidence of pressure ulcer formation: an international panel of experts was convened to address this question. Using an extensive literature search, new bench test data and current clinical research, the group looked at use protocols and identified desirable performance characteristics allowing them to make recommendations for use or avoidance. This presentation will cover aspects of the bench test data and how the dressings actually work in the prevention of pressure ulceration.

2. A hypothesis, a case study and an RCT: providing evidence for clinical effectiveness in the use of a silicone border sacrum dressing to reduce pressure ulcer formation in critically ill patients.

C. Tod Brindle MSN RN ET CWOCN
Virginia Commonwealth University Richmond, USA

Tod will present how the early initiatives he and his colleagues at Virginia Commonwealth University, Richmond, USA, implemented to augment his pressure ulcer prevention programme. Tod will also present the results of the randomised controlled trial led by Dr Peggy Kalowes to determine whether the prophylactic application of a silicone border sacral dressing reduces the incidence of sacral pressure ulcers (PUs), among critically ill patients, when compared to standard preventive care.

Eligible patients (n=367) admitted to the intensive care unit (ICU) were allocated to receive either standard care plus the test dressing (n=184) or standard care alone. Fewer PU's developed in the intervention group than in the controls (1 PU vs 7 PU, respectively); the Border Sacrum Dressing effectively prevented PU's in 98% of patients in the intervention group (p=0.001). Five other risk factors (altered level of consciousness, vasopressors, increased length of ICU stay, mechanical ventilation and >4 co morbidities) were found to be strong correlates (r=0.72) among patients who developed PU's.

In conclusion, the use of the silicone foam dressing was found to be effective in the prevention of PU formation (p = 0.001). The adoption of this new wound technology would improve the outcomes of high risk patients, as the identification of the characteristics/ unique risk factors related to the development of PU, should empower clinicians to recognize early, high-risk patients, while deploying aggressive preventive measures.
3. Innovations in the reduction of ulceration and pain in critical care.
Alison Johnstone, RGN, BSc, MSc
Clinical Nurse Specialist (Tissue Viability), NHS Greater Glasgow and Clyde Hospital.

On review of recent literature (Brindle 2010, Gentry and Wright 2010, Cano et al 2011, Chaiken 2012) the Tissue Viability specialist decided to carry out a product evaluation within critical care to identify if implementing the use of a prophylactic - five layer silicone foam (Mepilex Border® Sacrum) into the prevention strategy would achieve a reduction in the incidence of ulcers, which were considered to be caused by pressure, moisture, shear and friction within this client group. No ulcers developed over the course of the evaluation. 82 patients were identified as high risk according to patient selection criteria for application. 7 patients were excluded because of existing pressure ulcers or severe faecal incontinence. All patients continued to receive standard pressure ulcer prevention. Average treatment period was 9 days. Average number of dressings used per patient was 4. The dressing was able to be peeled back to enable the staff to check the skin integrity of the sacrum every 24 hours. Incidence of ulceration to the sacral cleft was recorded at 0% at the end of the evaluation.

Auditing and comparing data collected over the 3 months in both units has been useful to demonstrate how practice can be changed and patient's outcomes improved. The evaluation highlights that nurses have embraced the challenge of improving quality and outcomes for their group of patients in critical care. There will always be concerns about ethical issues involved in measuring patient experience and outcomes but we need to be mindful to maintain innovation in patient safety and effectiveness of care.

4. A change in practice: results from the Border Trial
Professor Nick Santamaria
RN, RPN, B.App.Sc, Grad Dip Health ED, M.ED.St, PhD
University of Melbourne & Royal Melbourne Hospital, Australia

A recently completed Australian randomised controlled trial investigated the effectiveness of applying multi-layer soft silicone foam dressings to trauma and critically ill patients (n=440) in the emergency department, to prevent the formation of pressure ulcers when on the intensive care unit; patients in the intervention group (n=219) had Mepilex Border Sacrum and Mepilex Heel dressings re-applied until they were discharged from the ICU.

There were significantly fewer patients with pressure ulcers in the intervention group compared to the control group (5 PU and 20 PU, respectively; p=0.001). This represented a 76% difference in pressure ulcer incidence between the groups (3.1% vs 13.1%), and a number needed to treat of 10 patients to prevent one pressure ulcer. Overall there were fewer pressure injuries in the intervention group than in the controls (7 PU vs 27 PU, respectively; p=0.002, comprising of sacral pressure ulcers (2 vs 8; p=0.05) and heel pressure ulcers (5 vs 19; p=0.002). The time to injury survival analysis indicated that intervention group patients had a Hazard Ratio of 0.19 (p=0.002) compared to control group patients. A cost-benefit analysis of the results demonstrated that the intervention group treatment costs were 3.6 times less than that of controls.

We conclude from the results that, multi-layer soft silicone foam dressings are clinically and cost effective in preventing pressure ulcers in critically ill patients, when applied in the emergency department prior to intensive care unit transfer.

5. A new standard of practice
Paulo Alves RN, McS
Universidade Católica Portuguesa, Oporto, Portugal

The formation of recommendations on the use of wound dressings in pressure ulcer prevention was undertaken by a group of experts in pressure ulcer prevention and treatment from Australia, Portugal, the United Kingdom and the United States of America. After a review of the literature, they concluded that there is adequate evidence to recommend the use of multi-layered soft silicone dressings for pressure ulcer prevention on the sacrum, buttocks and heels of high risk patients in the emergency department, intensive care unit and operating room settings. The literature used to inform this recommendation included
one prospective randomized controlled trial, 3 cohort studies and two case series. Recommendations for dressing use in patients at high risk for pressure injury and shear injury were also provided.

Speakers

Joyce Black RN PhD
Dr Black is an Associate Professor of Nursing at the University of Nebraska in the USA. She is a Fellow of the US Academy of Nursing and currently on the Board of the National Pressure Ulcer Advisory Panel.

Evan Call MS, CSM (NRM)
Evan Call is Adjunct Faculty in the Microbiology Department at Weber State University, USA, and undertakes research in relation to medical devices for pressure ulcer prevention. He is currently on the Board of the National Pressure Ulcer Advisory Panel

C. Tod Brindle MSN RN ET CWOCN
Tod Brindle is a wound and ostomy consultant for the Virginia Commonwealth University Medical Center, Richmond, in the USA. His clinical specialty area includes pressure ulcer prevention in high risk populations

Alison Johnstone RGN, BSc, MSc
Alison is a Registered Nurse with over 30 years experience in healthcare. Alison has held the position of Tissue Viability Specialist within Greater Glasgow and Clyde health board since 2000. She has published many articles within the specialty of wound healing and has presented at wound care conferences across the world. She continues to be pro-active and has recently won the innovation in practice award for her work in the introduction of a prophylactic dressing to prevent shear and friction in critically ill patients.

Nick Santamaria RN PhD
Professor Santamaria is the Professor of Nursing Research, Translational Research at the University of Melbourne and the Royal Melbourne Hospital. His research includes the prevention of pressure ulcers in critically ill trauma patients in the ICU.

Paulo Alves RN MSc
Paulo Alves is an Assistant Professor of Nursing and Tissue Viability at the Catholic University of Portugal and researcher of the Portuguese Wound Management Association. Pressure Ulcers are his main research. He is currently a board member of the European Pressure Ulcer Advisory Panel and the European Wound Management Association.
Thursday, 29th August, 8.30
Room N, level 01

Hartmann Breakfast session

HARTMANN Advances in Technology for Pressure Ulcer care

HARTMANN helps healing.
Thursday August 29th

HARTMANN GB – Breakfast Workshop

Thursday, 29th August 2013, Room N

8:00 – 9:00  
**Advances in technology for pressure ulcer care**  
UK delegates are invited to attend this session where, along with HARTMANN GB, Sian Fumarola and Susan Mason, will be discussing the National and strategic agenda with regard to the reporting of pressure ulcers; the practicalities of reporting and the work they have undertaken in the design and development of a new software to enable the tracking of patients with pressure ulcer damage, across areas of care

Interactive discussion and Q&A

**Presenters:**

Sian Fumarola:  
Senior Clinical Nurse Specialist, Tissue Viability, University Hospital of North Staffordshire

Susan Mason:  
Clinical Lead Tissue Viability North Division, Staffordshire & Stoke on Trent Partnership Trust

Sally Nesta:  
Senior product Manager HARTMANN GB
Thursday August 29th

State-of-the-art bioengineering technologies for evaluating support surfaces

Amit Gefen

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Introduction

Pressure ulcers (PUs) tend to develop when soft tissues are subjected to sustained deformations, particularly between a bony prominence and an external support (e.g. a mattress or cushion). One of the most important guidelines for preventing PUs is to use a soft support surface under weight-bearing soft tissues, in order to better distribute contact as well as deep tissue loads. Here we present utilization of MR imaging and computational modeling as state-of-the-art tools for evaluating performances of support surfaces in regulating tissue loads, with focus on the buttocks and heels. Specifically, we demonstrated how MRI is able to provide quantitative and accurate, non-invasive and subject-specific evaluation of deep tissue deformations as well as priorities of alternative heel padding solutions. We further demonstrate how computational finite element (FE) modeling can be based on the MR imaging for studying internal distributions of soft tissue loads, using an example of sitting on an air-cell-based cushion versus foam.

Methods

For direct MRI-based measurements of internal soft tissue deformations in the heel, we scanned healthy males (N=10) at a non-weight-bearing and weight-bearing supine posture, when the foot was at neutral external rotation or upright (Fig 1a) [1]. Three types of heel padding devices were tested per subject (Fig 1b).

![Fig. 1: Scanned configuration of the heel (a) and padding devices (b). The FE model of the (half) buttocks (c).](image)

For quantifying distributions of mechanical strains and stresses in the seated buttocks, we based our FE modeling on a single 4-mm-thick MRI slice acquired from a 21 years-old male, 1 year post a spinal cord injury (subject #5 in our previous work [2]). Segmentation and meshing of the buttocks tissues and cushion were performed using Simpleware® [3]. Loading conditions were chosen to simulate vertical descent of the ischial tuberosity (IT) under the load of the trunk (Fig 1c). Mechanical properties of tissues were adopted from the literature [2,4]. Simulations were all processed using the FEBio 1.5.1 software [5].

Results

The MRI scans of the heels indicated that tissue deformations significantly differed across support devices – which in turn differed in design and material properties. Importantly, it was also shown that these devices could be rated with respect to the criterion of minimization of internal tissue deformations, statistically (per the entire subject group) or for an individual [1]. Coupling FE modeling with MRI provided insights into internal tissue load distributions (as opposed to just spatially-averaged deformations), and could demonstrate the immersion of the buttocks in the air-cell-based cushion and the resulting muscle and fat strains and stresses. The FE simulations indicate that these strains and stresses when a subject is sitting on an air-cell-based cushion are substantially lower than when sitting on standard foam cushions.

![Fig. 2: Intensity of tissue stresses in the seated buttocks on an air-cell-based cushion. Warm colors indicate elevated stresses (in the IT and gluteal muscle tip).](image)

Discussion

It is demonstrated that imaging coupled with FE modeling or even imaging per se provides clinically valuable information on states of deep tissue loads, which is essential, now that the etiology of deep tissue injuries becomes much clearer.

Clinical Relevance

The present approach allows evaluating the effects of designs and materials of support devices on soft tissue deformations for practical, clinically-relevant decision-making of effectiveness in protection against PUs.

Acknowledgements

ROHO, Inc. (www.roho.com); Raphael Rozin Prize for Rehabilitation (2011)

Conflict of Interest

None.

References

Thursday August 29th

The influence of wound healing by electrical stimulation - Facts and level of knowledge

Thomas Wild, Thomas Eberlein

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Introduction

The treatment of wounds by means of electrical stimulation using the physiological fact that skin is electrically charged. In case of breach of the epithelium therefore become an electric current, which initiates the body's own healing processes and then also entertains. Therapy can now be imitated by using a specific technology to restore a physiological situation.

Background

Shown effects of the application of electrical stimulation have one of the highest evidence levels in the field of wound healing. Depending on the application different biological effects have been proven:

• Shown effects of the application of electrical stimulation

Depending on the application different biological effects have been described:


• stimulation of granulation tissue Pullar, CE The biological basis for Electric stimulation as a therapy to heal chronic wounds Journal of Wound Technology, 22555-22562 (2009)

• increase the capacity for collagen synthesis and extracellular matrix substances Pullar, CE The biological basis for Electric stimulation as a therapy to heal chronic wounds Journal of Wound Technology, 22555-22562 (2009); Bourguignon, GJ & Bourguignon, L.Y. Electric stimulation of protein and DNA synthesis in human fibroblasts. FASEB J 1, 398-402 (1987); oldman, R. & Pollack, S. Electric fields and proliferation in a chronic wound model.


• promotion of angiogenesis and activation of the production of growth factors (VEGF shown) Pullar, CE The biological basis for Electric stimulation as a therapy to heal chronic wounds Journal of Wound Technology, 22555-22562 (2009); Kloth, LC Electrical stimulation for wound healing: a review of evidence from in vitro studies, animal experiments, and clinical trials. Int J Low Extrem Wounds 4, 23-44 (2005), Young, M., Arnold, A., Zuder, D., Steel, HW & Heising S. Local therapy and treatment costs of chronic, venous leg ulcers with electrical stimulation (Dermapulse): a prospective, placebo-controlled, double blind trial. Wound Repair Rain 16, 480-487
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• reduction of edema Taylor, K., Mendel, FC, Fish, DR, Hard, R. & Burton, HW Effect of high-voltage pulsed current and alternating current on macromolecular leakage in hamster cheek pouch microcirculation. Phys Ther 77, 1729-1740 (1997); Reed, B.V. Effect of high voltage pulsed electrical stimulation on microvascular permeability to plasma proteins. A


• reduction in pain from wounds Young, M., Arnold, A., Zuder, D., Steel, HW & Heising S. Local therapy and treatment costs of chronic, venous leg ulcers with electrical stimulation (Dermapulse): a prospective, placebo-controlled, double blind trial. Wound Repair Rain 16, 480-487 (2008)

Conclusion

Based on these scientific finding electrical stimulation has to be implemented in the daily praxis of treating chronic wounds like the pressure ulcer.
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Pressure ulcers in the paediatric population

Guido Ciprandi, M.D., Ph.D.

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Introduction

In Paediatric Surgery Pressure Ulcers (PU) are a serious problem, limiting social activities, reducing growth of the youngest as well as the quality of life and resulting in a critical impairment of the biometry, whatever the age of the patient is. Although most hospitals have developed a policy on prevention and management, little is known about PU risks or incidence/prevalence in children nor about appropriate surgical and medical treatment for various anatomical sites. The purpose of this study is to document from a surgical point of view the background of incidence, therapy and follow-up of PUs in hospitalized children.

Methods

From January 2005 until December 2012 (8 consecutive years), PICU, Paediatric and Plastic Surgery Units, Neurorehabilitation Service the and Orthopaedic Unit enrolled 990 PUs out of 1323 Total Complex Skin Lesions, in 712 children with a mean age of 64 months. 58% of patients had more than one PU and the occiput was involved in 38% of the cases. All PUs were staged according the Braden Q Scale and EPUAP criteria. Age, sex, weight, height, functional health at admission, Paediatric Cerebral Performance Category, Primary System Dysfunction, Biometry impairment, concomitant Rare Diseases and Cromosomopathies were analysed. Medical devices, location and skin care practices were part of a wound-care protocol, including different medical and surgical treatment: 1. critical care of 3rd level (advanced dressing and wound bed preparation); 2. critical care of 4th level (NPWT); 3. surgical or autolytic debridement; 4. use of acellular dermal substitute; 5. skin-graft procedures; 6. cellular and scaffold choice using bioengineering techniques.

Results

Only 8.5% of all PUs (84 Pus) have been considered as an endogenous iatrogenic complication, whereas 906 PUs were from other Institutions. All children were submitted to a wound-care protocol; 102 PUs were infected (and 45 required systemic chemotherapy). 55 patients received major surgical cures: all in this group had a Stage III and IV PU, and in 32 cases the lesion was in the gluteo-sacral area. Three adolescents received a transient colostomy because of a huge perineosacral lesion.

Discussion

Prior to the NIH policy statement, children were routinely excluded from PU research because they were believed to occur infrequently in this population. In our study 3 to 6% of the recovered children, 22% of neonates admitted to a NICU and 35% of children present in PICU have to be cured for a PU, and that’s why most paediatric plastic surgeons should be confident with this multiform problem. Immobility, faecal incontinence, PEEP>10mmHg and serum albumin levels<2.5mg/dl are mainly involved in high degree PUs and are poor prognostic factors, every day present in grafted patients. In the future, we advocate an implementation of more preventive strategies together with much more attention paid to paediatric plastic surgical strategies devoted to cure PUs. In addition a strategic use of NPWT should reduce the number of infected lesions submitted to a systemic chemotherapy. Finally, the propeller flaps should reduce the number of necrotised flaps when not properly engraved and the wider use of these techniques must be advocated for paraplegic children together with minor anaesthesiological procedures.

Clinical relevance

1. Accurate assessment of patient risk for pressure ulcers is the first step in guiding appropriate nursing and MD interventions that prevent pressure ulcers. Patient assessment, scoring, and common clinical scenarios are presented in a large and monocentric series. 2. Indications for microsurgical debridement, NPWT as well as propeller flaps in all paediatric ages are reviewed and discussed.
Thursday August 29th

Room O
9.00 – 10.00 Free Paper Session 1
Chair: Jos Schols

Pressure ulcer prevention – is nursing knowledge appropriate or not? A descriptive multi-center study in Sweden
Carina Bååth, Sweden

The current state of pressure ulcer prevention research: “RCT” evidence-based?
Dimitri Beeckman, Belgium

Nurses’ pressure ulcer related judgements and decisions in clinical practice: a systematic review.
Ray Samuriwo, UK

Prevalence and prevention of pressure ulcers in malnourished and non-malnourished Austrian hospital patients and nursing home residents.
Silvia Schönherr, The Netherlands

Establishing the Roles of Allied Health Professionals in Pressure Ulcer prevention
Peter Worsley, UK
Introduction
Most pressure ulcers (PU) are avoidable. However, the prevalence of PU in Sweden remains unacceptably high, 16.6% in hospitals and 14.5% in nursing homes. Despite the importance of PU prevention and development of international evidence-based guidelines, several studies have demonstrated various levels of nurses’ knowledge of risk assessment and PU prevention. The aim of the study was to describe and compare the knowledge of registered nurses (RNs), assistant nurses (ANs), and student nurses (SNs) about preventing PU.

Methods
In total, 415 nurses from hospital wards and student nurses from two universities in the middle of Sweden participated. Data was collected November 2011 to February 2012 where the participants completed a Swedish version of the original Pressure Ulcer Knowledge Assessment Tool (PUKAT). A mean knowledge score of ≥ 60% is considered satisfactory. The PUKAT was translated by three nurse researchers and experts in PU prevention from English to Swedish.

Results
The mean knowledge score for the sample was 58.9%. The highest scores were found in the themes “nutrition” (83.1%) and “risk assessment” (75.7%). The lowest scores were found in the themes “reduction in the amount of pressure and shear” (47.5%) and “classification and observation” (55.5%). RNs and SNs had higher scores on “etiology and causes” and higher total scores than ANs. SNs had higher scores than RNs and ANs on “nutrition”.

Discussion
There is a knowledge deficit in PU prevention among nurses in Sweden. Therefore, a major educational campaign needs to be undertaken. Emphasis should be on understanding the etiology of ulcers and developing of PU. The PUKAT has been extensively validated. However, some limitations should be addressed. Some of the participants found the questions and response alternatives difficult to understand, possibly depending upon differences in context and practice between Sweden and the countries in which the PUKAT was validated.

Clinical relevance
The findings underscore the importance of continuing PU prevention education for nurses, nursing faculty, and nursing students. Nursing leadership at different levels in the health care system and in faculties of nursing education has a significant task to emphasize the core elements in patient care.

Acknowledgements
Christina Lindholm, Sophiahemmet University, and Ami Hommel, Lund University participated in the translation process of the PUKAT.

Conflict of Interest
None

References
The current state of pressure ulcer prevention research: “RCT” evidence-based?
Dimitri Beeckman 1*, Sabine Stordeur 2, Cathy Matheï 3, Aurélie Van Lancker 1, Geert Vanwalleghem 4
Hilde Heyman 5, Julie Nelson 6, Liz Avital 6, Katie Jones 6, Koen Van den Heede 2
1* Ghent University, Belgium, Dimitri.Beeckman@UGent.be
2 Belgian Healthcare Knowledge Center (KCE), Belgium, 3 KULeuven, Belgium, 4 Stedelijk Ziekenhuis Roeselare, Belgium, 5 Sint- Bartholomeus nursing home, Belgium, 6 National Clinical Guideline Center (NCGC), UK

Aim
The aim of this study was to develop a Belgian clinical practice guideline on risk assessment and prevention of pressure ulcers. Recommendations were developed based on a systematic review of randomized-controlled trials (RCTs) and subsequent meta-analyses. Following topics were covered: risk assessment, skin assessment, skin massage, repositioning, redistributing devices, nutrition and hydration.

Methods
The search for peer-reviewed articles included a search in OVID Medline, EMBASE, CINAHL and the Cochrane Library. The search was limited to articles published in English, French and Dutch. No date restriction was used. The search focused on high-quality systematic reviews and RCTs. When RCTs were unavailable the search was expanded to observational studies. For prognostic questions (risk assessment and skin assessment), the search focused on prospective cohort studies. All literature searches were done between March and September 2012. Search strategies were checked by reviewing the reference lists of relevant key papers and requesting the advice of the expert panel about additional papers.

A quality appraisal was done for each individual study and for each outcome. The quality of the retrieved RCTs and observational studies was assessed using the corresponding checklists of the National Institute for Health and Clinical Excellence (NICE).

For each clinical question the quality of the available evidence was summarized for each outcome using the GRADE-system and GRADEpro software. The level of evidence was determined based on the assessment of the risk of bias, inconsistency, indirectness, imprecision, publication bias. A meta-analysis was done using Revman-software. Studies were combined in the meta-analysis if the clinical and statistical heterogeneity were acceptable.

Results
In total, 122 papers were included for review and further analysis. In general, the topics were largely understudied and the (few) published studies are generally underpowered to illustrate clinical effectiveness (or rule out harm). The quality of the evidence ranges between low to very low. The nature of the evidence did not allow to formulate specific recommendations on, for instance, how frequent a patient should be repositioned and what type of mattresses should be used. However, it should be stressed that absence of evidence is not the same as evidence for absence of clinical effectiveness. All results should be interpreted with caution given the major methodological limitations. An overview of the major findings is presented in table 1.

Table 1: Summary of the most important findings

- None of the risk assessment tools nor their thresholds outperform the others to assess pressure ulcer risk.
- No conclusions can be drawn about the prognostic ability of skin assessment methods.
- There is no evidence for clinical effectiveness (or harm) of skin massage to prevent pressure ulcers.
- Evidence indicates that repositioning is clinically effective to prevent pressure ulcers. Yet, no sound evidence was found for the differences between different repositioning regimens (frequency and posture).
- There is evidence illustrating that both constant low-pressure devices as well as alternating pressure devices are clinically more effective than standard foam mattresses to prevent the development of pressure ulcers.
- There is insufficient evidence to determine the clinical effectiveness of profiling beds, seat cushions and various types of face pillows.
- There is evidence that using a pressure relieving device for heel off-loading, combined with the use of a pressure redistributing mattress, is clinically more effective than the use of a pressure redistributing mattress alone. However, there is no clear evidence about which heel ulcer prevention device is clinically most effective.

Conclusions
It is clear that vigorous research efforts are needed to improve the body of knowledge concerning assessment of risk for pressure ulcer development and the effectiveness of preventive strategies. For each of the topics under study there is a need for more independent, well designed multi-centre studies.

Conflict of interest
None
Nurses’ pressure ulcer related judgements and decisions in clinical practice: a systematic review

R. Samuriwo*, D. Dowding  

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Introduction
Most pressure ulcers are believed to be preventable if the appropriate measures are implemented to maintain skin integrity [1, 2]. The delivery of the best possible skin care to patients especially those who are in hospital is largely incumbent upon nurses making accurate judgements and good decisions about preventing and managing pressure ulcers. A detailed understanding of nurses’ decision making can result in improvement in quality and safety of care that patients receive as it enables healthcare commissioners and nurse educators to provide nurses with the cognitive strategies and conditions that they need to make the best possible decisions [3, 4].

Methods
The objective of this literature review was to synthesize the literature on nurses’ pressure ulcer related judgements and decision making in clinical practice. Key electronic databases were searched for studies that examined how nurses make pressure ulcer related judgements and decisions published in English from 1992 onwards. Selected abstract and full text articles were independently reviewed by both authors and a consensus reached on the articles to be included in this review. Selected studies were critically appraised using appropriate criteria [5, 6]. Data from these studies was synthesized into the themes presented in the findings.

Findings
Seventeen papers were identified which examined different aspects of nurses’ pressure ulcer related judgements and decision making. These papers provided an insight into the reasoning behind and the accuracy of nurses’ judgements about the risk of pressure ulcers, nurses’ about grading of pressure ulcers and nurses’ decisions about care to prevent or manage pressure ulcers.

Discussion
The 17 studies used different research methodological approaches, which make it challenging to make meaningful comparisons. Most of these studies were undertaken with small groups of settings who worked in specific settings and therefore their findings may not be applicable to all settings. Despite, these limitations, these studies provide a valuable insight into nurses’ pressure ulcer related judgements and decision making in clinical practice.

The evidence that is available has its limitations, but it suggests that nurses’ pressure ulcer related judgements and decision making are subject to environmental factors in clinical practice. The findings of the studies reviewed also indicate that the manner in which nurses prioritise and deliver care to prevent pressure ulcers in clinical practice is not always consistent with the guidelines for best practice. More research into nurses’ pressure ulcer related judgements and decision making is also needed in order to clarify the measures that can be implemented to ensure that nurses deliver the best possible skin care at all times.

Clinical relevance
Understanding how nurses make pressure ulcer related judgements and decisions is important, in order to provide insights into how to improve clinical practice and nurse education. This systematic review provides a key insight into the reasoning process that underpins nurses’ pressure ulcer related judgements and decision and the accuracy of these decisions and judgements.

Conflict of Interest
One of the reviewers (DD) wrote a paper that was included in this review, but was not involved in its appraisal or data extraction until data synthesis. No other potential conflicts of interest.

References
Prevalence and prevention of pressure ulcers in malnourished and non-malnourished Austrian hospital patients and nursing home residents

Silvia Schönherr 1*, Ruud JG Halfens 2, Christa Lohrmann 1

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2 Department of Health Services Research, Focusing on Chronic Care and Ageing, Maastricht University, the Netherlands

Introduction
Malnutrition is a significant risk factor for developing pressure ulcers (PUs) and/or impaired PU healing. International studies found that malnutrition occurred in up to 60% of hospitalized patients and in up to 85% of nursing home residents [1]. The aim of this secondary data analysis is to describe the prevalence and prevention of PUs in malnourished and non-malnourished hospital patients and nursing home residents in Austria.

Methods
The Austrian version of the Prevalence Measurement of Care Problems is a multicentre, cross-sectional study which is performed annually in hospitals and nursing homes [2]. For data collection purposes a standardized and tested questionnaire is used. From 2009 to 2012, data from 9861 hospital patients and 3577 nursing home residents were obtained.

Results
Malnutrition occurred in 20.2% of hospital patients and 24.1% of nursing home residents. Malnourished patients and residents had significantly more often PUs as compared to non-malnourished patients and residents (Figure 1).

* *p ≤ 0.001 between malnourished and non-malnourished patients and residents
Table 1: Prevention of PUs in malnourished/non-malnourished hospital patients and nursing home residents at PU risk (%)

<table>
<thead>
<tr>
<th>Prevention of PUs</th>
<th>Hospitals</th>
<th>Nursing homes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repositioning</td>
<td>29.5</td>
<td>25.8 *</td>
</tr>
<tr>
<td>Prevention of dehydration and malnutrition</td>
<td>25.2</td>
<td>18.4 *</td>
</tr>
<tr>
<td>Information and instruction</td>
<td>27.9</td>
<td>28.7</td>
</tr>
<tr>
<td>Floating heels</td>
<td>31.4</td>
<td>29.8</td>
</tr>
<tr>
<td>Moisturizer</td>
<td>63.2</td>
<td>63.3</td>
</tr>
<tr>
<td>Other</td>
<td>4.4</td>
<td>4.0</td>
</tr>
<tr>
<td>Total</td>
<td>998</td>
<td>1995</td>
</tr>
</tbody>
</table>

*p ≤ 0.05 between malnourished and non-malnourished patients and residents M+ malnourished M- non-malnourished

Discussion
PUs were significantly more common in malnourished patients and residents than in non-malnourished patients and residents, although the PU-categories were not higher than in non-malnourished patients and residents. One of the most popular PU-preventive interventions – repositioning – was significantly more often performed in malnourished patients and residents.

Clinical relevance
The data show that nurses are aware of the role of malnutrition as a risk factor for PUs, because malnourished patients and residents at PU risk received PU-preventive interventions like repositioning and prevention of malnutrition more often than non-malnourished patients and residents at PU risk. Nevertheless, PU-preventive interventions should be enhanced in all at-risk patients, especially in hospitals.

Acknowledgements
We appreciate the help of all participating institutions, nurses, patients and residents.

Conflict of Interest
There is no conflict of interest.

References
Establishing the Roles of Allied Health Professionals in Pressure Ulcer Prevention

P.R. Worsley, L. Schoonhoven, D.L. Bader,
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Introduction
There are many different clinical guidelines on the prevention of pressure ulcers [1]. Although these guidelines refer to ‘Health Care Professionals’ in the guidance it appears to target predominantly nursing staff. Other allied health professionals (AHPs) such as physiotherapists and occupational therapists are responsible for positioning and mobilising patients as part of their rehabilitation techniques. To achieve success in pressure ulcer prevention, all the members of the multidisciplinary team (MDT) are needed, as no one profession has all the required skills [2]. Research is needed to determine the most effective techniques to promote interdisciplinary knowledge sharing and long-term implementation into routine practice.

Aims of study:
1. To study the views of AHPs regarding pressure ulcer prevention.
2. Assess the knowledge and attitudes towards pressure ulcer prevention.

Methods
One focus group was conducted with AHPs (8 participants, four physiotherapists and four occupational therapists). All participants had at least 2 years of clinical experience. Participants were recruited from a large University Hospital in the South of England (University Hospital Southampton Foundation Trust). The Focus group lasted one hour where participants were encouraged to share their view surrounding current pressure ulcer prevention and ideas on how a MDT approach can be implemented. Interviews were recorded and transcribed verbatim, with subsequent constant comparison analysis to draw out key themes. In addition to the focus groups all participants received standardised psychometric questionnaires to evaluate knowledge and attitudes to pressure ulcer prevention and management [3,4].

Results
Key themes from the focus groups regarding barriers to prevention included;
- A lack of basic staff training
- Access to facilities/resources for prevention
- A lack of communication both on admission and discharge.

All the staff highlighted that they feel pressure ulcer prevention is high on their agenda, but increasing demands in other areas of healthcare mean focused attention can be difficult. Suggestions for future MDT practice were;
- A specialist MDT team designed to provide preventative advice and support
- Designated time for communication between professions during inpatient stay.
- Inter-disciplinary teaching sessions.

The questionnaires revealed that AHPs had reasonable knowledge of pressure ulcer prevention and aetiology with a median score of 17 out of 26 (range 13-20). Highest scores (median >80% correct answers) were observed in the classification and nutrition elements of the questionnaire. Lower scores were observed in risk assessment and some elements of prevention (Table 1).

Discussion
This study has shown the potential and willingness of staff to develop a MDT approach to pressure ulcer prevention. AHP attitudes towards pressure ulcers and knowledge of prevention were comparable to previous studies on nurses and nursing students [4].

Clinical Relevance
Pressure ulcers are one of the key ‘quality of care’ indicators in the National Health Service (NHS) and all members of the MDT have a responsibility to prevent pressure ulcers. Further work is needed to establish views/knowledge of all healthcare members to inform future design of MDT preventative strategies.

Conflict of Interest
There are no conflicts of interest.

References
Thursday, 29th August, 9.30 – 11.00
Room N, level 01

Workshop
How to measure pressure ulcer management improvement

Chair: Jan Kottner, Germany
Have we been successful? How to compare pressure ulcer frequencies within quality improvement contexts?

Jan Kottner
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Introduction
Institutional acquired pressures ulcers (PUs) are regarded as important outcome indicators for measuring the quality of care. Numerous quality improvement initiatives aim at improving the quality of PU prevention to finally reduce PU incidence. A vital step within the quality improvement cycle is to evaluate whether the improvement strategy was successful. Above all one needs to decide, whether PU incidence decreased, remained stable, or even increased [1]. Finding valid answers to these questions is a major challenge, because figures are influenced by various sources of bias. Even if sophisticated methods for risk-adjustment and standardization are used, there is still one source of error in the outcome that needs to be adequately taken into account: random or chance variation.

Theory of Statistical Process Control
One way to deal with random variation in PU incidence figures is the application of Statistical Process Control (SPC) thinking. A basic assumption within this theoretical framework is that in complex processes there are no two processes or outcomes that are exactly identical or predictable to 100% [2]. In other words, due to the infinite range of influencing PU care factors (e.g., skills of professionals, types of patients, workload, daytime, availability of support surfaces, and many more) variation is inherent in every PU care activity and outcome. This complex interplay of known and unknown factors can be regarded as a system that produces variable outcomes. However, as long as the system operates stable under similar conditions the outcome is variable but predictable within limits ("common cause variation"). The basic idea of quality improvement is to change such stable systems to produce a "better" outcome that is decreased PU incidence ("special cause variation"). SPC theory provides tools to help to decide, whether the new but still variable outcome is "really" better.

Statistical Process Control tools
A simple but powerful analytical tool to evaluate variation within healthcare processes and outcomes are run charts (Fig. 1). Based on established interpretation rules common cause and special cause variations can be detected. Compared to run charts, control charts additionally display so-called control limits (Fig. 2). Data points above the upper or below the lower control limits are considered to be special cause variations.

Fig. 1: Run chart: Pressure ulcer incidence
Fig. 2: Control chart: Pressure ulcer incidence (p-chart)

Learning aims for the workshop
The attendee…
…understands the role of variation in PU process and outcome data.
…understands the basic principles of SPC.
…interprets run and control charts.

Clinical relevance
Numerous financial and personal efforts are invested worldwide on improving PU prevention. SPC techniques can help researchers and practitioners to determine whether there were real changes in outcomes.

Conflict of interest
None.

References
Thursday, 29th August, 11.30 – 12.30
Auditorium, Room B level 02

EPUAP/EWMA joint session
Experience and evidence in pressure ulcer prevention and management
Do pressure Ulcers result in Pain?

Epidemiological Study in Hospital and Community Services

Alves, Paulo1,2, Amado, João1, Vieira, Margarida1

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2Portuguese Wound Management Association - APTFeridas

Introduction
Pressure ulcers occur in diverse care settings with high prevalence rates and represents suffering for patients and families. Pressure, shear, malnutrition and underlying disease morbidity are the major causes of pressure ulcer development, and can result in death, suffering and pain. Pain is often described as an significant clinical factor by both patients and providers, but pain associated with pressure ulcers remains unclear. Despite the need of more evidence in this area and the subjectivity of the theme, "pain" is always present in patients or providers with pressure ulcers. Pressure ulcers are painful, most patients report pain as "constant", and pain assessment should be included in all patient care plans (1,2). patients with chronic wounds experience wound-related pain(3,4).

Research regarding the multidimensional aspects of pressure ulcer pain is strongly recommended (5). To assess the state of knowledge of pain with pressure ulcers

Methods
A cross-sectional study, quantitative, descriptive, observational, multicentre, stratified random sample of the Portuguese Population. The Country was divided in districts, split in Hospital Care and Community care and then stratified the sample according to specificity study of wounds and this total population, and assuming an error of 1% with a confidence level of 99%. A validated questionnaire that included the method suggested by the European Pressure Ulcer Advisory Panel to study prevalence of pressure ulcers and the Measurement tool used to assess pain was Visual Analogue Scale. Statistical Package for Social Sciences (SPSS) software was used for statistical analysis. The facts were observed, recorded and interpreted without any manipulation of variables by the researcher. Because it is cross-sectional study there was no follow-up period of individuals.

The study design was adequate to provide estimates of prevalence and analysis of risk factors for pressure ulcers and chronic wounds, as well as to identify pain during the day and during the treatment period (wound dressing changes) in these patients. The research received approval from ethics committees and was preceded by informed consent of participants.

Results
The sample consisted on 4132 patients with wounds, from a total of more than 15000 patients observed from 10 of the 18th Districts of Portugal. There were a total of 7435 wound on average, each patient had wounds 1.80. Mostly female (58%) and the median age 63.7 years (SD 20.7). Regarding the primary diagnosis the most recorded the most prevalent were hypertension in 40.2% of patients admitted, followed by diabetes with 22.5%. Immobility 9.8% associated with neurological affections with dementia, Parkinson, Alzheimer, stroke / TIA who usually leave squel. and underlying disease morbidity are the major causes of pressure ulcer development, and can result in death, suffering and pain. Pain is often described as an significant clinical factor by both patients and providers, but pain associated with pressure ulcers remains unclear. Despite the need of more evidence in this area and the subjectivity of the theme, "pain" is always present in patients or providers with pressure ulcers. Pressure ulcers are painful, most patients report pain as "constant", and pain assessment should be included in all patient care plans (1,2). patients with chronic wounds experience wound-related pain(3,4). Research regarding the multidimensional aspects of pressure ulcer pain is strongly recommended (5). To assess the state of knowledge of pain with pressure ulcers

Some participants, regardless of wound type, could not describe the experience wound pain, related to sedation or analgesia but persons with venous, traumatic and pressure ulcers had more wound-related pain than the others.

More research should be done regarding assessment and implementation of pain protocols. Would be important to apply institutional measures that focus on pain management for patients Control wound pain can play a major role in enhance patient quality of life

Clinical relevance
This work has resulted in evidence that can contribute to decision making, as well as support future investigations. This study was Clinical relevant.

References
Thursday, 29th August, 11.30 – 12.30  
Room L/M, level 01

Workshop Best practice in pressure ulcer prevention

Chair: Alfred Steininger

Best practice of Industry in Austria  
Torsten van Steelandt, Austria

Education of Patients and Carers  
Elfriede Binder, Austria
According to experience communication is the most probable reason of acts and decisions. The consideration of consultations with patients and carers for instance leads to the following fundamental questions:

*Is the demand of education identified?*

*Who briefs and what is done to check whether the information reaches the recipient?*

*Are the consultations mutually satisfactory?*

*How is the understanding of the delivered handouts and booklets?*

Analyses of the current situation indicate frequently misapprehensions and precariousness. But the recipients of benefit gain more and more self-confidence and ask for an active involvement. Furthermore expert support, for example from patients’ ombudspersons, is obtained.

By means of practice-oriented reflections efficient and effective possibilities are demonstrated, which are able to impact positively on everyday situations.
Thursday, 29th August, 11.30 – 13.00
Room N, level 01

ArjoHuntleigh Symposium

ArjoHuntleigh
GETINGE GROUP
Thursday August 29th

ArjoHuntleigh Sponsored Satellite Symposium EPUAP August 29th 2013
Room N Thursday August 29th 11.30am – 1.00pm

Symposium Title:
Microclimate management a new approach to improve skin integrity; what is the clinical relevance?

Symposium abstract:
The maintenance of skin integrity involves a careful balance of external loads and intrinsic factors. The external loads and forces should not cause damage to the skin while considering the general health of the person and the ability of their skin to resist damage. In the past there has been a focus on providing optimal support surfaces for at risk patients that reduce mechanical load on the skin. In addition to this, today there is a need to consider interventions that modifying the environment at or near the skin surface (Wounds International, 2010).

In wound care microclimate is a term used to describe the interface between the skin and the surface with which it is in intimate contact. Microclimate refers primarily to the temperature of the skin or the soft tissues and humidity of skin surface moisture levels (Clark and Black, 2011). A poor microclimate, which results in skin that is too warm and too moist, reduces the resilience of the skin increasing its susceptibility to damage from pressure, shear or friction. Managing the skin microclimate may involve controlling the general environment such as; maintaining an optimum room temperature, avoiding the use of synthetic materials against the skin or using specific equipment to control the microclimate. These interventions may include the use of warming devices to prevent the tissues becoming too cold when patients have long periods in theatre (NICE, 2008) or specialist devices that keep the skin dry and at an optimum temperature e.g. Skin IQ™ MCM (Clark and Black, 2011).

Learning objectives;
Through attending this symposium participants will;
- Gain knowledge on concepts of microclimate management
- Understand the biomedical technological basis for mechanisms for managing moisture at the patient-surface interface
- Reflect on clinical relevance of these concepts on bedside care in practice

Chair:
Amit Gefen PhD, Associate Professor in Biomedical Engineering, Tel Aviv University, Israel and in-coming President European Pressure Ulcer Advisory Panel.

Speakers:
- Dan Bader DSc, Professor of Bioengineering and Tissue Health, University of Southampton, UK - 20 minutes – Microclimate management and tissue integrity; research leading to evidence based results
- Angel Delgado PhD, Director, Global Clinical Development & Clinical Sciences at ArjoHuntleigh, San Antonio, Texas, USA – 20 minutes – The science behind a novel approach to microclimate management
- Jean M. de Leon M.D., Professor, Department of Physical Medicine & rehabilitation, University of Texas Southwestern Medical Center, Dallas, Texas, USA - 20 minutes – Microclimate management approach to improve clinical outcomes
Thursday August 29th

Room O
11.30 – 12.30 Free Paper Session 2
Chair: Lisette Schoonhoven

The Use of Hemoglobin Saturation Ratio as a Means of Measuring Tissue Perfusion in the Development of Heel Pressure Sores
Kristen Aliano, USA

Multi-Modal Framework for Subject-Specific Finite Element Modeling of the Buttocks
Bucki M, France.

External Force Depression and External Force Undermining in Pressure Ulcers Caused by Nursing Care -The Mechanism and Evidence in Histological Findings-
Takehiko Ohura, Japan

Two Types of Undermining in Pressure Ulcers - Classification and Mechanism -
Takehiko Ohura, Japan

Evaluation of a Prototype Turning Mattress for the Prevention of Pressure Ulcers.
Peter Worsley, UK
The Use of Hemoglobin Saturation Ratio as a Means of Measuring Tissue Perfusion in the Development of Heel Pressure Sores

Kristen Aliano MD 1*, Steve Stavrides PA-C 2, Bobby Mathews PA-C 2, Thomas Davenport MD 2

1* Long Island Plastic Surgical Group, USA, kaliano@lipsg.com
2 Long Island Plastic Surgical Group, USA,

Introduction
The heel is a common site of pressure wounds. The amount of pressure and time needed to develop these wounds is dependent on various factors including pressure surface, patient's anatomy, and co-morbidities. We studied the use of the hemoglobin saturation ratio as a means of assessing heel perfusion in various pressure settings. This technology has previously been used in the assessment of lower extremity perfusion and for breast reconstruction flap monitoring [1 and 2].

Methods
The mixed perfusion ratio in the heels of five volunteers was assessed on three pressure surfaces and at off-load as a baseline using the ViOptix T.Ox™ Tissue Oximeter (ViOptix; Freemont, CA; Fig. 1). The surfaces studied were stretcher pad, plastic backboard without padding, and pressure reduction gel. Each surface was measured for five minutes with a real time reading.

Results
On the stretcher, the average StO2% decrease was 26.2± 10 (range 18-43). The average StO2% decrease on the backboard was 22.8 ± 12.3 (range 8-37), and 24.0 ± 4.8 (range 19-30) on the gel pad. The StO2% drop had a leveling off with stretcher, and gel pad but with backboard had a continued slow drop at 5 minutes.

Discussion
This study demonstrates that hemoglobin oxygenation ratio can be used to assess a tissue's direct perfusion in the setting of tissue pressure and can also be used to better assess the effects of pressure reduction surfaces. Using this method, a comparison of surfaces reveals a continued drop with a hard surface and plateau with all other surfaces. A comparison of gel versus stretcher shows a comparable reduction in tissue perfusion and therefore a similar pressure and shear reduction effect. While oxygenation ratios can be used to assess pressure precautions in skin care, further studies will be needed to determine time to skin breakdown as they pertain to pressure and tissue oxygenation.

Clinical relevance
This technology can be used as a screening tool to see which patients have decreased perfusion to certain parts of the body, and are thus more likely to develop a pressure wound.

Acknowledgements
We appreciate the help of the staff of Winthrop University Hospital.

Conflict of Interest: None

References
Multi-Modal Framework for Subject-Specific Finite Element Modeling of the Buttocks

Bucki M.1*, Payan Y.2, Cannard F.1, Diot B.3, Vuillerme N.4,5

1* TexiSense, France, marek.bucki@texisense.com
2 TIMC-IMAG UMR CNRS 5525, France, 3 IDS, France, 4 FRE 3405 AGIM CNRS-UJF-UPMF-EPHE, France, 5 IUF, France

Introduction
Biomechanical finite element (FE) modeling of the buttocks soft tissues is essential for an efficient prevention of pressure ulcers. Indeed, internal deformations not only depend on external skin pressures, but also on each individual's morphology. This abstract presents a fast, automatic and robust technique for the generation of patient-specific models to be used within a personalized pressure ulcer prevention strategy. The technique resorts to multiple complimentary modalities to gain insight at the patient's morphology while maintaining an acceptable prevention benefits vs imaging risks (or costs) ratio.

Methods
In order to produce high quality personalized FE models, it is necessary to resort to medical imaging and acquire the most relevant possible description of the modeled morphology. Yet building a FE model from a medical data set can be a challenging and time consuming task. To overcome the commonly encountered problems, a “mesh warping” approach has been chosen for its versatility [1]. In this framework, a generic or “atlas” model representing a typical organ is first assembled. Then, for each patient the atlas model is warped, or registered, so that its shape accurately represents the target morphology. An economically acceptable and practical image acquisition workflow must be designed in order to make personalized biomechanical modeling suitable for the largest number of wheelchair-ridden persons. We propose to use three different modalities providing an increasing insight at the patient’s morphology: (1) Kinect surface scanner (giving access to the external shape of the organ only, the internal structures are inferred by the registration process); (2) EOS bi-planar X-Ray imaging (skin surface and bony structures can be reconstructed, other soft tissues are inferred); and (3) CT for validation purpose only as the modality costs and irradiation may not even out its benefits.

Results
The atlas FE mesh was produced using a hexahedral dominant meshing technique [2] and comprises 14,868 elements (8,052 hexahedrons, 2,554 pyramids, 2,534 tetrahedrons and 1,728 prisms). The pelvis and femurs are considered as fixed rigid bodies. The EF mesh registration procedure was tested on 3 young healthy subjects (2: Kinect only, 1: CT). In all cases skin surface representation mean error was less than 1mm. Pelvis and femurs were modeled within segmentation accuracy in the CT case. Fig. 1 illustrates the FE mesh personalization workflow in the case where only the external Kinect scan is available.

Discussion
The presented modeling framework takes into account restrictions on the availability of medical images in situations where the benefits of the ulcer prevention strategy are deemed insufficient in regard of the imaging costs or incurred radiations. A low-cost and radiation-free scenario based on the publicly available Microsoft Kinect is proposed. The approximations in the biomechanical model when imaging of internal structures is not available are currently under study and will be published once a corpus of “ground truth” CT exams has been collected and processed.

Clinical relevance
The modeling technique enables the implementation of personalized biomechanical modeling of soft tissues.

Acknowledgements
The authors wish to thank the ANR TecSan IDS project and CAMI Labex for their support.

Conflict of Interest
Some authors are involved with the TexiSense Company (http://www.texisense.com/home_en).

References

Fig. 1: Kinect-based FE model generation (sagittal view).
External Force Depression and External Force Undermining in Pressure Ulcers Caused by Nursing Care

-The Mechanism and Evidence in Histological Findings-

Takehiko Ohura MD PhD1*, Hiroshi Nishihara MD PhD2*

1* Pressure Ulcer & Wound Healing Research Center (Kojin-kai), Japan, t-ohura@mb.snowman.ne.jp,
2* Department of Translational Pathology, Hokkaido University, Graduate School of Medicine, Japan, hnishihara@med.hokudai.ac.jp

Introduction
External Force Depression (EF-Dp) and External Force Undermining (EF-Un) are mainly caused by the loading of external force, such as repositioning, bed operation and diaper changing during nursing care. The onset mechanism of EF-Dp and EF-Un is due to pressure loading and tangential or vertical soft tissue movement affecting the wound and in addition, the existence of a bony prominence.

Mechanism
1. EF-Dp
In pressure ulcers, depressions in the wound and the granulation lumps, balls and flaps which are often seen in deep wounds and notches or indentations of the wound edge are evidence of pressure and shear force loading by repositioning and nursing care. This wound surface change teaches us a mysterious story and sometimes we have to be like Sherlock Holmes to find the important clues! The relationship between particular symptoms and nursing care, for instance repositioning and diaper changing are clarified due to keen observation of wound changes.

2. EF-Un
As far as the direction of EF-Un from the wound edge is concerned, the direction points towards the bony prominence site. The wound margin facing the undermining is freed from the wound bed while the wound margin not facing the undermining adheres closely to the wound bed. The epithelial growth from the edge of the wound, which begins to migrate and advances over the ulcer surface, is recognized in the wound margin. Such manifestations indicative of healing tendency are inconspicuous along the wound margins in the case of EF-Un.

Histological findings
The mechanism of EF-Un formation is identified in the histological findings. The interactive abrasion and rubbing between wound bed and canopy tissue caused the repeated exfoliation to the surface of the granulation tissues. This in turn caused the collagen fiber layer, which usually exists in the deep layer, to become shallow, and sometimes exposed to the air. The pivot area of undermining does not have granulation tissue due to repeated moving and rubbing but a collagen fiber layer can be observed. These two major phenomena in histological findings is evidence of the cause of EF-Un, such as repeatedly loading of the external force between both wound bed and canopy in the granulation tissue. The common structure of granulation layer is disturbed in order, due to repeated exfoliation and regeneration, often losing layers and lastly losing cell activity and potential regeneration.

Discussion
Recently I can say with confidence that repositioning by human power is “A double edged sword” from the view of wound healing and prophylaxis in pressure ulcers. Namely EF-Dp and EF-Un are caused by nursing care, especially, repositioning, diaper changing and bed operation. The histological finding of EF-Un and EF-Dp is a telltale sign for a history of previous inadequate nursing care. For instance, formation by repeated abrasion or rubbing between the wound bed and the canopy tissue, sometimes causing the soft tissue around the wound to move into the wound and revealing the resulting EF-Dp and EF-Un.

Clinical relevance
I am in a position to be able to observe the whole development process of thousands of pressure ulcer from the beginning to the end. In addition to the above role, I have taken 73 cases of the biopsy of granulation tissue.

Conflict of Interest
There is no conflict of interest.

References
Two Types of Undermining in Pressure Ulcers
- Classification and Mechanism -

Takehiko Ohura MD PhD

Introduction
There are two types of undermining in pressure ulcers and their progresses are quite different. One type of undermining, Necrotic Tissue Discharge-Undermining (NTD-Un) heals quickly, however, the other, External Force Undermining (EF-Un) is more difficult to heal. Few people know that the combination of shear force and pressure when loaded on the tissue near a bony prominence generates a large magnitude of compression inside the body. As a result, the upper part of the soft tissue and deep tissue near the bone are affected simultaneously at the time of pressure ulcer onset. This phenomenon leads to damage simultaneously both in the upper surface of the soft tissue and the deep tissue near the bone. Therefore, the possibility of an hourglass-shaped necrosis in the cross section of the affected tissue occurs and also a sandwich-shaped necrosis in a clinical situation.

Mechanism
1. NTD-Un
Stage III and IV pressure ulcers, especially, begin a severe and extensive necrosis and then the histolysis and discharge of necrosis progresses. Cross sections of these phenomena viewed by a CT-scan or ultrasonography reveal an hourglass-shaped necrosis. After histolysis and discharge of necrotic tissue, the resulting space where necrotic tissue existed becomes a cavity beneath the healthy skin surrounding the ulcer. This is NTD-Un, when viewed from the surface

2. EF-Un
EF-Un develops in the middle or the late phase of pressure ulcer healing. The cause of EF-Un is external force loading, for instance, repositioning, bed operation and diaper changing are the main causes.

Incidence of undermining
The present study analyzed stage III and IV pressure ulcers and cases of so-called DTI pressure ulcers that were treated and followed from the onset to the end. The study population comprised of 805 patients with stage III and IV pressure ulcers who were treated by the author’s group until the ulcers were cured in the 6-year period from 2004 to 2010. Of these patients, those who died within 4 weeks after pressure ulcer onset and those who transferred to other hospitals were excluded. Of the 805 cases with deep pressure ulcers 342 cases showed the existence of undermining (42.5%). Of all patients, including those with NTD-Un and those who had no symptoms of undermining, 26.3% developed EF-Un after 200 days post pressure ulcer onset due to external force loading having occurred. For purposes of this study data was divided into two groups: 1) Cases cured before the 200 day post pressure ulcer onset limit and 2) Cases cured post the 200 day pressure ulcer onset limit respectively.

Result

Conclusion
It was found that repositioning often had a negative effect on the clinical treatment of pressure ulcers. Caregivers should use repositioning gloves and a slippery sheet so that the gloved hands can be easily inserted under the patient’s body directly to the site of bony prominence without any pushing or pulling of the soft tissue to the wound. Caregivers should put gloved hands and forearms together and draw the prominent bone region towards them in a sliding motion.

A second option to solve this issue is to give up repositioning by human hands, and leave it to special high functioning mattresses which can automatically reposition the patients.

Clinical relevance
I am in a position to be able to observe the whole development process of thousands of pressure ulcers from the beginning to the end.

Conflict of Interest
There is no conflict of interest.
Evaluation of a Prototype Turning Mattress for the Prevention of Pressure Ulcers.

M. Woodhouse, P.R. Worsley, D. Voegeli, D.L. Bader,

Clinical Academic Facility, Faculty of Health Sciences, University of Southampton
D.L.Bader@soton.ac.uk

Introduction
Recent International Guidelines for pressure ulcers (PU) recommend that vulnerable individuals are repositioned regularly, regardless of the support surface [1]. To prevent PUs both pressure and shear have to be minimised by using support systems and by regularly turning bed-bound patients. A new prototype developed by Hill-Rom combines both strategies. It consists of a mattress that is designed to minimize tissue deformation and ischemic damage by turning patients mechanically on an air mattress with localized alternating low pressure. The mechanical tilt behaviour of the bed is termed Lateral Pressure Redistribution (LPR) therapy. In this volunteer study we addressed the following questions:

1. Does a mechanical tilt lead to adequate tissue viability in the sacral area?
2. Does the mechanical tilt produce similar effects to a clinical manual turn?

Methods
A total of 10 healthy volunteers, age 23–65 years, were recruited into the study. The test protocol was approved by the Local Faculty Ethic Committee. The study involved a surface prototype, which was divided into two sections. The sacral section was supported by alternating low pressure (ALP) with maximum pressure values adjusted to subject morphology [2]. The rest of the support surface was set at continuous low pressure (CLP). In addition, two air bellows were present at the base of the mattress along its length which provided a tilt mechanism. Transcutaneous gas electrodes (Radiometer, Denmark) were attached to the mid-area of the sacrum and the right scapula. Each volunteer was then carefully positioned on the activated mattress, the surface of which was covered by a 96 cell mat attached to a pressure monitor (Talley Mark III). Interface pressures were recorded before/after each test period. The gas tensions (\(T_{cPO2}\)/ \(T_{cPCO2}\)) were measured throughout the 60 min. test period involving two complete LPR turn cycles (right turn, horizontal, left turn, horizontal).

On a separate session, each volunteer was subjected to a test protocol on the LPR with deactivated turning mechanism. In this case, manual repositioning with pillow-support was adopted. For both measurement sessions, an inclinometer measured tilt angles at three locations, and comfort scores were completed.

Results
Analysis of the LPR data revealed the majority of sacral values for the volunteers were considered to be at minimal risk of compromised tissue viability, as defined by \(T_{cPO2}\) values consistently above 30mmHg and \(T_{cPCO2}\) between 36mmHg and 44mmHg [3] (Table 1). However, in some cases, there were compromised \(TcPO2\) levels at the shoulder during the turn and subsequent horizontal phases. A similar trend was observed with the manual turn protocol.

Table 1. Percentage of volunteers within each risk category for \(TcPO2\) during each turn cycle, as previously defined [2].

<table>
<thead>
<tr>
<th>TCM reading</th>
<th>Turn phase</th>
<th>LPR</th>
<th>MANUAL</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>No Risk</td>
<td>Mod Risk</td>
<td>High Risk</td>
</tr>
<tr>
<td>Sacral</td>
<td>Supine</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Left</td>
<td>60</td>
<td>20</td>
</tr>
<tr>
<td>Shoulder</td>
<td>Supine</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Left</td>
<td>60</td>
<td>20</td>
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</tbody>
</table>

During the manual turn median interface pressures did not differ significantly compared with the LPR protocol, although there was greater variability in the peak sacral pressures during the manual turn (Fig 2). Participants reported high levels of comfort during the entire turn cycle for both turning techniques.

![Fig 2. Peak sacral pressures during the LPR and Manual turn protocols.](image)

Discussion
The lateral rotation feature appeared effective in maintaining tissue viability at the sacrum, although compromised shoulder \(TcPO2\) was observed in some conditions. Interface pressures and comfort scores were similar between manual and LPR turning cycles.

Clinical Relevance
Novel technologies which mimic patient repositioning have the potential to aid current clinical practice. Future studies will assess the efficacy of this therapy with at risk patients.

Conflict of Interest
The prototype system was kindly supplied by HillRom.

References
Eliminating Hospital Acquired Pressure Ulcers: If Not Now, Then When?

Nancy E. Donaldson PhD, RN, FAAN

Collaborative Alliance for Nursing Outcomes (CALNOC), USA, Nancy.Donaldson@calnoc.org

Introduction
Hospital acquired pressure ulcers (HAPUs) are an iatrogenic consequence of patient care that is ubiquitous. HAPUs were among the first nursing sensitive indicators of patient care quality in hospitals [1] [2]. Now public reporting of hospital pressure ulcer (PU) rates, value based funding, and the increasing cost of HAPU amelioration have converged to drive strategic efforts to improve HAPU processes and outcomes. This paper traces the HAPU performance of hospitals participating in the Collaborative Alliance for Nursing Outcomes (CALNOC) benchmarking registry over eight years. Pressure ulcer processes are studied as well as the effects of age, Braden Scale score, and having a medical diagnosis on outcomes [3] [5]. The paper further examines multivariate predictors of HAPU at the unit level and provides direction for strategic efforts to eliminate HAPU.

Methods
Standardized PU prevalence methods and medical record review were used. The sample included 78 hospitals that collectively reported prevalence studies involving 258,456 patients over the 8-study years (2003-2010). Analyses were performed with repeated measures regression models. HAPUs were further modeled for 215 hospitals using the discrete Poisson regression.

Results
Findings reveal a significant decrease in HAPU across the 78 acute care hospitals (p<0.001). HAPU approached zero (HAPU 1.8) by 2010 and all stages of HAPU decreased, while CAPU remained stable. Of the covariates, medical diagnosis increased statistically and clinically over time. Decreased HAPUs were predicted by a combination of unit/patient characteristics. Data affirm the importance of reliable processes of care linking risk screening and assessment with evidence-based early intervention and prevention bundles of care.

Discussion
Access to and use of benchmarking structure, process and outcome data is crucial to managing variation in performance and in achieving dynamic performance improvement. The return on investment needs to be considered in building and sustaining effective HAPU prevention programs [5].

Clinical relevance
These findings highlight the capacity of hospitals to transform patient care and virtually eliminate an ancient nosocomial threat to patient care quality, costs and outcomes.

Conflict of Interest
Dr. Donaldson is CALNOC Senior Scientist Emeritus and a member of the CALNOC Board of Directors.

References
Thursday August 29th

Thursday, 29th August, 14.00 – 15.00
Room L/M, level 01

Workshop

The management of deep pressure ulcers
Delic Javorka, Serbia

Enthusiasm
Markus Duft, Austria
The management of pressure ulcers

Javorka Delic, Serbia

Pressure ulcers (PUs) are most frequent in the elderly population, but are not specific. PUs are specific for some diseases and injuries associated with immobility—stroke, myelitis, motor neurone disease, multiple sclerosis, Parkinson's syndrome, neuritis, dementia, trauma. The risk factors are malnutrition, age, contracture, incontinence, inadequate hydration, inadequate care, co-morbidities.

The distribution of PUs in a study of non-hospital patients with chronic wounds (n = 240) is 2.3% of all, in stages I and II (Delic J, 2009). In home care conditions the prevalence is from 2.6 - 24% (Huljev D, 2012).

In hospital conditions, in non-selected patients, the prevalence is from 12-27% in different studies and in selected patients in relation to pathology the highest number of severe PUs (shown by EPUAP) – is: in surgical patients 12%, geriatric 8% and neurological 2% after 7 days of hospital admission. In a hospital study of 592 neurological patients, 16 of all had PUs, with highest risk in patients who have had a stroke (QR=1.96) or trauma (QO=1.83) (Jovanovic Z, J Wound, Suppl 1, N1, 2012, Belgrade). The most common sites in hospital patients were the sacrum, heel, back, gluteal region, in stage III and IV. Osteomyelitis, cellulitis and and general infection (sepsis) have had 10% of all patients.

Therapy can be non-surgical (medication, dressings, skin care, nutritional resources, antibiotics, TNP, growth factors, extracellular matrix products, physical, turning patient at regular intervals, different type of mattresses, special beds, therapy of parallel diseases) and surgical (surgical debridement, application of split skin and local flaps, dermo-epidermal skin substitutes, therapy complications, reconstructive interventions).

The prevention of PUs should be started early as a constant procedure in all patients with high risk for the development of PUs and in all stages of the pressure ulcers, with good results in therapy and the prevention of complications.

Key words: pressure ulcers, distribution, non surgical and surgical management

Enthusiasm in the management of deep pressure ulcers

Markus Duft

Krankenhaus Göttlicher Heiland Wien, Department of General Surgery

This presentation will seek to reflect the term „enthusiasm“ and deep pressure ulcers. The talk examines, if the management of deep pressure ulcers is a topic in the Austrian health care system. Therefore the results of the Statistic Austria, regarding the analysis of the reported ICD 10 code: L 89.0 of the last eleven years, are presented. Challenges for the enthusiastic manager of deep pressure ulcers, especially for the area of Vienna, are pointed out. This presentation will outline that enthusiasm is important in the management of deep pressure ulcers on the side of the person providing the service “Managing deep pressure ulcers” and on the side of the person who avail oneself of the service “Managing deep pressure ulcers”- the patient. The presentation will focus on these above mentioned issues and give examples.
Nutricia Symposium

Specific Nutritional support for faster wound healing
Thursday August 29th

**EPUAP – Nutricia Symposium**

“Specific nutritional support for faster wound-healing”

29 August 2013, 13.30-15.00

**Program**

**Chair: prof. Jos Schols**

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<th>Time</th>
<th>Session</th>
<th>Speaker(s)</th>
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<tr>
<td>13.30-13.35</td>
<td>Opening</td>
<td>Prof. Jos Schols</td>
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<tr>
<td>13.35-14.00</td>
<td>1. Nutritional support in the treatment and prevention of pressure ulcers: An overview of studies with an arginine enriched Oral Nutritional Supplement</td>
<td>Prof. Jos Schols</td>
</tr>
<tr>
<td>14.00-14.30</td>
<td>2. Disease-specific nutritional support in malnourished pressure ulcer patients: A randomized, controlled trial.</td>
<td>Dr. Emanuele Cereda</td>
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<td>14.30-14.50</td>
<td>3. Effects of a specific arginine-enriched oral nutritional supplement on the healing process of chronic wounds in non-malnourished patients: A multicenter case study in the Netherlands.</td>
<td>Dr. Jacques Neyens</td>
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<td>14.50-15.00</td>
<td>Closing Q&amp;A</td>
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Nutritional support in the treatment and prevention of pressure ulcers: an overview of studies with an arginine enriched Oral Nutritional Supplement

Prof. Jos Schols, MD, PhD; Dept. General practice and Dept. Health Services Research, Maastricht University, The Netherlands

Abstract:
Malnutrition, inadequate or poor protein and energy intake and unintended weight loss have been identified as risk factors for pressure ulcer (PU) development.

In addition, many patients at nutritional as well as PU risk cannot meet their nutritional needs via normal oral intake.

Therefore, providing oral nutritional supplements (ONS) in addition to regular food intake seems a logical way to replenish body shortages of macro- and micronutrients as well as to supply extra nutrients for the preservation of skin tissue, strengthening of tissue resistance, and promoting tissue repair. To examine the effect of nutritional intervention in pressure ulcer care, clinical studies performed with a specific ONS enriched with arginine, vitamin C and zinc were reviewed. Seven clinical studies that were performed with the specific ONS, identified via electronic and conference databases, were included in the review. Five studies examined the effects of the specific ONS in patients with pressure ulcers, while two studies examined the effects of the specific ONS in Patients at high risk of developing pressure ulcers. All studies with the specific ONS, specifically developed for patients with pressure ulcers show positive effects of this ONS on ulcer healing and probably the ONS also can reduce the risk of developing pressure ulcers.
Disease-specific nutritional support in malnourished pressure ulcer patients: a randomized, controlled trial.

Subtitle: The OligoElement Sore Trial (OEST)

Emanuele Cereda MD, PhD1, Catherine Klersy MD, MSc2, Aldo Crespi MD3, Marcella Serioli RD4 and Federico D’Andrea MD4 for the OligoElement Sore Trial (OEST) Study Group5

1 Servizio di Dietetica e Nutrizione Clinica, Fondazione IRCCS Policlinico San Matteo, Pavia, Italy.
2 Servizio di Biometria e Statistica, Fondazione IRCCS Policlinico San Matteo, Pavia, Italy
3 SS di Prevenzione e Cura Lesioni Vascolari, ASL NO, Novara, Italy
4 SCDO Dietetica e Nutrizione Clinica, Azienda Ospedaliera Universitaria “Maggiore della Carità”, Novara, Italy
5 Appendix

IMPORTANCE. Malnutrition is a common comorbidity among pressure ulcer (PU) patients and nutritional support has been found to be effective in improving healing. Preliminary trials suggest that supplementation of arginine, zinc and antioxidants contributes to faster healing, but evidence from high-quality trials is lacking.

OBJECTIVE. To investigate whether a disease-specific oral nutritional supplement is beneficial to the healing of PUs.

DESIGN, SETTING, AND PATIENTS. Multicenter, randomized, controlled trial conducted from February 2010 to November 2012 in adult (≥18 year-old) malnourished patients with stage II, III and IV PUs; 200 long-term care residents and patients at home-care services were randomized and 157 included in the intention-to-treat analysis.

INTERVENTIONS. An energy-dense, protein-rich oral formula (400 mL per day) enriched with arginine, zinc and antioxidants vs. an equal volume of an isocaloric, isonitrogenous formula for 8 weeks.

MAIN OUTCOME MEASURES. The primary endpoint was the percentage of change in PU area. Secondary endpoints included: complete healing and reduction in area ≥40%, incidence of wound infections, total number of dressings at 8 weeks and percentage of change in PU area at 4 weeks. A cost-effectiveness analysis was also carried out.

RESULTS. Intention-to-treat analyses were based on 157 patients. Supplementation with the enriched-formula (N=78) resulted in significantly higher reduction in PU area vs. the use of control formula (N=79): 62.9% vs. 43.4 %; mean difference, 19.5% [95%CI, 9.6, 29.4]; P<0.001. Reduction in area ≥40% was more frequent in the enriched-formula group (73.1% vs 51.9%; difference, 21.2% [95%CI, 6, 35.3]; P=0.008). There was no difference in complete healing (15.4% vs. 7.6 %; difference, 7.8% [95%CI, -2.5, 17.7]; P=0.141). Intervention with an enriched formula at 8 weeks was found to be cost-effective, required a lower number of dressings and resulted in larger reduction in PU area also at 4 weeks. There was no significant difference between groups in incidence of wound infections at 8 weeks.

CONCLUSION AND RELEVANCE. Among malnourished patients with PUs, 8 weeks of supplementation with an oral energy-dense formula enriched with arginine, zinc and antioxidants resulted in better healing and was found to be cost-effective.

TRIAL REGISTRATION. ClinicalTrials.gov Identifier: NCT01107197

Appendix

The OligoElement Sore Trial (OEST) Study Group: Federico D’Andrea MD [Principal Investigator], Costanza Micunco RD and Marcella Serioli RD (SCDO Dietetica e Nutrizione Clinica, Azienda Ospedaliera Universitaria “Maggiore della Carità”, Novara, Italy); Emanuele Cereda MD, PhD [Co-PI], Riccardo Caccialanza MD and Chiara Bonardi RD (Servizio di Dietetica e Nutrizione Clinica, Fondazione IRCCS Policlinico San Matteo, Pavia, Italy); Aldo Crespi MD, Anna Lombardi RN and Emanuela Andreola RN (SS di Prevenzione e Cura Lesioni Vascolari, ASL NO, Novara, Italy); Lilia Gavassa MD and Francesca De Donà RD (Struttura Semplice di Dietetica e nutrizione clinica, Ospedale di Ivrea, ASL TO4, Torino, Italy); Paolo Martinoglio MD, Silvia Gervasio MD and Donatella Penoncelli RD (UO di Dietetica e Nutrizione Clinica, Ospedale “Maria Vittoria”, ASL TO2, Torino, Italy); Anna Demagistris MD and Alessia Chiarotto RD (Nutting Clinica, Ospedale Alba-Bra, ASL CN2, Cuneo, Italy); Mariangela Rondanelli MD, PhD and Simone Perma RD (Dipartimento di Scienze Sanitarie Applicate, Sezione di Nutrizione, Azienda di Servizi alla Persona di Pavia, Università degli Studi di Pavia, Pavia, Italy); Lidia ML Rovera MD, Monica Roma RD and Alessandra Galiea RD (SS Dietologia e Nutrizione Clinica, Azienda Ospedaliera “Ordine Mauriziano”, Torino, Italy); Andrea Pezzana MD and Mariantonietta Cozza RD (SoSD Dietetica e Nutrizione Clinica, Ospedale “San Giovanni Bosco”, ASL TO2, Torino, Italy).
Thursday August 29th

Effects of a specific arginine-enriched oral nutritional supplement on the healing process of chronic wounds in non-malnourished patients: a multicenter case study in the Netherlands.

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Aim
A series of cases has been conducted to record the effect of a specific arginine-enriched oral nutritional supplement (ONS) in patients with pressure ulcers (PUs), leg ulcers or diabetic foot ulcers. Primary outcome parameters: 1) wound size, 2) patients’ compliance and appreciation of ONS.

Methods
Design: case report study, approved by ethic committee, conducted in two Dutch nursing homes and one ambulatory wound centre. Twenty-two non-malnourished patients with a PU, leg ulcer or diabetic foot ulcer, existing > 3 weeks were included. All participants were offered 1-3 servings per day of a specific arginine-enriched ONS in addition to their regular diet and standard wound care, for 12 weeks max. Besides patient characteristics, information on wound size (cm\(^2\)), product intake plus appreciation and photographs were collected every month.

Results
Fourteen females and eight males (mean age: 80) were included. Main diagnosis: arterial leg ulcer (n=5), venous leg ulcer (n=6), diabetic foot ulcer (n=2) and PU (n=9). Within 7-12 weeks, complete healing occurred in 11 ulcers, 10 showed a partial wound size reduction (35% to 75%) and one kept unchanged. Overall, the daily ONS servings, on average 400 ml, were fully consumed and the appreciation was good (n=22).

Conclusion
Nutritional support with a specific arginine-enriched ONS seems to be beneficial for the healing of different types of chronic ulcers in non-malnourished patients. More research into this field should be performed.
Thursday August 29th

Room O
14.00 – 15.00 Free Paper Session 3
Chair: Jan Kottner

Pressure RElieving Support SUrfaces: a Randomised Evaluation 2 (PRESSURE 2)
Jane Nixon, UK

Internal strains in sacral area of human subjects in supine position on a bed
C.W.J.Oomens, The Netherlands

High Voltage Pulsed Current in Pressure Ulcer Healing; Preliminary Study
Anna Polak, Poland

A virtual procedure and its requirements to optimize supporting structures with respect to pressure ulcers by numerical simulation
Alexander Siefert, Germany
Introduction
PRESSURE 2 is a randomised controlled trial involving up to 2954 patients comparing High Specification Foam (HSF) and Alternating Pressure Mattresses (APMs).

The rationale for the trial is that current practice is variable and clinical guidelines are not based upon high level evidence, rather expert opinion. Many patients do not like APMs [1, 2], they can impede rehabilitation (eg in following stroke) and we do not know whether APMs are better than HSF in prevention of pressure ulcers (PUs). Given the high cost of APMs and their management we need to establish the relative effectiveness of APMs compared to HSF.

The objectives of the trial are to determine whether there are differences between HSF and APMs when both are used in conjunction with a profiling bed frame in high risk acute hospital patients in relation to:
1. Preventing the development of a new category 2 and above PU
2. Preventing the development of new category 1 and above PUs
3. Preventing the development of new category 3/4/U PUs
4. Healing of existing Category 2 PUs
5. Health related quality of life (SF-12, EQ-5D and PUQOL)
6. Cost effectiveness

A validation sub study, using photography with blinded central review and expert clinical assessment of the skin sites, will be carried out to assess any bias in the reporting (over or under-reporting) of category 2 or above pressure ulcers.

Methods
The trial is a multicentre, open, randomised, double triangular group sequential, parallel group trial, with two planned interim analyses. Consenting high risk patients will be randomised to receive either HSF or APM in conjunction with an electric profiling bed. The group sequential design provides an efficient design through the possibility of early stopping.

The primary endpoint is time to developing a new Category 2 or above PU from randomisation to 30 days post trial completion or withdrawal/deaths (max 90 days). An a priori sample size estimate estimates that a maximum of 588 events, corresponding to 2954 patients, are required to detect a difference of 5% in the incidence of 2 Category 2 PUs, assuming 18% on APM [1] and 23% on HSF, corresponding to a hazard ratio of 0.759, with 90% power and overall 2-sided significance level of 5%, accounting for 6% loss to follow-up [1]. The sample size accounts for the sequential group design and multiplicity in the two interim analyses at 300 and 445 events, using Lan-DeMets α and β spending functions [2].

Results

Discussion
As both mattresses are in routine clinical use it is important to obtain a definitive answer to this effectiveness question. The adaptive trial design minimizes the number of patients required whilst maintaining trial conduct through independent review.

Clinical relevance
We plan to start recruitment in UK centres in September 2013. The PRESSURE 2 team are currently seeking centres to support this NIHR HTA funded trial.

Acknowledgements
This presentation presents independent research funded by the National Institute for Health Research (NIHR) under its Health Technology Assessment Programme (11/36/33). The views expressed in this presentation are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health

Conflict of Interest
None

References
[2] Lan KKG, DeMets LD Biometrika 70 (3) 659-63 1983
Internal strains in sacral area of human subjects in supine position on a bed

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Introduction
The last decade has provided considerable scientific evidence that when tissues are subjected to sustained pressure and shear, at least two damage pathways play a role in the development of Pressure Ulcers (PUs). One damage pathway is caused by compression-induced ischaemia and takes several hours before early detectable signs of damage at the cellular level. At high internal strains (during sitting or lying on a hard surface) an alternative pathway involves direct deformation related damage leading to the first signs of detectable cell damage within minutes of external loading. [1,2,3].

To prevent PUs both damage pathways need to be avoided by using special support systems and/or regularly turning of bed-bound patients. A new support prototype developed by Hill-Rom combines both strategies. It consists of a mattress that is designed to minimize tissue deformation and ischaemic damage by turning patients mechanically on an air mattress with localized alternating pressure at the sacrum. The mechanical tilt behavior of the bed is termed Lateral Pressure Redistribution (LPR) therapy. This study addresses the following questions: What is the magnitude of the internal strain in the sacral area of a person lying on a typical mattress? Does a mechanical tilt lead to an internal strain reduction in the sacral area?

Methods
Based on MRI images of human volunteers in prone and supine positions on a rigid surface, a detailed finite element (FE) computer model was built of the sacral area. It constituted a 2-dimensional plane stress model with an accurate description of the morphology of the sacral area with distinct descriptions of fat, muscle, skin, ligaments and bone. The different soft tissues were described with an Ogden material model, while the bone and ligaments were considered to be rigid bodies. A body force was applied to the model to simulate gravity. The contact between the sacrum and the bed was described with contact elements including Coulomb friction. The undeformed model was built using the unloaded sacral area (prone position) and tuned in such a way that the loaded contours of the model (in supine position) best fitted to the MRI images (Fig 1a). An extensive parameter study was performed to examine the influence of different parameters.

Results
The highest peaks of maximum shear strain are clearly found in the muscle close to the sacrum (Fig. 1.b). LPR angles between 20 and 40 degrees removed the peak shear strains higher than 0.48 with an associated decrease in the tissue area in which high strains are present. Currently, the maximum LPR tilt angle that can be attained in the bed is approximately 10 degrees. However, the results in the present study show an increase in beneficial effect at LPR angles exceeding 10 degrees.

Discussion
This study was focused on the maximum shear strain in skeletal muscle, an important parameter to evaluate PU risk, because a threshold level for deformation-induced muscle damage exists for maximum shear strain values between 0.5 and 0.7 [2]. This means that the results are primarily of interest for pressure related deep tissue injury (DTI). The study will be extended to investigate the effects of shear strains in skin and subcutaneous fat.

Acknowledgements
We appreciate the help of Baukje Hemmes from the University of Maastricht for providing the MRI images.

Conflict of Interest
None

References
High Voltage Pulsed Current in Pressure Ulcer Healing; Preliminary Study

Anna Polak\(^1,3\)*, Jakub Taradaj\(^1,2\), Andrzej Franek,\(^2\) Edward Blaszczak\(^2\)

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**Introduction**

Guidelines (NPUAP/EPUAP 2009) on pressure ulcer treatment give a special role to ES, recommending it for the management of recalcitrant Stage II-IV pressure ulcers. However, a wider use of ES in wound treatment may be hampered by the lack of studies precisely defining the type of therapeutic electric current to be used, its pulse parameters, electrode polarity and the duration and frequency of treatments.

The detailed knowledge of the effect of various types of electric current on tissue healing processes is necessary for electrical therapy to be successful in the treatment of pressure ulcers and other soft tissue defects.

The purpose of this prospective, randomized, controlled preliminary study was to establish the effect of high-voltage pulsed current (HVPC) on the healing of chronic pressure ulcers.

**Methods**

The research covered 28 females aged 42-95 years with stage II and III pressure ulcers. The patients were randomly divided between two groups.

Group A, the experimental group, consisted of 13 subjects with 19 pressure ulcers whose average baseline size was 2.98±2.78 cm\(^2\) and average duration 2.84 months. The mean age of these patients was 82.00±16.22 years.

Group B (the control group) had 15 subjects with 17 pressure ulcers whose average baseline size was 3.28±2.15 cm\(^2\) and average duration 2.36 months. The mean age of patients in this group was 79.00±11.02 years.

Most ulcers in both groups were stage II (16 in the experimental group and 14 in the control group).

All patients in the two groups received standard supportive care and topical treatments including wet-to-moist dressings. The experimental group patients were additionally treated with HVPC (100 µs, 100 pps, 100-150 V) applied continuously for 50 minutes once a day, five times per week. All patients were monitored for healing progress for 4 weeks. Wound surface areas and their linear dimensions (lengths and widths) were measured weekly.

**Results**

After 4 weeks of treatment wound areas and linear measurements decreased statistically significantly in both groups (\(p<0.05\)), but in the experimental group wounds healed better than in the control group.

The respective reductions were 87.27±12.65% and 49.39±43.51% for wound surface area (\(p=0.0067\)); 82.32±22.33% and 39.18±43.32% for wound length, and 81.22±21.95% and 49.54±44.42% for wound width (\(p=0.0059\) for length; \(p=0.019\) for width).

**Discussion**

The results of this research confirm previous studies\(^1,2,3\) showing that HVPC is effective in treating Stage II and Stage III pressure ulcers.

Patients in the current study received 50-minute HVPC procedures once a day, 5 days a week, so the total treatment time was 4.16 hours in a week. Kloth\(^1\) used similar durations, applying HVPC for 45 minutes a day for 5 days in a week (3.75 hours a week).

The electric current parameters selected for this study (100 µs, 100 pps, 100-150 V, sensory stimulation) were similar to those used by Kloth\(^1\) (100 µs, 105 pps, 100-175 V), Griffin\(^2\) (100 pps; 200 V), and Houghton\(^3\) (50 µs; 100 pps, 50-150 V).

As in other studies,\(^1,2,3\) in this study the sterilized treatment electrode was placed over the pressure ulcer.

In this study cathodic stimulation was applied for 2 weeks to facilitate granulation tissue formation, followed by anodal stimulation for the rest of the treatment time. However, Kloth\(^1\) treated pressure ulcers first with anodal stimulation, and introduced cathodic stimulation if the wound healing progression was not observed; whereas Griffin\(^2\) used cathodic stimulation throughout the entire treatment period. This differences suggest that more research is necessary in order to determine the effectiveness and optimal use of cathodic and anodal stimulation in pressure ulcer treatment.

**Clinical relevance**

The results of this study show that recalcitrant Stage II and Stage III pressure ulcers can be effectively treated with HVPC (100 µs, 100 pps, 100-150 V, sensory stimulation) applied for 50 minutes a day, five times a week over 4 weeks.

**Conflict of Interest**

The authors have nothing to disclose.

**References**

A virtual procedure and its requirements to optimize supporting structures with respect to pressure ulcers by numerical simulation

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Introduction
Within the last years the capabilities of finite elements (FE) simulations have increased dramatically. A challenge for the application within the medical sector was so far a realistic representation of the human body and its properties. Accordingly several human body models with different grades of detailing have recently been developed ([1] and [2]). Using them in combination with models of the supporting structure enables a virtual product optimization with respect to pressure ulcers following known risk criteria of international guidelines [3]. Compared to the existing product development which uses hardware prototypes this virtual process allows for a more detailed product assessment by non-measurable quantities as e.g. internal tissue loads. Further the method is reproducible, which is an important benefit with respect to measurements including test persons. Finally the application of digital prototypes offers a reduction of time and cost efforts. The method and its requirements will be presented here.

Methods
The first step of the process is the generation of a validated model for the supporting structure. This can be separated in the identification of material properties by specimen tests, the generation of the FE-model and finally the validation by an indenter test, see figure 1.

Results & Discussion
The simulation is separated in two steps. First the static preloading due to gravity and then the application of active devices of the supporting structure as e.g. change of pressure or posture. Then the evaluation is carried out by computing relevant mechanical quantities as e.g. strains and stress in the tissue, in the supporting structure and in the interaction zone. There are no limitations as known from real testing. Comparing the results with known risk criteria leads to the final assessment of the supporting structure. Based thereon possible potentials for optimizing the structure can be identified and tested just by adapting the model with respect to geometry or its properties. Due to the virtual nature of the process it enables on the one hand an increase of the informational value by non-measurable quantities and on the other hand it decreases the time and cost efforts within the product development by the application of digital prototypes.

Clinical relevance
The shown virtual procedure can be used for the research of the aetiology of pressure ulcers and for the product development to evaluate and optimize economically existing supporting structures.

Conflict of Interest
There were no conflicts of interest.

References
The heel and foot are amazing structures designed to resist the effects of loading associated with standing, walking, running and jumping. When a patient is ill however the area of the heel exposed to loading changes. Plantar skin and, in particular the heel skin and fat pad, has a unique structure that allows this region to tolerate forces and loading which would otherwise disrupt the skin integrity and compromise its blood supply. Both the heel and the Achilles tendon regions are however recognized as potentially vulnerable areas and therefore need to be a focal area for risk assessment and protection. These talks will provide a framework for healthcare professions to identify patients at increased risk of pressure damage to the heel and foot area, highlighting the role of both intrinsic and extrinsic factors, so that an effective, patient-specific protection strategy can be implemented.

Heel ulceration has a marked impact on patients, reducing their mobility and their quality of life. It may also jeopardise limb viability and lead to amputation. Foot, heel and malleolar pressure ulceration accounts for over 33% of all pressure ulcers, the heel is also a common location for diabetic callus, skin fissuring and overt ulceration to develop. In many cases the origin of a heel ulcers can be traced back to a specific event such as an operation or ill-fitting footwear and this should make the diagnosis of pressure ulceration easy but that is not the case for all heel and foot wounds where the aetiology of the wound may be difficult to define and underlying medical conditions such as peripheral arterial disease or diabetes may indicate other possible causes. To protect patients, assess them fully and to understand why wounds develop in this region some knowledge of heel anatomy and pathophysiology is necessary. Without this knowledge an incorrect diagnosis may be made, but is it necessary to reach the correct diagnosis?

We would argue that it is as we use the diagnosis to define treatment, we also use the diagnosis as a potential marker of the quality of care a patient has received and which member of the multidisciplinary team is engaged in subsequent patient management.

What is the difference between a diabetic foot ulcer and a pressure ulcer? A diabetic foot ulcer is defined according to the International Consensus on the Diabetic Foot, as a full thickness wounds below the ankle in a diabetic patient, irrespective of duration, skin necrosis and gangrene are also included in the current system as ulcers. A pressure ulcer is commonly defined as a 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. These definitions are not exclusive; all foot pressure ulcers in a diabetic are by definition also diabetic foot ulcers while not all diabetic foot ulcers are pressure ulcers.

These talk will explore these issues, as practitioners seem to struggle to differentiate between pressure ulceration and diabetic foot ulceration. The key to successful management of all patients with chronic wounds on the foot is to ensure that they undergo full assessment, including vascular assessment, and that their long term management includes planning for podiatry input and offloading. Not all patients defined as having pressure ulceration appear to gain this support in routine practice.

A series of case studies will highlight these issues and work through the arguments relating to assessment, wound acquisition, diagnosis and management.

Conflict of Interest
None
Thursday August 29th

Room L/M
15.30 – 17.00  Student Paper Session
Chairs: Michael Clark and Amit Gefen

Translation and Psychometric Properties of the Dutch National Prevalence Measurement of Care Problems to Measure Quality of Pressure Ulcer Care in Indonesian Hospitals
Yufitriana Amir, The Netherlands

The use of support surfaces and repositioning for patients with reduced mobility in a sample of Norwegian hospitals
Ida Marie Bredesen, Norway

Improving Wound Healing In Pressure Sore Reconstruction: Our Protocol And The C.O.P. (Cone Of Pressure) Flap
Francesco Gargano, USA

DTI Risk Assessment in Heel and Sacrum Regions using Finite Element Analysis
Takuma Kitagawa, Japan

Modeling the Supported Heel: Towards Understanding Risk Factors for Heel Ulcers
Ayelet Levy, Israel

Patient-Specific Posture Scheduling for Pressure Ulcer Prevention
Sarah Ostadabbas, USA
Translation and Psychometric Properties of the Dutch National Prevalence Measurement of Care Problems to Measure Quality of Pressure Ulcer Care in Indonesian Hospitals

Yufitriana Amir1, Jan Kottner2, Jos M.G.A. Schols3 Christa Lohrmann4 Ruud J.G. Halfens5

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2Charité-Universitätsmedizin Berlin, Germany, 3Maastricht University, CAPHRI, The Netherlands, 4Medical University of Graz, Austria, 5

Introduction
In 2012, the hospital-acquired pressure ulcer (PU) prevalence was introduced as a new nursing sensitive care indicator for international hospital accreditation in Indonesia. However, no standard, valid and reliable instrument for a national prevalence measurement is available yet. A possible option for Indonesia is the Dutch National Prevalence Measurement of Care Problems (Landelijke Prevalentiemeting Zorgproblemen / LPZ) instrument. This well-known standardized instrument and measurement are used to measure PU prevalence and other relevant quality indicators of PU care based on the structure, process and outcome categories of the Donabedian model. In the meantime, the LPZ measurement has been adopted by several countries. The aims of this study were to evaluate the content validity of the Indonesian version of the LPZ measurement instrument and to assess the interrater agreement and reliability of the PU categories, the Braden scale and the Care Dependency Scale (CDS).

Methods
The LPZ measurement instrument consists of six part questionnaires: the characteristics of patients including the risk of developing PUs (assessed by the Braden Scale) and the patient’s care dependency (assessed by the CDS), the categorization of PUs based on the EPUAP-NPUAP PU categorization, the prevention of PUs, the treatment of PUs and the structural quality indicators related to PUs at the ward and hospital levels. The LPZ questionnaires and the CDS were translated into Indonesian language. The Braden scale had already been translated. Content validity and interrater agreement and reliability studies were performed to assess the psychometric properties of the instrument. Eighteen Indonesian experts were invited to evaluate the content validity of the Indonesian version of the instrument for measuring the quality of pressure ulcer care and its clarity of wording in Indonesian. Seventy-two nurses were involved in assessing and reassessing 734 hospitalized patients for the interrater study of PU categorization and 105 patients for the interrater study of the Braden scale and the CDS.

Results
Most Indonesian experts (91.8%) rated the Indonesian version of the LPZ instrument as good on clarity of wording. The content validity of the six part questionnaires ranged from 0.50 to 1.00. All five PU categories were assessed and showed an interrater reliability of κ = 0.92 (95% CI: 0.87 - 0.97) and an interrater agreement of πo = 98.6% (95% CI 97.5 - 99.3). The interrater reliability ICC (1,1) of the Braden scale sum score was 0.90 (95% CI: 0.85-0.93). The interrater reliability ICC (1,1) of the Braden scale items varied from 0.52 (95% CI: 0.35 – 0.65) for the “nutrition” item to 0.85 (95% CI: 0.79 – 0.90) for the “friction and shear” item. The exact proportion of agreement score was 39% for the Braden scale sum score and 68% – 84% for the items. Limits of agreement were between -1.8 and 1.8. The interrater reliability ICC (1,1) of the CDS sum score was 0.88 (95% CI 0.83-0.92). The minimum interrater reliability ICC (1,1) was 0.68 (95% CI: 0.57 - 0.77) for “recreational activities” and the maximum ICC (1,1) was 0.87 (95% CI: 0.81 - 0.91) on “eating and drinking”. There was a 45% exact agreement on the CDS sum scores and 58% - 74% exact agreement for the items. Limits of agreement were between -18.2 and 18.2.

Discussion
PU prevalence and PU care indicators can be measured quite precisely with low measurement errors in Indonesian hospitals. This supports the validity of the LPZ measurement. The high interrater agreement and reliability of the EPUAP-NPUAP PU categorization, the Braden scale and CDS sum scores indicate the ability of Indonesian nurses when using those scales and classifications to differentiate between patients.

Clinical relevance
This study provides a standard, valid and reliable questionnaire to measure the prevalence of PUs and the quality of PU care in Indonesian hospitals.

Acknowledgements
The Directorate General of Higher Education, Ministry of National Education and Culture of Indonesia

No Conflict of Interest
Introduction
Pressure ulcers (PU) are adverse events that affect hospital patients. Although PU etiology is multifactorial, immobility is one of the main risk factors [1]. Patients with limited mobility are three to eight times more likely to have a PU than mobile patients [2-3] and patients with mobility problems are statistically more likely to have prevention in bed [3]. Evidence based guidelines recommend systematic assessment of mobility level as a risk factor for PU and implementation of support surfaces, heel elevation and planned repositioning to alleviate pressure exposure [4]. The aim of this research was to examine whether immobile patients were repositioned and provided with support surfaces.

Methods
This analysis was conducted using data from a multicenter cross-sectional study including 1209 patients ≥18 years admitted to 88 somatic hospital wards at six trusts in Norway. The European Pressure Ulcer Advisory Panel’s (EPUAP) method was used [5]. PU was assessed as no ulcer or category I-IV according to EPUAP international definitions [4]. Support surfaces were defined as no special device, non-powered or powered device. Planned repositioning in bed and in chair was defined as either present or not. Teams of nurses were trained in the use of the Braden scale (BS) and classification of PU prior to the data collection. Missing data on support surfaces and repositioning were interpreted, as no such preventive measures taken. A sub-analysis of 1162 patients with complete BS was conducted. Descriptive data are presented as frequencies and percentages. For comparison between reduced and not reduced mobility and the use of pressure redistributing devices and repositioning in bed, χ² test was used.

Results
Patients with reduced mobility (scores 1 or 2 on the BS mobility subscale, n = 182) were more likely to be positioned on pressure redistributing in bed than those without mobility difficulties (scores 3 or 4, n = 980) (p < 0.001). However, 45.6 % of the patients with reduced mobility were not positioned on special devices and 66.5 % did not have planned repositioning in bed. Floating heel/heel protection was not used for 58.2 %. Furthermore, 39 % immobilized patients received neither special support surfaces nor repositioning (Table 1). Very few received special support surfaces and repositioning in chair. 55 % of those with reduced mobility were > 70 years. 98 patients (53.8 %) had a PU. 49 (50 %) of the PU were category I, 30 (30.6 %) category II, 9 (9.1 %) category III and 10 (10.2 %) were category IV.

Table 1: Support surface and repositioning in bed for patients with reduced mobility (n=182)

<table>
<thead>
<tr>
<th>Support surface</th>
<th>No planned repositioning n (%)</th>
<th>Planned repositioning n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No special device (n=83)</td>
<td>71 (85.5)</td>
<td>12 (14.5)</td>
</tr>
<tr>
<td>Non-powered device (n=83)</td>
<td>50 (60.2)</td>
<td>33 (39.8)</td>
</tr>
<tr>
<td>Powered device (n=16)</td>
<td>0 (0)</td>
<td>16 (100)</td>
</tr>
</tbody>
</table>

Discussion
There was a difference in the use of support surfaces in bed between those with and without reduced mobility corroborating findings of Moore & Cowman [3]. Contrary to guideline recommendations [4], this study shows that a high number of patients with reduced mobility do not receive appropriate prevention. Moreover it is disturbing that approximately half of the immobilized patients already had a PU and were at risk of further tissue damage [1-3]. Since reduced mobility is shown to be a major risk factor for development for PU [1-3], local guidelines should focus on immobility as risk factor, and use of support surfaces and repositioning to reduce the risk of PU.

Clinical relevance
Patients with reduced mobility are particularly at risk of PU development and must get preventive measures.

Acknowledgements
We appreciate the help of the data collectors and coordinators at each participating hospital. Thanks for funding to Oslo University Hospital, The Norwegian Nurses Organization, University of Oslo and Sophies Minde Ortopedi AS.

Conflict of Interest
None.

References
Introduction
Pressure sores have a multifactorial etiology with recurrence rates between 12 and 82%.[1-3] We present our protocol to address this multifactorial pathophysiology and hypothesize that an important contribution to recurrence is the shearing force over a bony prominence. The cone of pressure, also known as the “inverted ice cream cone” represents the main factor to be corrected. By filling the dead spaces with the C.O.P. flap we hypothesized that recurrences would be significantly reduced.

Methods
Our study retrospectively reviewed 20 patients treated with flap coverage for stage 4 pressure sores over a 36 month period. According to the flap type, the patients were designated to two groups: group 1 included ten patients treated with the C.O.P flap and group 2 included 10 patients treated with a conventional flap without the anchoring technique. The groups were comparable for demographics, ulcer location and size (p<0.05). All patients underwent our protocol of debridement, attempt at negative tissue cultures, and wound vac therapy prior to surgery. The COP flap is a large deepithelized rotation flap inset with transcutaneous non-absorbable bolster sutures. (Figs. 1-3) Fasciocutaneous flaps for both groups were the posterior thigh flap for ischial wounds and gluteal flaps for sacral pressure sores. Mean follow up was 12 months. Three surgeons performed the cases.

Results
Wounds were treated with serial debridements, antibiotics, and wound vac therapy. Recurrence rates were 10% in the C.O.P. flap group and 70% in the conventional flap coverage group (p value<0.02). (Table1) Revisions were done in all patients with recurrences.

Discussion
Deepepithelized flaps have been used previously with decreased pressure sore recurrence rates.[4-5] Anchoring the flap over ischial tissues can be difficult and bone anchor for this purpose have been described.[5] Compared to previously described methods, our technique avoids foreign bodies with removable of bolster sutures and secure the flap inset eliminating dead space and minimizing shearing force, suture ripping, and tension on superficial sutures. The technique can be applied to both ischial and sacral pressure sores providing padding over bony prominence without jeopardize flap vascularity.

Clinical relevance
The abstracts illustrate an innovative protocol and surgical technique to decrease recurrence rate in the surgical management of pressure sores. Decreasing the recurrence rate the abstract will provide better patient outcomes. The abstract also shows a new surgical technique and a defined protocol for the management of pressure ulcers. Performance and competence will both improve with the presented data.

Conflict of Interest
The Authors have no conflict of interest.

References
DTI Risk Assessment in Heel and Sacrum Regions using Finite Element Analysis

Takuma Kitagawa 1*, Naotaka Mimura 1, Yoshikazu Tanaka 2, Hideo Itagaki 3, Makoto Takahashi 1

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2 Unicharm Corporation, Japan, 3 Osaki Citizen Hospital Iwadeyama, Japan

Introduction
We estimated stresses in deep tissues using finite element analysis (FEA). This study had two objectives. One objective was to develop simplified 3D sacrum and heel models using minimal information obtained by measurements in a short time. Ultrasonography was used to determine shapes of deep tissues. The other objective was to estimate the equivalent stress distribution in subcutaneous tissues. By obtaining information on deep tissues and determining displacement to the skin surface, risk assessment for deep tissue injury (DTI) would be possible.

Methods
To create simplified 3D models, we measured sacrum regions in four elderly people and heel regions in another four elderly people using ultrasonography and took photographs for making heel outlines. Each model incorporates bones and soft tissue structures (skin and fat) (Fig. 1). Ultrasound images of the sacrum and heel were used to determine the thickness and curved surface of each soft tissue. FEA software ANSYS 13.0 was used to make models and analyze the equivalent stress. Rigid flat plates were set up above the models to apply force on the sacrum and heel models. Analyze conditions were decided to give the rigid flat plate 5 mm displacement in the heel model direction and 3 mm displacement in the sacrum model direction.

Results
Maximum equivalent stress in subcutaneous tissues occurred at the boundaries between skin and fat and between fat and bone but not at the surface of the skin. The thinner the fat layer was, the higher was the equivalent stress is (Fig. 2).

Discussion
Pressure ulcers can develop easily if the fat layer is thin. Therefore, using a finite element model based on ultrasound images should show the probability of pressure ulcer occurrence in a patient. In this study, we showed maximum equivalent stress and equivalent stress distribution calculated by a simplified 3D model based on ultrasound images. This method may be applicable to risk assessment for deep tissue injury.

Acknowledgements
We would like to thank Mr. H. Toda and Mr. T. Nagai who offered continuing support and constant encouragement.

Conflict of Interest
We received joint research funding from Unicharm Corporation.

References
[2] Ran S. et al., “Exposure to internal muscle tissue loads under the ischial tuberosities during sitting is elevated at abnormally high or low body mass indices” J. Biomechanics 43:280-286, 2010
Introduction

Heel ulcers (HUs) tend to develop when the soft tissues of the posterior heel are subjected to sustained deformations, which primarily occurs in immobile patients with impaired sensation. Guidelines for preventing HUs in bedridden patients often recommend prescription of soft support surfaces under the heels, or even complete elevation of the feet, in order to better distribute (or eliminate all together) the soft tissue loads. In this study we used MRI scans to develop a three-dimensional (3D) anatomically-detailed finite element (FE) model of the heel. The modeling was used for evaluating the effects of the following factors on the state of heel tissue loads: (i) Local tissue mechanical property changes that may be associated with medical conditions e.g. diabetes and heel/leg oedema, (ii) Support stiffness options.

Methods

To build the 3D FE model, we used 56 axial MRI slices of the left ankle and foot from a 34 years-old healthy male. The scans were acquired in non-weight-bearing and weight-bearing configurations (subject #2 in our previous work [1]) (Fig. 1a). The FE model included segmentation and meshing of skin, fat, the calcaneus and the Achilles tendon, using the ScanIP module of SimpleWare® [2] with specific local refinements to the skin and the Achilles insertion region (Fig. 1b,c).

Results

Fig. 2: Intensity of the effective strains (a) and stresses (b) in an axial cut through the heel and cushion. (c) Intensity of effective stresses in a corresponding sagittal cut.

The strain/stress analyses indicated elevated strains in the subcutaneous fat tissue located between the posterior calcaneus and the skin-support contact area (Fig. 2a) as well as elevated stresses in the skin, bone and tendon (Fig. 2b,c). Interestingly and importantly, the area of increased stresses in the Achilles tendon is obtained proximally to the insertion site rather than directly under the calcaneus (Fig 2c).

Discussion

This is the first 3D FE heel model developed to study HUs which includes representation of the Achilles tendon. It appears that including the tendon insertion is critical in realistically modeling the problem. It was notable that elevated tissue stresses appeared under the proximal Achilles insertion site (Fig. 2c), which corresponds to the common clinical manifestation of HUs. This finding already indicates that any further stiffening of the tendon, e.g. due to accelerated collagen cross-linking or calcifications in diabetes, may exacerbate the internal loading conditions and hence increase the risk for developing HUs.

Clinical relevance

Attention should be paid to individuals with systemic or heel pathologies that may increase HUs risk.

Acknowledgements

Raphael Rozin Prize for Rehabilitation, Israel (2011).

Conflict of Interest

None.

References

Patient-Specific Posture Scheduling for Pressure Ulcer Prevention

Sarah Ostadabbas ¹*, Rasoul Yousefi ¹, Mehrdad Nourani, ¹ Matthew Pompeo ²

¹ University of Texas at Dallas, Richardson, TX, USA, sarahostad@utdallas.edu
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Introduction

Pressure ulcer is a severe threat for immobilized and peripheral neuropathic patients such as bed-ridden, elderly, and diabetics. The optimal strategy to deal with pressure ulcers is prevention. The current standard for prevention is to reposition at-risk patients every two hours [1]. Since each patient has a different body structure and risk level, some expectedly need more frequent pressure relief than others. A fixed schedule may either result in some patients getting ulcers, or nurses being overworked by turning some patients too frequently.

The contribution of this work is twofold: first, we propose a system for determining if a patient is at risk for a pressure ulcer based on measurements taken from a pressure mat. Second, an optimization problem is formulated to determine the maximum average interval between posture changes to minimize nursing effort required to prevent pressure ulcer formation. Our experimental results show a 30% increase in the average time between repositioning over the standard schedule.

Method

Every posture exposes the body to a different pressure distribution. The high-risk regions for developing pressure ulcer are often over bony areas of the body. We model the non-permanent effects of excess pressure as stress by using pressure-time injury model introduced in [2]. Stress will build whenever the pressure is above a certain threshold, and recover when the pressure is below this threshold. When stress in any region exceeds a certain region- and patient-specific threshold, the patient is considered to be at risk for a pressure ulcer.

Nurses relieve the stress in high pressure body regions by periodically repositioning the patient to shift the pressure. The amount of effort required to do this is based on the number of nurses and the time it takes to move the patient from one position to another.

We have presented a model of this problem and provided a framework for solving it optimally over a finite duration [3]. Stress is tracked independently for each at-risk region of skin based on the pressure on each region over time. An optimal repositioning schedule is computed to minimize nursing effort while ensuring that no region ever exceeds its stress threshold.

Results

To verify the effectiveness of the proposed scheduling, we collected pressure data from a commercial pressure mat for several subjects lying on a hospital bed. Table 1 shows our scheduling results for two subjects in different postures. In each case, the average interval between turnings is greater than 120 minutes (i.e. the standard practice). Interestingly, in this particular experiment, some time durations are less than 120 minutes indicating those patients must be re-positioned faster than standard 2-hour period to avoid unrecoverable pressure loading.

Table 1: Posture turning schedules

Discussion

While pressure ulcers have been extensively studied, much remains unknown. For instance, while the length of exposure to constant pressure causing pressure ulcers is known, the effect of varying pressures is unknown. Furthermore, there is no model showing how much rest between pressures is required to fully or partially recover from the initial exposure. Finally, the specific effects of various compounding factors (e.g. fever, anemia, body mass, shear, and temperature) are largely unknown. These are potential research questions for both animal and human studies. Animal studies can be used to get the basic structure of the models, while human studies can fill in the parameter values.

References

Thursday, 29th August, 15.30 – 17.00
Room N, level 01

Parafricta Symposium
Chairman
Professor Dr Jos M.G.A. Schols

Professor of Old Age Medicine, Department of Family Medicine and Department of Health Services Research; Caphri - School for Public Health and Primary Care, Maastricht University, The Netherlands

Speaker 1
Nils A Lahmann, PD, PhD, MSc, BA, RN

Senior Assistant Professor, at the Department of Nursing Science; Charité Universitätsmedizin Berlin, Germany,

“Relation between pressure, friction and pressure ulcer categories: a secondary data analysis of hospital patients using CHAID methods”

Abstract:

Introduction

Empirical evidence suggests that pressure forces in combination with shear seem to be primarily responsible for deeper tissue injuries leading to category III or IV pressure ulcers. Superficial frictional forces seem to cause skin lesion resembling category II pressure ulcers. The objective of this study was to explore the empirical relationships between friction forces and category II pressure ulcers and between pressure forces and category III and IV pressure ulcers.

Methods

A secondary analysis of n=28,299 adult hospital patients was conducted. For the classification of the sample regarding pressure ulcers as a dependent variable and the Braden scale items as predictor variables, Chi-square Automatic Interaction Detection (CHAID) for modelling classification trees, controlled for age, has been used.

Results

7.5% (95% CI 7.2 to 7.8) of the hospital patients had “Friction & Shear” problems. The category “Problem” of the item “Friction & Shear” was the strongest predictor for category II pressure ulcers. Category III/IV prevalence was 1.9%. Compared to all other Braden scale items there was the strongest association between being completely immobile and deeper category III/IV pressure ulcers.

Discussion

There is a strong relationship between friction forces and superficial skin lesions and between pressure forces and deeper category III and IV PUs. This indicates that there might be different aetiologies causing different wounds.

Clinical relevance

Conflict of Interest

None
Thursday August 29th

Speaker 2

Glenn Smith

Clinical Nurse Specialist Nutrition and Tissue Viability, Isle of Wight NHS Trust, U.K.

“Implementation of new friction reducing technology in clinical practice – challenges and implications.”

Abstract:

The introduction of new technology in any field poses challenges regarding the understanding of its efficacy, management of its use in clinical practice, and how it impacts upon patient safety, productivity and resource management. This presentation will centre on moving from the evaluation of a new technology, to its implementation in clinical practice, and how to support other clinicians, health professionals and health resources managers in taking forward a new friction reducing technology in a healthcare economy. It will draw on real world challenges and how to manage these effectively to deliver a well-rounded and planned pressure ulcer prevention pathway for patients in primary and secondary care settings.

Speaker 3

Deborah Gleason

Clinical Nurse Specialist - Tissue Viability ,St. Helens & Knowsley NHS Trust, Liverpool, U.K.

Heel Pressure Ulcers: Where now?

Abstract:

Pressure ulcers represent a significant burden fiscally for the NHS and reduce quality of life for patients. New pressure ulcers are estimated to occur in 4-10% of patients admitted to acute hospitals and the total cost in the UK is estimated to be £1.4 - £2.1 billion annually comprising 4% of the total NHS expenditure.

The Department of Health has driven the pressure ulcer agenda as never before to the forefront of quality and adopted a zero tolerance approach to pressure ulcers. The concept of “harm free” care builds on and integrates Quality, Innovation, Productivity and Prevention (QUIPP) initiatives and pressure ulcer prevention is also part of the national safety express programme; plus the NHS operating framework for 2012/2013 includes a new national Commissioning for Quality and Innovation (CQUIN) goal that promotes the use of the NHS safety thermometer which can be used to measure the incidence and prevalence of pressure ulcers.

Patients develop friction heel blisters from the constant movement of the heel on their bed linen and or poor manual handling techniques. Friction forces affect the superficial tissues and lead to cellular breakdown in the tissues which induce serum filled blisters. Heel pressure ulcers are costly and if not treated promptly and properly may lead to osteomyelitis and often limb amputation.

In this presentation the author will discuss a trial of “Parafricta® Bootees”, conducted in one NHS trust over a 12 month period. Results demonstrate that the introduction of this product has resulted in a significant reduction (32%) in the number of hospital-acquired, avoidable heel pressure ulcers.
Thursday August 29th

Room O
15.30 - 16.30  Free Paper Session 4
Chair: Christina Lindholm

The incidence of pressure ulcers on a static air mattress: A multi- centre cohort study in Belgian nursing homes
Dimitri Beeckman, Belgium

Cost-effectiveness analysis of 3-in-1 disposable wash cloths impregnated with dimethicone 3% compared with standard care in the prevention and treatment of IAD in older patients
Dimitri Beeckman, Belgium

Comparison of the characteristics of pressure ulcers between Austrian hospitals and nursing homes in 2012
Manuela Mandl, Austria

Comparison of the characteristics of pressure ulcers between incontinent and continent patients in Austrian hospitals and nursing home residents
Manuela Mandl, Austria

Micro-training for Micro-support
Romana Jurkowitsch, Elisabeth Enengl, Austria
The incidence of pressure ulcers on a static air mattress: A multi-centre cohort study in Belgian nursing homes

Dimitri Beeckman 1*, Brecht Van Vaerenbergh 1, Lisette Schoonhoven 2

1* Ghent University, Belgium, Dimitri.Beeckman@UGent.be
2 IQ Healthcare Radboud University Nijmegen, The Netherlands

Introduction
Pressure ulcer prevention in bed includes the application of an appropriate support surface, combined with correct repositioning on a continuing basis. Heels should be free of all pressure permanently. The aim of this study was to investigate pressure ulcer incidence when lying on a static air mattress in nursing home residents being at risk of developing a pressure ulcer.

Methods

Design
Multi-centre prospective cohort study.

Outcomes
The outcomes of this study were defined as the incidence and the time to develop a Category II-IV pressure ulcer.

Sample
Data were collected in a convenience sample of four nursing homes in Belgium. A consecutive sample of 68 participants was included based on following inclusion/exclusion criteria: (1) being bedbound (> 8 hours in bed/during the day), (2) aged > 65 years, and (3) a Braden score < 19 and/or Category I pressure ulcer. Residents were excluded if (1) the expected admission time in the nursing home was < 1 month, (2) there was a “do not resuscitate code” specifying ending all therapeutic interventions, (4) they receive palliative care, (5) the bodyweight was more than 139 kg (mattress specification) and, (6) informed consent could not be obtained from the resident or his/her legal representative.

Device under study
The device under study was the Repose® mattress overlay (Frontier Medical Group, New South Wales, UK). This mattress is a combination of two urethane membranes. The inner membrane is inflated and provides static pressure redistribution throughout tubular cells, which form along the length of the overlay. The second membrane is formed from a multidirectional stretch, vapor permeable and strong material. The combination of the two membranes provides pressure redistribution. The length of the mattress is 1780mm and the width is 770mm. The maximum patient weight is 139kg

Procedure
Prior to the study, all nurses attended a theoretical training on (1) pressure ulcer prevention (pathology, classification, differentiation between incontinence-associated dermatitis and the use of the Braden scale for risk assessment), (2) an introduction to the study aims and protocol, (3) and the use of the data collection instrument. The purpose of this training was to certify the precision and uniformity of the data collection.

After inclusion of the resident, he/she was nursed for 30 days on the static air mattress. A standardized 4 hourly repositioning protocol was applied for all resident being included in this study. Besides, a standardized protocol for prevention in the chair was applied (Repose® Cushion combined with 2-3 hourly repositioning). The Repose® Wedge was used to relieve pressure at the heel. Daily skin assessments were performed by the ward nurses (qualified nurses and nursing assistants under the supervision of a qualified nurse), in the morning. Study completion was defined as: (1) development of a pressure ulcer Category II–IV, (2) 30 days of attending the study (follow up period), (3) transfer to a non-participating ward, (4) death or (5) withdrawal of the initial consent to participate.

Quality of the data
The inter-rater reliability of the observations of the skin at the pressure areas and the Braden Scores were monitored weekly by the researcher. Quality checks were performed unannounced in a random sample of patients included in the study.

Data collection instrument
Clinical observations were performed according to the procedure by the European Pressure Ulcer Advisory Panel. The Braden Scale was used to assess pressure ulcer risk of each resident. Pressure ulcers were categorized according to the 2009 EPUAP/NPUAP classification system.

Results
Analysis are currently ongoing. The results will be available in August 2013.

Conflict of interest
This trial was performed as part of an MSc study. The mattresses and cushions were kindly provided by Frontier Medical Group, New South Wales, UK.
Cost-effectiveness analysis of 3-in-1 disposable wash cloths impregnated with dimethicone 3% compared with standard care in the prevention and treatment of IAD in older patients

Dimitri Beeckman1*, Charlotte Vanhuyse1, Hilde Heyman, Sofie Verhaeghe1, Ann Van Hecke1, Liesbet Demarré1

1* Ghent University, Belgium, dimitri.beeckman@ugent.be

Introduction
Incontinence associated dermatitis (IAD) is a reactive response of the skin to a chronic exposure to urine and faecal material. It can be observed as an inflammation and as erythema with or without erosion or denudation [1,2]. Incidences vary between 3.4% and 25% depending on the study population and setting [1]. Distinguishing pressure ulcers from IAD is important as preventive measures and treatment differ [2]. The prevention and treatment of IAD should consist of (a combination of) a skin protector, a moisturizer, and a perineal skin cleaner. Preliminary evidence suggest that 3-in-1 disposable wash cloths impregnated with the skin protectant dimethicone 3% may be effective for preventing IAD[3]. Data on the cost-effectiveness of 3-in-1 disposable wash cloths are lacking. The aim of this study was to examine the cost-effectiveness of 3-in-1 disposable wash cloths impregnated with dimethicone 3% compared with standard care in the prevention and treatment of IAD in older patients.

Methods
A randomized controlled trial was conducted in a nursing home setting in Belgium. All residents were screened to assess if they were affected by or at risk for developing IAD. Residents were at risk for IAD if they were incontinent for urine, feces, urine/feces, and/or having erythema of the perineal skin (not caused by pressure/shear), and/or having an edematous skin in the genital area. Residents were randomly allocated to the experimental or control group using opaque sealed envelopes. Residents allocated to the intervention group were treated according to a protocol including the use of a 3-in-1 perineal care wash cloth impregnated with a 3% dimethicone skin protectant. Residents allocated to the control group were treated according to the institutions’ current standard care. This standard care consisted of perineal skin cleaning with water and pH neutral soap, a moisturizer (lotion) and/or a barrier film as skin protectant. Main outcome measures were incidence of IAD and the time to develop IAD. The secondary outcome were the marginal direct medical costs (consisting of labour cost and material cost) related to both interventions. The study period was 60 days. Direct medical cost consisted of labour cost and material cost. Labour cost related to the activities to prevent and treat IAD was examined using two methods: direct time measurement by the researcher (CV) and a subjective time estimation by a double-Delphi method.

Cost of materials was retrieved from the institution. Frequency of incontinence episodes was scored by the ward nurses using a standardised study file. Cost-effectiveness was evaluated using both the institutions’ and residents’ perspective.

Results
Overall, 183 residents were screened to participate in the study, and 70 were eligible to be included. Three patients were not willing to participate, leaving 34 patients allocated to the experimental group and 33 residents allocated to the control group. Data analysis is ongoing and final results will be available in June 2013.

Acknowledgements
We appreciate the help the nurses who helped with data collection and all residents willing to participate in the study.

Conflict of Interest
No conflict of interest. The study materials of the experimental group were kindly provided by Sage Products®

References
Comparison of the characteristics of pressure ulcers between Austrian hospitals and nursing homes in 2012

Manuela Mandl¹, Ruud JG Halfens², Silvia Schönher⁵, Christa Lohrmann¹

¹ Institute of Nursing Science, Medical University of Graz, Austria, manuela.mandl@medunigraz.at
² Department of Health Services Research, Focusing on Chronic Care and Ageing, Maastricht University, the Netherlands

Introduction
International studies report high prevalence rates of pressure ulcers (PUs) in hospitals and nursing homes while inadequate prevention and treatment was also indicated [1]. In order to provide tailored prevention and treatment strategies, it is important to examine the characteristics of PU, e.g. category or location. Therefore the aim of this secondary data analysis is to compare the characteristics of PUs between Austrian hospital patients and nursing home residents.

Methods
The Austrian version of the Prevalence Measurement of Care Problems is a multicentre, cross-sectional study which is performed annually in hospitals and nursing homes [2]. For data collection purposes a standardised and tested questionnaire is used. In 2012, data from 3648 hospital patients and 695 nursing home residents with PU were analysed.

Results
Data show that prevalence of PU was 2.9% in hospitals and 4.7% in nursing homes, whereas, with regard to those at risk, the prevalence was 10% in hospitals and 6.3% in nursing homes. In hospitals, most of the PUs (57.1%) had developed before admission, whereas in nursing homes, most of the PUs (81.8%) had developed in the current institution.

<table>
<thead>
<tr>
<th>Patients/residents with PU per institution</th>
<th>Category 1</th>
<th>Category 2</th>
<th>Category 3</th>
<th>Category 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitals (N=105)</td>
<td>40.9%</td>
<td>37.1%</td>
<td>18.1%</td>
<td>3.8%</td>
</tr>
<tr>
<td>Nursing homes (N=33)</td>
<td>6.1%</td>
<td>27.3%</td>
<td>42.4%</td>
<td>24.2%</td>
</tr>
</tbody>
</table>

In hospitals, 40.9% PUs belonged to category 1, whereas most PUs in nursing homes (42.4%) were attributable to category 3. In both settings most of the PUs had been existing for 2 weeks to 3 months. Moreover, 8.7% of the PUs in hospitals and 8.5% of the PUs in nursing homes had been existing for more than 1 year. Figure 1 shows that most of the PUs in hospitals were located, in a nearly equal distribution, at the buttocks, sacrum and heels, whereas most of the PUs in nursing homes were located at the buttocks.

Discussion
The results of this study show large differences between the two settings regarding PU-characteristics. Although prevalence of PU among the PU-at-risk patients was lower in nursing homes than in hospitals, most PUs in nursing homes had developed in the current institution and belonged to category 3, whereas in hospitals, most PUs had developed before admission and belonged to category 1. In both settings nearly 10% of the PUs had been existing for more than 1 year.

Clinical relevance
The present data show that nursing homes should mainly focus their efforts on PU-prevention, since more PUs seem to develop there. Hospitals, on the other hand, should concentrate more on PU-treatment. These data enable clinicians to enhance their awareness, which may help to tailor PU-related prevention and treatment interventions to the individual needs of affected patients and residents.

Acknowledgements
We appreciate the help of all participating institutions, nurses and patients/ residents.

Conflict of Interest
There is no conflict of interest.

References
Comparison of the characteristics of pressure ulcers between incontinent and continent patients in Austrian hospitals and nursing home residents

Manuela Mandl1, Ruud JG Halfens2, Christa Lohrmann1

1* Institute of Nursing Science, Medical University of Graz, Austria, manuela.mandl@medunigraz.at
2 Department of Health Services Research, Focusing on Chronic Care and Ageing, Maastricht University, the Netherlands

Introduction
Incontinence (INC), whether urinary (UI), fecal (FI) or double (DI), is known as one possible associated factor for the development of pressure ulcer (PU). In order to provide an in-depth analysis, the aim of this secondary data analysis is to describe the characteristics of PU in incontinent and continent Austrian hospital patients and nursing home residents.

Methods
The Austrian version of the Prevalence Measurement of Care Problems [1] is a multicentre, cross-sectional study which is performed annually in hospitals and nursing homes. For data collection purposes a standardised and tested questionnaire is used. From 2009 to 2012 data from 9861 hospital patients and 3577 nursing home residents were obtained.

Results
With regard to the entire period, the results show that 56.3-88.2% of the incontinent hospital patients as well as 83.1-93.3% of the incontinent nursing home residents are at high risk (according to the Braden Scale) of developing a PU.

In hospitals, 42.1% of the fecally continent patients suffered from a category 1 PU, as compared to 38.3% of fecally incontinent patients with a category 2 PU.

Moreover, 34.3% of the doubly continent residents had a category 3 PU. In contrast, 41.7% of the doubly incontinent residents suffered from a category 2 PU (Figure 2).

Discussion
The available data in Austria support the fact that incontinence is one possible associated factor for the development of PUs, because the risk for PU and the levels of care dependency are higher for the incontinent population in both settings. Surprisingly, doubly incontinent residents suffered from a PU category 2, as compared to doubly continent residents with a PU category 3. Future research questions should focus on differences in nursing interventions regarding PU and INC.

Clinical relevance
The data represent the Austrian clinical reality and enable to develop tailored interventions in order to achieve high-quality patient-centered nursing care.

Acknowledgements
We appreciate the help of all participating institutions, nurses and patients.

Conflict of Interest
There is no conflict of interest.

References
Introduction
A micro-training is a small training session for one or two learners. It concerns certain care activities or small portions of knowledge. The focus is on domestic, individual conditions. The knowledge of patients and their caregivers is an important resource for the prevention of pressure ulcers. It seems self-evident that the participation and understanding of patients and their family members are essential in health issues. Those affected generally want to participate and take responsibility. People are interested to take their lives into their own hands and to have control over it. The process of a micro-training is made in small steps for beginners; there is an assessment of the addressee, it is documented and an evaluation proposal is made. Each provider performs the micro training in the same manner [1]. Training techniques must not be complicated, so they make a difference [2].

Methods
The two authors developed a micro training on micro-supports; this article is a contribution towards the theme of best practice in pressure ulcer prevention and their treatment. As a template, the concept can be used to create micro-trainings for care education of the network of patients and families and in cooperation with the University of Witten / Herdecke. With the concept of micro-training it is possible to give caregivers a basis for systematic and quality-assured pedagogical guidance of patients. In the broad field of care oriented nursing education, in comparison to other countries, little or no evidence-based knowledge exists in Germany and Austria. The development of micro-training is done on the basis of current knowledge [3].

Results
In summary, the most important data is presented. The point is to create the concept and thereafter, transfer it into an implementation and evaluation phase. Our goal is to address as many people and organizations as possible, in order to use the tool.

Clinical Relevance
The concept of health literacy has increasingly gained importance in recent years. All health care professionals are committed to continually increasing their health literacy. Caregivers have the closest contact with the clients and they should head in this direction with information, training and advice [4].

References


Friday
30th August

ABSTRACTS
Friday, 30th August, 8.50
Auditorium B, Level 02

Introduction to the 17th Annual EPUAP meeting, Stockholm, Sweden

Christina Lindholm

Future Meetings

8.40 – 8.50   Introduction to the 2014 Focus Meeting on Skin Health and the Microclimate, Southampton, UK
              Lisette Schoonhoven, Dan Bader

8.50 – 9.00   Introduction to the 17th Annual EPUAP meeting, Stockholm, Sweden
              Christina Lindholm

              Brussels 2015, Dimitri Beeckman
A Review of the Ageing Skin as a Determinant of Pressure Ulcers

Terence J Ryan

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Introduction

The effects of ageing are from birth to the tomb. They include direct effects of injury to the cell on structure and function over a lifetime. Each cell system may affect another and associated age related disease such as diabetes, hypertension, dementia or the accumulated scars of injury and repair such as an amputation stump or HIV/AIDS are all relevant to this title and have an influence on pressure ulcers. Photoageing is an acceleration of such processes in skin exposed to ultraviolet irradiation.

Methods

The techniques used in support of this study over a period of 50 years have included clinical observation of the skin biopsy and skin histology, cell culture, lymphosyntigraphy, fibrinolysis, autography, capillary microscopy, laser doppler and several other techniques.

Results

The focus of this paper is a review of 50 years of the study on the interrelationship of the structure and function of the skin with respect to mechanical forces and the significance of old age with respect to blood supply and lymphatic drainage. An oversimplification of study of only epidermis and dermis must be remedied by knowledge of adipose tissue and cells such as the melanocyte or the mast cell as well as an immunosurveillance system. Of especial interest is the switching on of the repair mode of the epidermis when it is subject to mechanical stress so that cytokines, growth factors and many other inflammatory processes are activated. The control of proteases by an inhibitory process led by Plasminogen activator inhibitor (PAI-1) released from the epidermis is of particular interest. Ischaemia is of course important but so is reperfusion. Perfusion is influenced by temperature and so is the response to temperature through effects on the elasticity and pliability of the skin.

Acknowledgements

The author appreciates the help of many colleagues in the Oxford Department of Dermatology referred to in the presentation.

References

Topical Enzymatic Treatments for Debridement and Wound Maintenance

Amihay Freeman

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Introduction
The growing numbers of chronic ulcers present a huge challenge to currently employed labor intensive treatments. There is an urgent need in a new approach providing effective, user-friendly treatments especially at the home-care settings. Here we report (I) results demonstrating feasibility, safety and preliminary efficacy of a new modality of enzymatic wound debridement: continuous streaming of papain solution, and (II) in vitro results demonstrating potential prevention of wound infection by creme containing novel silver – glucose-oxidase-hybrid.

Methods
Continuous streaming of papain solution was affected by gravity from a feeding reservoir onto ulcers occluded within disposable device, simultaneously affecting mild negative pressure over the wound. Used solutions were collected in a disposable collecting-bag:

A multi-centered, double blinded, Phase I/II randomised controlled trial was launched to test the safety and preliminary efficacy of increasing concentrations of papain in the streamed solutions for venous ulcers debridement. Patients were treated with 5-consecutive daily 6hrs-streaming sessions, followed by standard changes of wet dressings throughout a 3 months follow-up period. Streaming of same solution devoid of enzyme served as control.

Prevention of microbial infection was tested in vitro by Zone of Inhibition (ZOI) measurements using glucose oxidase – silver hybrid solutions and cremes.

Results
(I) 48 patients were enrolled, 36 were treated with enzyme containing solutions and 12 with solutions devoid of enzyme. Patients treated with enzyme containing solutions experienced debridement with exposure of 50-70% of wound area as granulation tissue vs exposure of 30% for the control group. 50% of enzyme debrided wounds exhibited spontaneous wound-closure or substantial wound size reduction (>75%) within 2-7 weeks post treatment. SAEs were not observed.

(II) Effective ZOIs were recorded for the prevention of bacterial, yeast and fungal growth.

Conclusions
Our results indicate that:

a) Continuous streaming of proteolytic enzyme solution is a safe and effective modality for wound debridement, paving the way to its use at the outpatient clinic, nursing home and homecare settings.

b) Silver-Enzyme hybrids carry potential wound infection prevention, enabling facilitated wound closure.
Friday August 30th

Ergonomics – how individuals move in bed

R.H.M. Goossens
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Summary
The human body is supported throughout most of life (while we sleep, travel, work and in our spare time). It is estimated that when one is 72 years of age, 62 years have been spent in some form of body support, such as an office chair and a bed. [1] Body-supporting surfaces are often related to complaints in the neck, back, buttocks, legs and soft tissue. Numerous solutions for cushioning the contact area between product and user have been and implemented during the last centuries, but only in the last decades systematic research has been conducted on the underlying mechanical principles and the results of mechanical load imposed on the human skin and muscular skeletal system. The skin is the interface between body and body support. Within the skin, all kinds of mechanoreceptors continuously monitor the deformation and warn us of damage (pain). The stress-strain relationship shows that there can be a high degree of deformation of the skin (up to 50%) before yield (mechanical damage) occurs. Physiological response however starts at lower deformation of the skin and is more important when evaluating the effect of body support.

Friction turned out to be a significant component factor of mechanical load on the skin [1,2]. Friction on the skin consists of three components: the deformation, ploughing and adhesion components. The adhesion component (µa) between skin and support surface is the most important component for body support interfaces and it can be influenced by the choice of material and texture. It is well known that people that sit or lie down for prolonged periods change their posture and user 20-40 postural can be observed during an 8 hours period of night rest [3,4].

One of the reasons that can be found in literature for this ‘urge to move’ is that these movements are necessary to persevere the blood flow in the tissue. Because the blood flow can be obstructed by occlusion of the blood vessels when the tissue is under external pressure, the body reacts on this by (sometime unconsciously) changing the posture and thus unload the tissue that is obstructed and load another part of the body.

The question that arises is, what frequency of loading and unloading of the tissue is necessary in order to keep the blood flow at an acceptable level? In a pilot study, although the data shows large differences between subjects, an interesting aspect in the data seems to suggest that when the time interval is about 10 minutes, that for every level of pressure between 2.7 kPa and 5.3 kPa (20 and 40 mmHg) the blood flow remains unchanged. These pressure levels are typically measured on the buttocks of healthy users on consumer beds [5]. In order to optimize the mechanical load that acts on the skin during body support, different cushions have been developed. Especially for the prevention of pressure ulcers, many foam cushions, cushions incorporating gel or water, and air fluidized cushioning can be found. All cushioning materials, except foam, need a cover to keep the medium (air, liquid, gel) together. To obtain an understanding of the principle by which the different cushioning materials work, this paragraph discusses them from a biomechanical perspective.

When considering the biomechanical behavior of different body support surfaces, including consideration of the cushion and the cover (top layer), the following models can be seen [6] (Fig. 1).

![Fig. 1: Support principles.](image)

For all these principles the support pressure increases with the increase of the imprint of the body (depth of the body) into the cushion [the cushion behaves like a spring]. However, the solid cushion behaves like a far more stiff spring then the liquid and air cushion. And the liquid cushion is more stiff then the air cushion. When the cover of the cushion is under tension it helps to carry the load. This is the so-called ‘hammock effect’ resulting in an extra pressure and shear force at the contact surface.

References
Skin integrity, ageing and biomicromechanical factors: a modeling approach

Georges Limbert

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Introduction

Besides its numerous biophysical functions, the skin is primarily a mechanical interface to the external environment. The geometry and biophysics of this multi-layered biological structure are keys in determining the nature and characteristics of these tribological interactions. With age, the dermal-epidermal junction (DEJ) that forms a 3D interlocking wavy interface between the dermis and epidermis tends to flatten out, potentially rendering the skin more prone to shearing and friction injuries [1]. To date, it appears that no study has examined the role of the DEJ topography characteristics on the mechanical response of skin when subjected to surface loads. Here, it is proposed to explore this question using an idealised parametric multi-layer 3D finite element model of human skin.

Methods

A 3D parametric finite element model representing the skin as a composite structure containing the stratum corneum, living epidermis, papillary and reticular dermis was developed. The age-dependent topography of the DEJ (Fig. 1) surface was accounted for via analytical equations based on experimental data reporting the spatial density of dermal papillae [2] and their geometrical characteristics [3-4]. Each skin layer was assigned its own mechanical properties extracted from the literature.

Results

The results of the computational analyses showed that the topography of the DEJ had a significant effect on the transmission of mechanical load from the skin surface to the deeper layers, particularly when considering shear stress (Fig. 2).

Discussion

This study has highlighted microstructurally-based strain/stress conversion mechanisms that could explain the reduction in skin integrity with age. The modeling framework is currently being extended to include microclimate factors (e.g. temperature, humidity) which are believed to play a critical role in superficial pressure ulcers.

Clinical relevance

This study has provided a mechanistic insight into load transmission mechanisms relevant for pressure ulcers.

Acknowledgements

The author would like to thank Prof. Amit Gefen for many fruitful discussions that were initiated during his visit to the UK supported by a Distinguished Visitor Fellowship of the Royal Academy of Engineering (London) which is also gratefully acknowledged.

Conflict of Interest: none

References

[2] Sauermann et al., Skin Research and Technology 8:52-56, 2002
Nursing tools for the risk assessment and classification of Incontinence-associated dermatitis (IAD)

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2 Department of Nursing Science and Gerontology, UMIT-The Health & Life Sciences University, Vienna, Austria

3 School for general health and nursing at the Social Medical Center South, Vienna, Austria

Introduction

Incontinence associated dermatitis (IAD) is a clinical manifestation of moisture related skin damage and a frequent problem for patients with urinary and/or fecal incontinence [1]. The differentiation between incontinence associated- and pressure related skin damage (pressure ulcers) is difficult [2]. Valid instruments for risk assessment and classification of IAD could help with the differentiation in order to plan and implement effective prevention measures as well as nursing interventions.

Methods

A systematic literature review was done in the databases Medline, Academic Search Elite, CINAHL (via EBSCO), EMBASE and Cochrane Library. Two English instruments (PAT, IADIT) were translated into the German language according to ISPOR (PAT-D, IADIT-D). The content validity- and interrater-reliability testing of PAT-D was completed in primary care and long term care facilities. The content of the IADIT-D item descriptions was validated by a Delphi-study and the interrater-reliability testing was completed in long term care facilities. For the content validity, measures of central tendency and statistical dispersion were identified. The interrater-reliability analysis was done using Cohen's Kappa, weighted Kappa, AC1-Statistic for single variables as well as the ICC for the total score. The concordance level of the raters was analysed using Yules Q-, Phi- and Spearman's coefficient, McNemar-Test and Stuart-Maxwell-Test according to Fleiss and Everitt.

Results

Five English instruments were identified and PAT as well as IADIT were translated to the standards of the ISPOR [3]. Table 1 shows the results of the content validity testing of PAT-D and IADIT-D.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Sample</th>
<th>Results</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAT-D</td>
<td>N=70</td>
<td>Md (CVI*)=4.61-4.93</td>
<td>High content validity</td>
</tr>
<tr>
<td>IADIT-D</td>
<td>N=44</td>
<td>Md=1.06-1.35</td>
<td>High levels of agreement</td>
</tr>
</tbody>
</table>

Table 2 gives an overview of the interrater-reliability testing results of PAT-D and IADIT-D.

<table>
<thead>
<tr>
<th>Scale (Sample)</th>
<th>K</th>
<th>AC1</th>
<th>ICC (95%CI)</th>
<th>Interpretation (Landis, Koch, 1977)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAT-D (N=127)</td>
<td>0.49-0.69</td>
<td>0.63-0.82</td>
<td>0.80 (0.72-0.85)</td>
<td>Moderate to almost perfect agreement</td>
</tr>
<tr>
<td>IADIT-D (N=381)</td>
<td>0.70-1.00</td>
<td>0.76-1.00</td>
<td>Substantial to almost perfect agreement</td>
<td></td>
</tr>
</tbody>
</table>

IADIT-D: The concordance level of the raters from is less affected by the effect of the different basic probabilities (McNemar Test: $\chi^2_{df=1, \alpha=0.25} = 2.71 > \chi^2_{df=1} = 2.52 [p= 0.284]; 86-97 %; r_Y = 0.889; r_P = 0.831 [p<0.001]; r_s = 0.77 [p<0.001]).

Conclusion

The high agreement levels of the content as well as the middle to high concordance levels of the PAT-D and IADIT-D items indicate, that both instruments are acceptable overall for the use in acute care and long term care facilities in regards to the content validity and interrater-reliability.

Clinical relevance

The nursing practice has to increase its awareness for the construct, risk assessment and classification of IAD as well as the differentiation to the pressure ulcer.

Acknowledgements

The conducted research studies investigated the test-theoretical quality criteria of PAT-D and IADIT-D for the first time and build a foundation for future nursing science studies.

No conflict of Interest

References

Friday August 30th

9.30 – 10.30 Room L/M (Level 01)

Workshop – How to teach pressure ulcer management

Chair: Elfriede Binder

9.30 – 9.50  Teaching programme of nursing - perspective of Canada
Nicola Waters, Canada

Pressure ulcer prevention has been identified as a top teaching and research priority. Yet time devoted to the topic in undergraduate nursing programs often remains limited. The WOUND mnemonic [1], a simple reminder tool, has been successfully incorporated into various stages of an undergraduate education program. Intended for use in conjunction with local skin and wound assessment the tool enables students to recognize contributing patient factors and identify ways to collaboratively manage those at risk of or living with pressure ulcers and other chronic wounds.


9.50 – 10.10  Medical perspective of pressure ulcer prevention
Barbara Fohsl Grande, Austria

10.10 – 10.30  Managing pressure ulcers in Croatia
Josipa Bišćan, Poliklinika Medikol, Voćarska 106, 10 000 Zagreb, Croatia
Dubravka Trgovec, General Hospital Zabok, Bračak 8, pp.36, 49 210 Zabok, Croatia
Croatian Nurses Association, Professional Group for Quality Management

Abstract
One of the indicators of quality of health services is the preservation of the integrity of the skin, while as a result of the unfavorable impact of a series of factors, pressure ulcer can be caused. In monitoring and improving the quality of health care, it is necessary first and foremost to make a plan, i.e. to specify the target, then to execute a plan while recording problems and unexpected results and to analyze and compare the obtained data and to make the adjustment while ensuring the implementation of what has been learned.

To manage pressure ulcer, it is necessary to make a timely assessment of the risk of its occurrence, which requires a balanced way of the general assessment in all departments, in accordance with the policies of the institution. For this to be done it is necessary to pre-educate staff, then it is important to have protocols for specific clinical treatments, work instructions, consistent records of monitoring, the ways of management of nursing documentation and lists to monitor pressure ulcers. It is also essential to have information on the categorization of patients on the ward, the information about the number of staff and the availability of supplies (antidecubital mattresses, modern coating for treatment of ulcers), the information about the patients education and, of course, the analysis of all the monitored activities in order to positively affect individual negativity and find the way towards the improvements.

A quality IT system that will allow a new data entry at any time, as well as insight into the current health status of the patient, and thus easily enable to obtain statistical data is extremely important as well.

In Croatia, managing nursing documentation has become a liability, and numerous trainings of health care professionals, doctors and nurses have been conducted on the topic of the modern treatment of pressure ulcers based on good practice; as well as the patient education on self-care of pressure ulcers when leaving the hospital. Concerning the patient treatment, a multidisciplinary approach to patient, while following professional guidelines, is applied.

Keywords: education, risk assessment, guidelines, pressure ulcer
Friday August 30th

Room O
8.30 – 9.30 Free Paper Session 5
Chair Lena Gunningberg:

Journey to Zero
Elaine Bethell, UK

Why Do Patients Develop Severe Pressure Ulcers?
Carol Dealey, UK

Lessons Learnt from Root Cause Analysis Investigation of Severe Pressure Ulcer Incidents
Clare Greenwood, UK

Suspected Deep Tissue Injuries or Unstageable Pressure Ulcers – What & How to Report?
Clare Greenwood, UK

Pressure ulcer prevalence and incidence – an integrative review exploring the scope of the problem across Scandinavia and Ireland
Zena Moore, Ireland

Pressure ulcer risk assessment and prevention strategies across Scandinavia and Ireland – an Integrative Review
Zena Moore, Ireland
Introduction

Background of clinical issue

Avoidable pressure ulcers are seen as key indicators of the quality of nursing care. NHS Midlands and East ambition 1 to achieve Zero avoidable pressure ulcers by December 2012 became number one priority objective for WHAT for 2012/13.

To assist delivery of this ambition a Rapid Spread Action Tool Model was implemented. This successful approach enabled significant reduction in avoidable pressure ulcers (PU) - patient harms. Zero category 3 and 4 PU’s were reported in November and December 2012.

Management approach

Rapid spread action tool model (1) encompasses a process of winning hearts and minds, mobilising staff to a common goal, implementing large scale change and removing barriers to change at a very fast systematic pace.

Full support of Trust and Management boards was key to the success. A multidisciplinary “Delivery” Team was developed which utilised the skills and authority of Chief, Deputy and Heads of Nursing, Tissue Viability Team, Matrons, Therapist. Improved reporting was essential and achieved by developing processes within the patient safety team and Informatics dept. The Communications team and a framework for education and training for all staff was integral to success.

Outcomes

The number of avoidable pressure ulcers has significantly reduced and 3 only were reported for Nov and Dec 2012 – zero category 3 and 4’s.

The SSKIN bundle has been incorporated within the intentional rounding – Care and Comfort rounds, improved user-friendly documentation, patient information, different ways of working, and time frames regarding baseline skin assessment and equipment provision have been enhanced.

A robust process of reporting and monitoring has been developed, any patient that now develops a Category 2,3 or 4 PU must have a root cause analysis completed – the ward manager interviewed, by the TV Lead Nurse and either Head of Nursing or Deputy Chief Nurse and action plans developed.

Different ways of working have been embedded across the Trust, the challenge now is sustainability – this process has been enhanced by utilising innovations within the Change Champions programme and Pressure Ulcer Collaborative programme

Weekly PUP sustainability audits take place and areas that don’t achieve the standards set, are monitored and action plans put in place.

The way the challenges and barriers faced and overcome will be discussed.

Clinical relevance

Briefly summarize the clinical relevance of your work here (1-2 sentences).

Acknowledgements

We appreciate the help of WHAT – PUP Delivery team.

Conflict of Interest nil

References

Why Do Patients Develop Severe Pressure Ulcers?

Carol Dealey 1*, Justin Keen 2, Jane Nixon 3 on behalf of the Severe Pressure Ulcer Group

1* University of Birmingham C.DEALEY@bham.ac.uk
2 Institute of Health Sciences, University of Leeds, UK 3 Clinical Trials Research Unit, University of Leeds, UK

Introduction

Severe pressure ulcers are important indicators of failures in the organisation and delivery of care. We have a good understanding of patient risk factors, and of some of the ways in which individual clinical errors can contribute to their development. But we have a relatively poor understanding of the role played by the wider organisational context in their development.

Methods

The study was undertaken in six sites in Yorkshire, England. A retrospective case study design was used. Interviews with patients and relevant staff, and records and other documents, were used to produce eight detailed accounts of the events leading to the development of Category III or IV pressure ulcers. A parallel review of patient notes was undertaken, for each account, by a local nurse specialist. Iterative review, involving reviewers with different backgrounds, was then used to validate the accounts and to interpret them (Figure 1). Reviewers made explicit judgements about the best explanation for the accounts, eg a single error, a sequence of errors, or the organizational context made ulcer development more likely.

Results

For seven of the eight accounts, the reviewers judged that the organisational context made the development of a severe pressure ulcer more likely. In one account it was judged that there was also a single precipitating event, and in three there was also a sequence of precipitating events. In one account development was judged to be unavoidable. The organisational contexts exhibited at least one of three characteristics. (1) Clinicians failed to listen and respond to patients’ or carers’ observations about their risks or the quality of their treatment and care. (2) Clinicians failed to recognise and respond to clear signs that a patient had a pressure ulcer or was at risk of developing one. (3) Services were not effectively co-ordinated, either within a single setting, or between settings when patients moved.

Discussion

The results are consistent with theories of the role of organizations in safety and failure. Severe pressure ulcers developed in environments where co-ordination failed, an explanation emphasized by the Institute of Medicine and others. [1] They also developed in cultures that accepted risky clinical practices. [2]

Clinical relevance

The findings have implications for the conduct of reviews of incidents. Patients and carers should be interviewed: they can provide information that could not be derived from clinical notes or other sources. Ways in which the organizational context contributes to incidents should also be taken into account.

Acknowledgements

This presentation presents independent research funded by the National Institute for Health Research (NIHR) under its Programme Grants for Applied Research Programme (RP-PG-0407-10056). The views expressed in this presentation are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health.

Conflict of Interest

None

References

Lessons Learnt from Root Cause Analysis Investigation of Severe Pressure Ulcer Incidents

Clare Greenwood 1*, Jimmy Choo 2, Elizabeth McGinnis 3

1, 2, 3* Tissue Viability Department, Leeds Teaching Hospitals NHS Trust, England  
Clare.Greenwood@Leedsth.nhs.uk

Introduction
Leeds Teaching Hospitals NHS Trust (LTHT) is one of the largest acute hospital trusts in the United Kingdom, seeing well over one million National Health Service (NHS) patients every year. Pressure ulcer (PU) prevention is a key target in improving patient care, safety and experience in the NHS [1]. Within LTHT all severe PUs (category 3 or 4) [2] that develop within the hospital are investigated using a root cause analysis (RCA) process [3]. RCA is designed to identify the root causes and contributory factors that led to the patient developing a PU, throughout their journey. Key learning points can then be identified to improve practice and patient care.

Methods
Records of all RCA investigations performed during April 2011- March 2013 were retrieved. Details of the root causes and contributory factors identified for severe PUs were extracted. Content analysis was performed on the extracted data. These were then grouped into themes and subthemes. Reflective analysis by the LTHT tissue viability team was used to enhance the discussion of the causes and lessons learnt from the RCAs.

Results
Table 1 showed the number of RCAs that were performed and analysed. Not all RCAs could be analysed because they were either incomplete or hadn’t been uploaded to our incident management system.

<table>
<thead>
<tr>
<th>Table 1: Number of PU RCAs performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2011-2012</td>
</tr>
<tr>
<td>Number of serious PU incidents</td>
</tr>
<tr>
<td>Number of RCAs analysed (%)</td>
</tr>
</tbody>
</table>

There was a 42.5% decrease in the number of serious PUs in LTHT over the 2 year period. This reduction in PUs was also reflected in our annual PU prevalence audit with a reduction in hospital acquired PUs (cat 2 or above) from 3.3% in 2011 to 2.66% in 2012.

The contributory factors to PU development were extracted and grouped under four main themes (Table 2) – Individual patient factors, organisational & environmental factors, training & education and communication. Individual nurses’ competency and lack of communication were highlighted as the most prominent challenges that can be addressed in order to reduce PU incidence.

Discussion
The most prominent theme for severe PU development was individual patient factors (e.g. comorbidities, nutrition, continence, non-compliance). This can be addressed through staff education on risk factors and their management. The second highest contributory theme to severe PUs development was training and education. For 2011-2012 it was predominantly due to a lack of delay in performing skin assessments & risk assessments, incorrect equipment usage and lack of documentation, and therefore was the main focus on nursing education for the last year. For 2012-2013 although training & education was still the second highest contributory factor, it was mainly due to inaccurate skin & risk assessments and delays in accessing equipment. Competency documentation has since been developed which reflects all of these issues and competency assessment is mandatory for all nursing staff and clinical support workers within LTHT. We are hoping that this will lead to a further reduction in serious PU incidents in the following year.

Clinical relevance
Through learning from serious PU incidents, this can lead to an improvement in practice through identifying and addressing the contributory factors that led to the PU developing, with the aim of preventing all avoidable serious PUs in LTHT in the future.

Acknowledgements
We would like to thank all members of the LTHT Tissue Viability Team for their support and feedback on this paper.

Conflict of Interest
None

References
Suspected Deep Tissue Injuries or Unstageable Pressure Ulcers – What & How to Report?

Clare Greenwood 1*, Elizabeth McGinnis 2

1, 2* Tissue Viability Department, Leeds Teaching Hospitals NHS Trust, England
Clare.Greenwood@Leedsth.nhs.uk

Introduction

Within the UK National Health Service (NHS) a proportion of a provider's income is related to the Commissioning for Quality and Innovation Framework (CQUIN). CQUINs are used to incentivise providers to deliver quality and innovation improvements which will lead to an improvement in quality of services and reduce patient harms [1]. Monthly prevalence audits on all inpatient ward areas take place which includes pressure ulcers (PU), in the form of the Safety Thermometer. As part of this only category 2, 3 and 4 pressure ulcers are required to be recorded. This has led to variation in how and when NHS facilities report Unstageable PUs and Suspected Deep Tissue Injury (sDTI). These wounds, especially on the heel might not be included as they could be recorded as a diabetic foot ulcer or an ischaemic ulcer, and sometimes not reported at all as they do not fall into a category that requires reporting.

Methods

A review of the current literature with regards to definitions and pathophysiology of unstageable and suspected deep tissue injuries and pressure ulcer reporting was performed. Key issues were extracted and compared with current clinical practice experiences and guidelines.

Results

• PU grading systems are designed to describe the severity of the wound by the depth of the tissue damage. However, it has been acknowledged that there can be inter-rater reliability issues which are directly dependent upon the rater's level of knowledge and expertise [2].
• With sDTI and unstageable PUs the depth of the damage is unknown, and at the 2005 NPUAP conference it was recommended that sDTIs should be documented in the unstageable category as the extent of the ulcer is unknown [3].
• sDTIs are thought to be caused by mechanical stresses and strains in the deeper tissues as they are distorted by bony prominences – with muscle being the more susceptible than fat and skin layers, as demonstrated by modelling studies [4].
• Prevalence audits have found that sDTIs are more prevalent in acute care settings and the most common site is on the heel [5].

Discussion

• Within our facility, all unstageable PUs and sDTIs are classified together as unstageable PUs. This is mostly due to training issues; to avoid confusion amongst nurses regarding the differences, but does comply with NPUAP guidance [3].
• Heels are the most common site for unstageable and sDTI PUs to develop, and are the most difficult wounds to assess depth (Figure 1): blood blisters may dry up and peel off and therefore be considered superficial; some unstageable pressure ulcers persist – current guidelines recommend leaving stable eschar intact [6] however sharp debridement may reveal a category 4 wound. Therefore within this one grading category we have both superficial and deep PUs.

Clinical relevance

The impact of an Unstagable PU or sDTI on the patient and the healthcare provider are difficult to determine due to the uncertainty of the pathophysiology when clinically assessing the wound. More research is required on unstageable and sDTIs, especially with regards to the heel as this is the most common site of development, but does not match with current theories with regards to how they develop.

Conflict of Interest
None

References


Figure 1: Necrotic Blister - Unstageable or sDTI?
Introduction
Pressure ulcers are a common debilitating problem, adversely affecting quality of life and negatively impacting on health care expenditure.1 As a precursor to research exploring the impact of risk assessment on the prevention and prevalence of pressure ulcers, the authors conducted an integrative review of the literature, as this would provide valuable insights into the empirical evidence surrounding current practice in pressure ulcer risk assessment, prevention practices and not least the existence of pressure ulcers in the included literature. This paper reports on the prevalence and incidence of pressure ulcers across Scandinavia and Ireland.

Methods
This study followed Cooper’s2 five stages for integrative research reviews. Studies published in peer-reviewed journals, involving any study design, but specifically exploring pressure ulcer prevalence, incidence in adults or children, in any care setting were included. Irish, Norwegian, Swedish, Danish and Icelandic studies, written in English, Norwegian, Danish, Swedish or Icelandic language were eligible for inclusion. The agreed full text articles were summarised in a matrix and a content analysis of all articles was undertaken, independently, by two of the researchers (ZM and EJ). For those papers in Scandinavian, content analysis was conducted by EJ and verified by MvE. The overall findings were discussed collectively and meanings were drawn from the results so that PU prevalence and incidence data could be understood.

Results
Thirty two studies reported pressure ulcer prevalence rates. Mean prevalence in Norway was 17% (4.8%-29%) in Ireland was 15.57% (4%-37%), in Denmark was 14.5% (2.2%-35.5%) in Sweden was 25.38%, (0.04%-42.7%). Prevalence in Iceland was 8.9%.

In acute care, mean prevalence was 20.9% (0%-42.7%) and in long stay was 11.7% (2.4%-23.7%). Prevalence among hospice patients was 35.7%, and in community care was 0.04% and 4%.

Nineteen studies reported pressure ulcer incidence rates. No incidence study from Iceland was identified; the single incidence study from Norway noted a figure of 16.4% (29). The mean incidence from Ireland was 11.47% (8%-14.4%) from Sweden was 20.26% (3.1% -49%) and Denmark was 1.8% (1.4%-2.7%).

Mean incidence in acute care setting was 17.6%, (1.4%-49%), in long stay was 6.63% (3.1% - 8.4%). Incidence in the hospice setting was 20.4%. No study reported pressure ulcer incidence figures from the community care setting. In some studies grade 1 accounted for up to 60% of all ulcers, conversely, in other studies grades 2-4 accounted for 40%-60% of all ulcers. Most ulcers were on the sacrum and heels.

Discussion
Figures for both prevalence and incidence were similar in Ireland and Norway and highest in Sweden, Denmark demonstrated the lowest incidence rates, with Iceland demonstrating the lowest prevalence rates. Figures were consistently highest in acute care and hospice settings, and lowest in the care of the older person setting. Few data were available from the community setting.

Clinical relevance
It is evident that despite significant attention to pressure ulcers they remain a significant problem, warranting further investigation into prevention strategies employed.

Acknowledgements
This work is partly funded by a research grant from Norwegian College of Nursing (Norsk Sykepleierforbund NSF), 2012. We are grateful to Karin Bakke, Jana Myrvold and Menno van Etten.

Conflict of Interest
The authors have no conflict of interest to declare.

References
Introduction
Pressure ulcer risk assessment is a component of the assessment process used to identify individuals at risk of developing a pressure ulcer. Use of a risk assessment scale is recommended in international pressure ulcer prevention guidelines. Yet it is evident that there are challenges in their use. For instance, clinicians might find them time consuming, or confusing and scales are also used outside the setting they were designed for. Furthermore, conducting a risk assessment itself is not an intervention; rather it acts as a precursor to the planning and implementation of prevention strategies. Thus, use of a risk assessment scale alone will make no difference to pressure ulcer prevention, unless it is followed by action. Therfore, this review set out to explore the documented nurse practices regarding risk assessment and related pressure ulcer prevention strategies in Scandinavia and Ireland.

Methods
This study followed Cooper’s five stages for integrative research reviews. Studies published in peer-reviewed journals, involving any study design, but specifically exploring pressure ulcer risk assessment and prevention, in adults or children, in any care setting were included. Irish, Norwegian, Swedish, Danish and Icelandic studies, written in English, Norwegian, Danish, Swedish or Icelandic language were eligible for inclusion. The agreed full text articles were summarised in a matrix and a content analysis of all articles was undertaken, independently, by two of the researchers (ZM and EJ). For those papers in Scandinavian, content analysis was conducted by EJ and verified by MvE. The overall findings were discussed collectively and meanings were drawn from the results so that PU prevalence and incidence data could be understood.

Results
Ten studies explored risk factors associated with pressure ulcer development, 8 studies identified activity and mobility, 3 studies identified age and 2 studies identified nutrition. Some settings had no formal risk assessment in use. For others, the mean use of a formal risk assessment scale was 45% (9%-95%). Mean percentage of patients risk assessed was 57.25% (24%-100%).

Discussion
Risk assessment practice was found to be irregular, based on both numeric scales and clinical judgments. This means that some vulnerable patients are not screened for pressure ulcer risk, conversely, when risk assessed, a care plan is not necessarily provided. This lack of a standardised approach to care delivery leaves patients without the recommended prevention strategies, thereby compounding their risk of pressure ulcer development.

Clinical relevance
To address the potential patient safety implications, clinical practice could benefit from exploration and identification of methods for improving actual pressure ulcer preventive practice.

Acknowledgements
This work is partly funded by a research grant from Norwegian College of Nursing (Norsk Sykepleierforbund NSF), 2012. We are grateful to Spesialbibliotekar Karin Bakkemo, Spesialbibliotekar Jana Myrvold and Menno van Etten.

Conflict of Interest
The authors have no conflict of interest to declare.

References
Molnlycke workshop

Medical device-related pressure ulcers – practical tips to prevention
Friday August 30th

Medical device related pressure ulcers
- practical tips to prevention
Mölnlycke Health Care Workshop, EPUAP 2013

Pressure ulcers from medical devices are increasing in frequency, and it has been said MDR pressure ulcers are an epidemic. High-risk patients should be identified in risk assessments, skin inspection beneath devices must occur on every shift (ref: Black, J et al, Medical Device Related Pressure Ulcers, IWJ 2013)

Dr Joyce Black, of University of Nebraska in the USA and Tod Brindle of Virginia Commonwealth University, Richmond USA will inspect the issues and provide solutions to a problem that affects many acute healthcare facilities around the globe.

Joyce Black RN PhD
Dr Black is an Associate Professor of Nursing at the University of Nebraska in the USA. She is a Fellow of the US Academy of Nursing and currently on the Board of the National Pressure Ulcer Advisory Panel.

C. Tod Brindle MSN RN ET CWOCN
Tod Brindle is a wound and ostomy consultant for the Virginia Commonwealth University Medical Centre, Richmond, in the USA. His clinical specialty area includes pressure ulcer prevention in high risk populations.
Friday August 30th

Room O
9.30 – 10.30 Free Paper Session 6
Chair: Dimitri Beeckman

CPI™ Wound Therapy Used in the Treatment of Complex MRSA Wounds in High-Risk Surgical Patients
Patrick V. Marasco, USA

Laboratory values alterations in geriatric patients with pressure ulcers
Lenche Neloska, Macedonia

Pressure ulcer treatment in hospitalized pediatric patients
Anna-Barbara Schlüer, Switzerland

Pressure ulcer in Austrian nursing home residents with and without dementia
Sandra Schüssler, Austria

Spinal Cord Injury: using functional activity in pressure relief
May Stinson, UK

Pressure ulcer incidence and risk factors for patients undergoing surgery that lasts more than three hours
Adinda Toppets, Belgium
Introduction

Complex wounds colonized with drug resistant bacteria, such as MRSA are difficult challenges in high-risk surgical patients. These patients are too ill to tolerate more traditional surgical debridement methods that are performed in the operating room under general anesthesia. Closed pulsatile irrigation was evaluated as an alternative to traditional surgical debridement.

Chronic wounds such as diabetic ulcers, pressure ulcers, venous leg ulcers and surgical wounds are of medical and economic concern worldwide. 1 Bioburden including devitalized tissue, colonizing microorganisms and bacteria organized into biofilms are significant barriers to normal wound healing. Biofilm is associated with unregulated inflammation and delayed or altered wound healing.2 Current standards of wound care have proven only marginally effective and many commercial topical agents and wound dressings are ineffective against a developed biofilm matrix.3 Physical methodologies such as mechanical debridement are essential to eradicate devitalized tissue and biofilm from chronic wounds. Closed pulsatile irrigation (CPI™) is a self-contained, non-invasive, hydro-mechanical debridement method used to effectively debride and cleanse both acute and chronic wounds.4

CPI™ has improved the safety and accessibility for this method of mechanical hydro-debridement which can be safely delivered to patients at the bedside as a daily treatment without requiring an operating room or general anesthesia.5

Methods:

All high-risk patients were referred to plastic surgery for complex non-healing MRSA wounds over a four year period. Risk was determined by advanced age and significant co-morbidities. Chronic MRSA wounds included those wounds which were resistant to Negative Pressure Wound Therapy (NPWT), intra-venous antibiotics or previous surgical debridement. Patients were treated with daily CPI™ wound therapy using 3 L normal saline at a maximum pressure of 15 psi along with standard dressing changes. Linear measurements and photographic documentation were recorded weekly.

Results:

All patients treated with low pressure CPI™ showed enhanced healing over time. Chronic MRSA wounds showed either complete healing by secondary intention or successful wound bed preparation suitable for surgical skin graft or flap reconstruction.

Table 1. Summary of data Group Ave. Number of Pressure Ulcers CPI™ treatments

<table>
<thead>
<tr>
<th>Control (N=76)</th>
<th>31.8 ± 0.5</th>
<th>40%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention(N=35)</td>
<td>23 %</td>
<td>20 %</td>
</tr>
</tbody>
</table>

Healed by Secondary Intention Successful Wound Bed Preparation for Graft or Flap Reconstruction

Clinical relevance

This study retrospectively evaluates the utilization of CPI™ as a cost effective treatment for high-risk surgical patients with complex non-healing MRSA wounds.

Conclusion:

CPI™ has a role in the treatment of high-risk chronic MRSA wound patients who otherwise could not tolerate traditional surgical debridement methods. Further investigation is needed to determine the mechanisms through which CPI™ enhances the healing rate.

Acknowledgements:

We have not received any financial support for the study. We would like to acknowledge the staff within the Departments of Plastic Surgery Lawrence General Hospital, Rehabilitation Medicine Life Care Centers of America® and Comfort Home Care Agency for their time and effort.

Conflict of Interest Disclosure:

*Patrick V. Marasco, MD, FACS is the inventor of CPI™ Wound Therapy and founder of PulseCare Medical LLC. *Dr. Venturi is Chief Medical Officer for PulseCare Medical LLC. Both are equity shareholders in PulseCare Medical LLC.

Address: 1 Plastic Surgery Center, North Andover, MA, USA, * National Plastic Surgery Center, Washington, DC, USA

References:

Introduction
Previous studies have shown that hypoproteinemia and anemia are associated with development of pressure ulcer. The aim of this study was to investigate the relationship between pressure ulcers, anaemia and serum protein alteration in geriatric patients.

Methods
We conducted a hospital-based case control study that included 183 patients with pressure ulcers (mean age 76.11 years) and 1296 patients without pressure ulcer (mean age 76.07 years).

Results
Several haemato-chemical parameters were observed in total of 1479 geriatric patients. Our results suggest that both anaemia and serum protein alteration significantly increase the pressure ulcers development (Fig. 1) (Tab.1). The results have shown significant differences in the prevalence of:
- decreased red cells between patients with pressure ulcer (44.6%) and patients without pressure ulcer (37.34%), \( p=0.018 \), \( \chi^2 \) = 5.613
- decreased haemoglobin between patients with pressure ulcer (65%) and patients without pressure ulcer (52.16%), \( p=0.001 \), \( \chi^2 \) = 10.779
- decreased serum iron between patients with pressure ulcer (30.05%) and patients without pressure ulcer (23.53%), \( p=0.05 \), \( \chi^2 \) = 3.702
- and total hypoproteinemia between patients with pressure ulcer (68.3%) and patients without pressure ulcer (49.69%), \( p<0.001 \), \( \chi^2 \) = 22.261

Table 1: Laboratory alteration in patients with and without PU

<table>
<thead>
<tr>
<th>Modalities</th>
<th>Without PU</th>
<th>With PU</th>
<th>( \chi^2 )</th>
<th>( \chi^2 ) (4)</th>
<th>P</th>
<th>OR</th>
<th>95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erythrocytes</td>
<td>37.34</td>
<td>44.6</td>
<td>5.613</td>
<td>5.613</td>
<td>0.018</td>
<td>1.472</td>
<td>1.077-2.011</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>52.16</td>
<td>65.0</td>
<td>10.779</td>
<td>10.779</td>
<td>0.001</td>
<td>1.689</td>
<td>1.222-2.333</td>
</tr>
<tr>
<td>Fe serum</td>
<td>23.53</td>
<td>30.0</td>
<td>3.702</td>
<td>3.702</td>
<td>0.05</td>
<td>1.336</td>
<td>0.970-1.925</td>
</tr>
<tr>
<td>Serum protein</td>
<td>49.69</td>
<td>68.3</td>
<td>22.261</td>
<td>22.261</td>
<td>&lt;0.001</td>
<td>2.224</td>
<td>1.596-3.098</td>
</tr>
<tr>
<td>Hyperglycemia</td>
<td>40.9</td>
<td>48.0</td>
<td>2.336</td>
<td>2.336</td>
<td>0.130</td>
<td>1.350</td>
<td>0.989-1.843</td>
</tr>
</tbody>
</table>

Discussion
Pathomechanical and pathophysiologic risk factors to potential skin breakdown should receive particular attention. Patients with pressure ulcer suffer from anaemia and serum protein alteration more than patients without pressure ulcer. Hypoproteinemia is predicting risk factor for pressure ulcer development in geriatric patients. Both, anaemia and hypoproteinemia influence to the pressure ulcer development, thus correct diagnosis is important for the adequate treatment. It is crucial however that all other risk factors are considered and carefully examined while treating pressure ulcers.

Clinical relevance
Certain haemato-chemical parameters are indicators of development of pressure ulcers.

Conflict of Interest - none
Introduction

Although pressure ulcers (PUs) have gained a great deal of attention in adults, far less is known about PUs in children and neonates [1]. There are several guidelines for wound treatment in adult patients regarding both the prevention and treatment of PUs as well as wounds in general, but to our best knowledge no such guidelines exist for pediatric care. Wound care in pediatric patients needs to take account of several relevant differences between children and adult patients making the management of acute and chronic wounds of various etiologies in the pediatric population to a challenge [1]. Due to their small body sites, especially in newborns, neonates and infants, pediatric patients present difficulties for finding an appropriate wound treatment.

Methods

In 2009 a multicenter, cross-sectional, point prevalence study was conducted in all 14 pediatric hospitals in the German-speaking part of Switzerland on one day in June [2]. All pediatric departments were included. The instrument and method of data collection of the Dutch National Prevalence Measurement of Care Problems (LPZ) was used to assess the treatment of pressure ulcers [3]. The instrument collects among other things the following categories of data on patient level: (1) patient characteristics (demographic and clinical data), (2) assessment of the severity of pressure ulcers using the EPUAP categories [4], as well as (3) prevention and treatment interventions.

References


Results

Table 2: Wound dressings used in the 142 patients with a total of 269 PUs categories 1 to 4

<table>
<thead>
<tr>
<th>Wound dressing</th>
<th>Cat. 1</th>
<th>Cat. 2</th>
<th>Cat. 3</th>
<th>Cat. 4</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No dressing</td>
<td>205</td>
<td>7</td>
<td></td>
<td></td>
<td>212 (78.8)</td>
</tr>
<tr>
<td>Ointment</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td>20 (7.3)</td>
</tr>
<tr>
<td>Hydrocolloid</td>
<td>6</td>
<td>2</td>
<td></td>
<td></td>
<td>8 (3)</td>
</tr>
<tr>
<td>Paraffin gauze</td>
<td>3</td>
<td></td>
<td>1</td>
<td></td>
<td>4 (1.5)</td>
</tr>
<tr>
<td>Polyurethane foam</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
<td>4 (1.5)</td>
</tr>
<tr>
<td>Drying out/dry</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>3 (1.2)</td>
</tr>
<tr>
<td>Alginate</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>2 (0.7)</td>
</tr>
<tr>
<td>Oil</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1 (0.4)</td>
</tr>
<tr>
<td>Dressing containing silver</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1 (0.4)</td>
</tr>
<tr>
<td>Film dressing</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1 (0.4)</td>
</tr>
<tr>
<td>Others</td>
<td>11</td>
<td>1</td>
<td></td>
<td>1*</td>
<td>13 (4.8)</td>
</tr>
<tr>
<td>Total n(%)</td>
<td>253(94)</td>
<td>11(4)</td>
<td>3(1)</td>
<td>2(1)</td>
<td>269(100)</td>
</tr>
</tbody>
</table>

Discussion

Most of all patients had pressure ulcers of category 1, so appropriate prevention to decrease any further trauma in these patients is mandatory. It seems reasonable that most of the category 1 PUs are not treated with a wound dressing at all, since in category 1 PUs the skin is still intact [4]. This makes it possible to recognize any changes in these ulcers quickly and easily. The use of any dressing in pediatric patients must rely on a clear goal for the intended treatment, with consideration of potential critical aspects like causing further harm or trauma.

Clinical relevance

It is a clinical challenge to use dressings, which are both appropriate to the goal that has to be achieved in wound healing as well as to the specific pediatric needs. In addition, the choice of a dressing in children with PUs should be balanced and well documented as well as regularly evaluated.

Acknowledgements

We would like to thank the nursing staff members, the chief nursing officers of all the hospitals involved for their active participation in this study. Further, we thank all the children and their families for their contribution.

Conflict of Interest

None.
Pressure ulcer in Austrian nursing home residents with and without dementia

Sandra Schüssler 1*, Theo Dassen 2, Christa Lohrmann 1

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2 Institute of Health Sciences Education and Nursing Science, Charité - Universitätsmedizin Berlin, Germany

Introduction
Pressure ulcer (PU) is a common care problem in nursing homes with serious negative outcomes like reduced quality of life, increased nursing care needs and health care costs. More than 50% of nursing home residents have a medical diagnosis of dementia [1]. PU in residents with dementia can become an aggravating problem against the background of increasing cognitive deficits and care dependency. In the international literature, there are only few studies focusing on PU in residents with dementia. Therefore the aim of this secondary data analysis is to present the characteristics of PUs in Austrian nursing home residents with and without dementia.

Methods
The Austrian version of the Prevalence Measurement of Care Problems is a multicentre, cross-sectional study which is performed annually in nursing homes [2]. For data collection purposes a standardized and tested questionnaire was used. From 2009 to 2012, data from 3577 nursing home residents were obtained.

Results
60.2% (n=2155) of the residents had a medical diagnosis of dementia. A comparison of residents with and without dementia yielded no significant difference in the prevalence of PU (5.2% vs. 6.5%, p>0.05). In both groups younger residents (<75) were more affected by PU than older residents.

Table 1: PU categories according to EPUAP & NPUAP in residents with and without dementia, in %

<table>
<thead>
<tr>
<th>PU-categories</th>
<th>Residents with dementia (n=111)</th>
<th>Residents without dementia (n=92)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>14.1</td>
<td>16.1</td>
</tr>
<tr>
<td>Category 2</td>
<td>40.5</td>
<td>32.6</td>
</tr>
<tr>
<td>Category 3</td>
<td>28.8</td>
<td>40.2</td>
</tr>
<tr>
<td>Category 4</td>
<td>16.2</td>
<td>10.9</td>
</tr>
</tbody>
</table>

Table 1 shows that residents with dementia suffer most often from PU category 2, whereas residents without dementia are most often affected by PU category 3. Residents with dementia and PU show a higher rate of complete care dependency than residents without dementia suffering from PU (64.9% vs. 39.1%).

Discussion
There are no differences in the prevalence of PU between residents with and without dementia, but residents with dementia show a lower category of PU. Residents with dementia and PU are more affected by malnutrition, but less affected by stroke/hemiparesis. Urinary incontinence is very high in both groups.

Clinical relevance
The results may help nurses tailor their nursing care to the individual residents’ needs. Malnourished residents with dementia and PU and residents with stroke/hemiparesis without dementia suffering from PU should receive more attention.

Acknowledgements
We appreciate the help of all participating institutions, nurses and residents.

Conflict of Interest
None

References
Spinal Cord Injury: using functional activity in pressure relief

Stinson May 1*, Cathy Gillan 2, Rachel Schofield 1 Julie Morton 2 Alison Porter-Armstrong 1

1* University of Ulster, N. Ireland, md.stinson@ulster.ac.uk
2 Belfast Health & Social Care Trust, N.Ireland

Introduction
Individuals with spinal cord injury (SCI) are at high risk of developing pressure ulcers (PUs) due to limited mobility, prolonged sitting time, and reduced sensation [1]. Popular activities for individuals with SCI include computer use [2], which encourages sedentary behaviour thus increasing PU risk. During rehabilitation, individuals are taught to perform weight shifts every 15 minutes to reduce seated interface pressure [3], however, concordance with this regime has been shown to be poor [4]. It was hypothesized that integrating weight shifts into everyday activities would enhance concordance and promote tissue viability. This study aimed to (1) investigate the frequency, type and quality of weight shift movements normally performed by SCI individuals over a one hour period, (2) investigate the effectiveness of an adapted computer based activity to reduce interface pressure.

Methods
Fourteen participants with SCI (12 male, 2 female; aged 23-62 years) were recruited from Regional Spinal Cord Injury Unit, Belfast Health & Social Care Trust. The study comprised two strands. Strand A used a prospective, cohort design and Strand B used a repeated measures design. In both strands, participants used their own wheelchair and prescribed pressure reducing cushion, and wore loose fitting clothing. The XSensor pressure sensing mat was positioned between the participant and the cushion to measure interface pressure and an Activpal3 accelerometer was attached to the participant’s sternum to measure the angle of trunk tilt. In Strand A, participants engaged in a computer activity of their choice for 1 hour while the frequency and type of movements was observed and recorded. In Strand B, participants engaged in a computer activity while alternating between normal sitting (10 mins) and forward reaching (5 mins) over a 30 minute period. In the latter position, the keyboard or iPad was moved forward to a position 150% x arm length.

Results
Strand A: The number of movements within the one hour period ranged from 0 -28, with three participants performing no movements. At least four pressure relieving movements were performed by 42.9% of participants, but most of the movements (84.4%) yielded less than 25% reduction in interface pressure compared to normal sitting.

Strand B: The adapted computer activity, involving reaching forward by 150% arm length, significantly reduced interface pressure around the ischial region compared to normal sitting; significant reductions were found in the Dispersion Index (p<0.05) and Peak Pressure Index (p<0.001).

Discussion
Despite being at high risk of developing PUs, this study showed that individuals with SCI did not adhere to NPUAP recommendations of performing pressure reliefs every 15 minutes [3]. Furthermore, the majority of pressure reliefs performed by the individuals were held for less than 20 seconds and had minimal effect on reducing interface pressures. In contrast, this study also showed that the effectiveness of weight shifts in reducing interface pressure could be enhanced by incorporating a forward reach of 150% x arm length within an everyday, computer activity. Further research is needed to explore the application of other functional activities on pressure relieving behaviours in at risk populations.

Clinical relevance
Health practitioners should explore the incorporation of pressure relieving movements, such as learning/reaching forward, within everyday activities in an effort to improve client concordance with pressure relieving recommendations.

Acknowledgements
This work was supported by the United Kingdom Occupational Therapy Research Foundation (UKOTRF). The authors thank Prof Stephen Sprigle, Georgia Institute of Technology, Atlanta and Gabriel Mallon, Aspire Independent Living Advisory Team, for their support throughout this study.

Conflict of Interest
None.

References
Pressure ulcer incidence and risk factors for patients undergoing surgery that lasts more than three hours

Adinda Toppets1*, Dimitri Beeckman2, Annelies Vanhoof2, Lien Robben3, Ilana Laureys3, Jan Vranckx4

1* University Hospital of Leuven, Belgium, adinda.toppets@uzleuven.be
2 University of Gent, Leuven, 3 University of Leuven, Belgium, 4 University Hospital of Leuven, Belgium

Introduction
The prevalence of pressure ulcers (category I- IV) in the overall population in Belgian hospitals is 12.1% [1]. Prevalence rates in specific patient populations are significantly higher. For example, the incidence of pressure ulcers in surgical patients varies between 4.7% and 66% [2].

Undergoing surgery seems to be a risk factor to develop pressure ulcers even in patients who are not at risk otherwise [2]. We assume that pressure ulcers occur during the peroperative period whilst patients are during surgery not able to reposition or feel pain caused by prolonged pressure.

The purpose of this paper is to determine the pressure ulcer incidence (category I-IV and II-IV) and risk factors for patients undergoing surgery that lasts more than three hours.

Methods
The research design was a single center follow-up study at the University Hospitals of Leuven, Belgium. Pre-, per- and postoperative data were collected using the electroning health record. The skin of the patients was observed before the surgery, within three hours after the surgery and 48 hours after surgery. Data were collected by three researchers who where trained in pressure ulcer classification.

Statistical analysis was performed with SPSS. Each variable was examined individually using univariate logistic regression analysis to identify those risk factors that were associated with the occurrence of pressure ulcers category II-IV. Variables with a p-value of > 0.2 were then considered for inclusion into a stepwise backward elimination multivariate logistic regression analysis.

Results
Two days after surgery the incidence of pressure ulcers category I-IV was 6.7% and the incidence of pressure ulcers category II-IV was 2.2%. In total 5 patients, of the 225 observed patients, developed a pressure ulcer category II-IV.

The following variables were included in the multivariate logistic regression analysis: ‘anemia’, ‘diabetes’, ‘total length of surgery’, ‘total length of hypotensive period’ (diastolic blood pressure < 60 mmHg), ‘sedation score’, ‘repositioning postoperative’. The only statistically significant variable was total length of hypotensive period (p = 0.018).

Discussion
This study suggests that there is no relationship between the length of surgery and the occurrence of pressure ulcers. This is in contradiction with previous studies. For example, Schoonhoven et al. [2] reports that for every 30 minutes surgery is prolonged beyond 4 hours, the risk of developing pressure ulcers is increased by approximately 33%. Given the small number of patients with pressure ulcers in this study (n= 5) and in the study published by Schoonhoven et al. [2] (n = 21) the results of the statistical analysis should be interpreted with caution. Further analysis in larger trials will be necessary to determine the link between length of surgery and the occurrence of pressure ulcers.

Conflict of Interest
No conflict of interest has been declared by the authors.

References
Patient as a partner in care

Erik Hew de Laat
Radboud University Nijmegen Medical Centre, The Netherlands, e.delaat@plchir.umcn.nl

Introduction

In the past decades, the attitude of the patient changed from complying with a prescription to negotiating behaviour change. Accordingly, the all-knowing healthcare professional changed to a guide or coach of the patient. In this way, patient and health care professional make a shared and informed decision.

The internet and the social media have an significant influence on this dynamic process. Patients are not only informed by healthcare professionals anymore but use websites to find out information about their condition. They share information and experiences with others in their communities and consult physicians and nurses using telemedicine. These are characteristics of a movement: Health 2.0 closely related to the concept of Medicine 2.0.

Across the health care industry, from large hospital networks to patient support groups, new media tools like weblogs, instant messaging platforms, video chat, and social networks are reengineering the way professionals and patients interact [1].

In a health information system, PatientsLikeMe, patients report their relevant health information, Member profiles are posted where other members can have access to them, providing a basis for passive information sharing and active dialogue among patients [2]. Internet-based Ask the Doctor service run by family physicians are emerging [3]. eDocAmerica gives individuals and their family members unlimited email access to board certified health care professionals who provide personal answers to all health related questions.

In the Radboud Nijmegen University Medical Centre in the Netherlands Jan Kremer, professor of reproductive medicine began his digital in vitro fertilisation (IVF) clinic in 2003 to make more information available to patients and reduce the barrier for them to make contact with doctors and nurses. Patients take charge of their records and can view test results, pictures of embryos, letters to GPs, and other information, as well as emailing questions to their care team, guaranteed to be answered within a day. Patients, not professionals, have driven its development. This innovation is used as a blueprint for a national worldwide “mijnzorgnet.nl” (mycarenet.nl) and promoted by the Ministry of Health, Welfare and Sport of the Netherlands

In this vision, in similar terms to participatory medicine, participatory care is a movement in which networked patients shift from being mere passengers to responsible drivers of their own health, and in which providers encourage and value them as full partners.

References


Friday August 30th


Anne Cecile Mulder
Radboud University Nijmegen Medical Centre, the Netherlands, AnneCecileMulder@gmail.com

Introduction
Persons with spinal cord injury (SCI) perform daily activities to prevent pressure ulcers (PUs). Increasing self-management behavior can decrease the impact of a chronic condition on a person’s health status. Self-management interventions to prevent PUs should be implemented into chronic SCI care. In order to do so, information is needed on self-management behavior in the SCI population. This study explored which personal, SCI related and health related factors influence self-management behavior in persons with SCI. With this knowledge health care professionals can focus on the main influencing factors to increase the person’s extent of self-management.

Methods
The extent of self-management was measured using the PAM 13-Dutch. A 30-item questionnaire was completed by 165 persons with a SCI from two rehabilitation centers in the Netherlands. Correlations and a logistic regression model were measured to determine associations between self-management and assumed influencing factors.

Results
Significant correlations were found between the PAM 13-Dutch and the number of PU prevention behavior, time since injury, self-reported health, education, usual activity (EQ 5D-3L), complete SCI and comorbidity. Education and completeness of SCI were found to be the main influencing factors on the extent of self-management behavior. Results of the PAM 13-Dutch in the sample of persons with a SCI were compared to results of the PAM 13-Dutch in a large sample of persons with chronic conditions. Persons with a SCI indicate to have a significant lower extent in self-management behavior.

Discussion
It can be assumed that increasing PU prevention behavior goes together with higher self-management behavior. Higher education levels and complete SCI indicate to have most impact on a higher extent of self-management behavior.

Clinical relevance
Health care professionals who provide SCI care and PU prevention care should consider the characteristics of the person versus the potential influencing factors in their efforts to increase the patient’s self-management behavior. Self-management education and instruction should be tailored to the individual with SCI to increase the extent of self-management behavior.

Conflict of Interest
The authors have nothing to disclose.
Friday August 30th

Friday, 30th August, 11.30 – 12.30
Room N, level 01

PUCLAS Workshop

Chair: Dimitri Beeckman, Belgium
Friday August 30th

Room O

11.30 -12.30  Free Paper Session 7
Chair: Nils Lahmann

Is pain a predictor of Category 2 pressure ulcers? Results of the PURPOSE Pain Cohort Study
Jane Nixon, UK

From systematic review to clinical practice: Using consensus methods to develop a Pressure Ulcer Risk Assessment Framework (PURAF)
Susanne Coleman, UK

The Design and Pre-testing of a Pressure Ulcer Risk Assessment Framework (PURAF)
Susanne Coleman, UK

The Modified Jackson/Cubbin – Risk Scale’s Predictive Value in the PU Development at ICU
Maarit Ahtiala, Finland

Factors predicting the development of pressure ulcers in an at risk population receiving prevention: a multicenter cohort study
Liesbet Demarre, Belgium

Pressure ulcer risk assessment and preventive care in Norway and Ireland – what difference does a risk scale make?
Edda Johansen, Norway
Is pain a predictor of Category 2 pressure ulcers? Results of the PURPOSE Pain Cohort Study

Jane Nixon1*, Isabelle Smith1, Sarah Brown1, Andrea Nelson2 Elizabeth McGinnis3, Nikki Stubbs4 and Lyn Wilson5 on behalf of the PURPOSE Pain Cohort Group

1* Clinical Trials Research Unit, University of Leeds, UK, j.e.nixon@leeds.ac.uk
2 School of Healthcare, University of Leeds, UK, 3 Leeds Teaching Hospitals NHS Trust, UK, 4Leeds Community Healthcare Trust, UK and 5Mid Yorkshire NHS Trust, UK

Introduction
Pain is an important symptom which aids the diagnosis of many conditions. A systematic review of health related quality of life studies in patients with pressure ulcers (PU), identified that patients’ reports of localised skin pain associated with early PU development are often ignored [1, 2, 3]. This study was a prospective cohort study that explored the role of pain as an early predictor of Category 2 PU development.

Methods
We conducted a prospective cohort study with 30 days follow-up, in 26 acute and community UK NHS centres involving patients at high-risk of PU development. High risk was defined operationally as having one or more of the following characteristics:
1. Braden bedfast/chairfast AND completely immobile/very limited mobility
2. Localised skin pain on any pressure area skin site
3. Category 1 PU on any pressure area skin site.

Full stepwise variable selection was used to determine which a priori factors of interest including age, diabetes, history of prior weight loss, mobility (Braden Scale), presence of skin alterations, presence of category 1 PU, setting (acute or community), analgesic/pain relief use and whether the presence of pain on a pressure ulcer free skin site at baseline were predictive of Category 2 PU development. The a priori factors were based upon a conceptual framework derived from a systematic review of the literature [4].

For risk factor studies using multivariate logistic regression it is recommended that at least 10 events (ie PUs) per risk factor for reliable estimation of effects. For a model with 9 risk factors and assuming an event rate of 15% and potential loss to follow up of 5% we required 632 patients.

Results
Of 3826 patients assessed 634 were registered to the study; after a loss of 32 patients to follow-up we had an analysis population of 602.

The median age of the study population was 80 years (21, 101), with 233 (38.7%) men and 397(65.9%) from acute hospital and 205(34.1%) from community settings.

A total of 152 (25.3%) patients developed one or more new Category ≥ 2 PU. A total of 464 (77.1%) patients reported pressure area pain, on a healthy, altered or category 1 skin site, at baseline and of these 130 (26.0%) developed a new Category ≥ 2 PU, compared with 22 (15.9%) of those without pain.

Univariate logistic regression identified 3 baseline factors which were statistically significantly associated with the odds of developing a new Category ≥ 2 PU: the presence of Category 1 PU (OR 3.20 CI 2.63 to 4.74, p<0.0001), alterations to intact skin (OR 1.79, CI 1.20 to 2.66, p=0.0045) and pain (OR 2.05, CI 1.25 to 3.38, p=0.0047).

The final model obtained includes: the presence of Category 1(OR 3.25 CI 2.17 to 4.86, p<0.0001), alterations to intact skin (OR 1.98, CI 1.30 to 3.00, p=0.0014) and pain (OR 1.56, CI 0.93 to 2.63, p=0.0931).

Discussion
This is the first study to include pain as a risk factor for PU development and suggests that it may be an important risk factor even in the presence of other factors which are independently predictive of Category ≥2 PU development.

The study requires replication.

Clinical relevance
Assessing and responding to patient reported pain on pressure ulcer free skin sites may be an important part of a pressure ulcer prevention strategy.

Acknowledgements
This presentation presents independent research funded by the National Institute for Health Research (NIHR) under its Programme Grants for Applied Research Programme (RP-PG-0407-10056). The views expressed in this presentation are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health.

Conflict of Interest
None declared

References
From systematic review to clinical practice: Using consensus methods to develop a Pressure Ulcer Risk Assessment Framework (PURAF)

Susanne Coleman1*, Jane Nixon2 and Andrea Nelson3 on behalf of the PURPOSE PURAF Study Group

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2 Clinical Trials Research Unit, University of Leeds, United Kingdom.
3 School of Healthcare, University of Leeds, United Kingdom.

Introduction
Risk assessment (RA) is viewed as key to PU prevention and in clinical practice RA tools are routinely used. While these tools offer some structure to RA many were developed decades ago. Systematic review evidence [1] has become available, making it timely to re-consider the risk factors that should to be considered in RA and the RA process.

Methods
We have undertaken an international consensus study which aimed to agree a PU risk factor minimum data set (MDS) to underpin the development of a new Pressure Ulcer Risk Assessment Framework (PURAF) for use in clinical practice. Underpinned by the systematic review risk factor evidence, a modified nominal group technique was used based on the RAND/UCLA Appropriateness method. The PU Research Service User Network (PURSUN) was also involved in the consensus process (Fig 1).

The consensus process comprised initial meetings of an international expert and PURSUN groups followed by 2 consensus cycles, to agree the risk factor domains/sub-domains and the assessment items and structure for a PURAF.

Results
The consensus process reduced an initial list of risk factors identified by the systematic review (15 domain/46 sub-domains) into a final set of 9 risk factor domains/sub-domains for inclusion in the PU risk factor MDS and PURAF and the structural elements of the PURAF.

Discussion
The consensus study facilitated international expert group consideration of PU evidence as well as the views of service users in the development of a PU risk factor MDS and PURAF and the structural elements of the PURAF.

Clinical relevance
The work demonstrates the use of a robust process in translating epidemiological research evidence into a format of direct relevance to RA practice.

Acknowledgements
This presentation presents independent research funded by the National Institute for Health Research (NIHR) under its Programme Grants for Applied Research Programme (RP-PG-0407-10056). The views expressed in this presentation are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health.

Conflict of Interest
None

References
The Design and Pre-testing of a Pressure Ulcer Risk Assessment Framework (PURAF)

Susanne Coleman¹*, Jane Nixon² and Andrea Nelson³ on behalf of the PURPOSE PURAF Study Group

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² Clinical Trials Research Unit, University of Leeds, United Kingdom.
³ School of Healthcare, University of Leeds, United Kingdom.

Introduction
We have undertaken a systematic review of PU risk factors [1] and an international consensus study which identified key risks factor domains/sub-domains for inclusion in a PU risk factor Minimum Data Set and Pressure Ulcer Risk Assessment Framework (PURAF) (Fig 1) and key features of the structure of a PURAF including: draft data items; a screening stage and full risk assessment stage (Fig 1); decision schema (ie not a score) and; distinction between primary prevention and secondary prevention/treatment pathway. This presentation details the design and pre-testing element of the draft PURAF.

Methods
Cognitive pre-testing methods were used to indicate how clinical nurses interpreted the questions, response categories and instructions of the draft PURAF. We held 3 sessions grouping nurses by job role to ensure that they felt comfortable in raising issues relating to the draft PURAF. Using case studies nurses were trained in the use of tool and were randomly allocated to a one to one think out loud interview or a focus group. The focus group meetings and the think out loud interviews were audio-recorded and transcribed. A directed content analysis approach was used to identify key themes and areas of confusion regarding the use of the PURAF and data completeness analysis was also undertaken. Analysis was undertaken after each session and adjustments were made to the draft PURAF prior to the next session.

Results
The pre-testing identified areas of confusion and led to changes to the PURAF drafts between sessions. Changes included amendments to the overall flow, format and colour coding of the PURAF content, the support for decision making, the wording of specific assessment items and the data items for inclusion in the screening stage of the PURAF. Missing data decreased over the pre-test sessions as the PURAF was developed (Fig 2).

Discussion
The pre-test enabled the development of the provisional PURAF – PURPOSE T (Pressure Ulcer Risk Primary Or Secondary Evaluation Tool) which will be presented. The involvement of clinically based nurses in the interpretation and use of the draft instrument led to important amendments to the design and wording, ensuring clinical applicability.

Clinical relevance
The PURPOSE T is the first RA tool to be developed using systematic review evidence, an international expert group, service users and nurses in clinical practice. On going development and assessment of reliability and validity through Field Testing is near to completion and the tool will be available for implementation in clinical practice.

Acknowledgements
This presentation presents independent research funded by the National Institute for Health Research (NIHR) under its Programme Grants for Applied Research Programme (RP-PG-0407-10056). The views expressed in this presentation are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health.

Conflict of Interest
None

References
Introduction

There are numerous risk assessment scales available for pressure ulcer (PU) risk. Braden scale is the most widely used also in intensive care units (ICU). Jackson/Cubbin (J/C) -pressure area risk calculator [1] is specifically developed for ICUs and it has been shown to perform best in ICUs [2]. The J/C risk scale was both modified (mJ/C) and more precisely defined to suit for Finnish health care and for assessment of PU risk [3]. It still contains the original 12 risk categories such as age, weight (BMI), associated diseases, general skin condition, mental condition, mobility, hemodynamics, respiration, oxygen requirements, nutrition, incontinence and hygiene plus three conditions (transport to surgery/scan, requirement of blood products and hypothermia) which result in deduction of one point out of the total score i.e. increasing the risk. 56.7 % of patients with a pressure ulcer had a J/C-score below or equal 29 (high risk limit). We further examined the significance and relative weight of individual risk categories within the mJ/C scale in the development of pressure ulcers.

Methods

The current study population includes all medical and surgical patients admitted to a mixed ICU (24 beds) in Turku University Hospital in 2010 (N=1629). The study protocol was approved by the Ethical Committee of Hospital District of Southwest Finland.

Results

The prevalence of PUs was 11.8 % (N=181 PUs) in 2010. The corresponding incidence was 11.1 % and incidence rate was 3.0/100 ICU days. The most prevalent locations were sacrum, heels and nose. The nasal PUs were device (non-invasive BiPAP/CPAP ventilation mask) induced. 13 patients had exclusively PUs in the nose and these patients were excluded from the further analysis of significance and relative weight of individual risk categories within the mJ/C scale in the development of pressure ulcers. Hemoglobin concentration was noticed to identify patients at risk of developing PUs and it can most probably be used as a substitute for the category “requirement of blood products”.

Table 1: Distribution of patients according to B-Hb

<table>
<thead>
<tr>
<th>Hemoglobin (g/l)</th>
<th>PU/No (%)</th>
<th>PU/Yes (%)</th>
</tr>
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<tbody>
<tr>
<td>&lt; 75</td>
<td>6.6</td>
<td>9.9</td>
</tr>
<tr>
<td>75-100</td>
<td>35.6</td>
<td>42.0</td>
</tr>
<tr>
<td>&gt;100</td>
<td>57.8</td>
<td>48.1</td>
</tr>
</tbody>
</table>

The patients with lower hemoglobin concentration had significantly more PUs than those with higher hemoglobin concentrations (Logistic regression, P=0.0143) (Table 1). Analysis of different categories of mJ/C scale shows that the original categories or their subcategories are not of equal weight (see example in Fig. 1).

Figure 1. Proportion of PUs in hygiene subcategories

Discussion

Analysis of different categories of mJ/C scale shows that the original categories or their subcategories are not of equal weight and significance. This shows that the interpretation of J/C scale needs to be revisited.

Clinical relevance

The study helps to understand which risk categories among modified Jackson/Cubbin scale are the most important in the development of pressure ulcers. In addition the results aid in further development of the risk scale which can be even more powerful in the prediction of pressure ulcer risk in intensive care.

Acknowledgements

The study is financially supported by The Finnish Wound Care Association and Department grants.

Conflict of Interest

None.

References

Factors predicting the development of pressure ulcers in an at risk population receiving prevention: a multicenter cohort study

Liesbet Demarré*, Sofie Verhaeghe, Ann Van Hecke, Els Clays, Dimitri Beeckman

* Ghent University, Belgium, Liesbet.Demarre@ugent.be

Introduction
Several studies examined risk factors predicting pressure ulcer development. The identification of patients at risk for pressure ulcer development is complex because of the use of various types of pressure ulcer prediction [1]. Studies identifying risk factors in hospitalised patients at risk while receiving standardised preventative measures are lacking. This study aimed to identify predictive factors associated with the development of pressure ulcers in patients at risk when receiving standardised preventative measures.

Methods
Data were collected in a multicenter cohort study in Belgian hospitals. A consecutive sample of 610 patients with a Braden score < 17 was included. All patients received standardised preventive measures, consisting of two types of equally effective alternating low pressure air mattresses [2]. Patient data, skin assessment, risk assessment, medical history, and diagnosis were collected during a three-year study. Independent predictive factors were identified using multivariate statistics.

Results
The incidence of pressure ulcers category II-IV was associated with the presence of non-blanchable erythema (OR= 5.02) and incontinence-associated dermatitis (OR= 2.71) (Table 1). Severe pressure ulcers (category III-IV) were associated with non-blanchable erythema (OR=47.31), a uro-genital diagnosis (OR=16.59) and diabetes (OR=12.65) (Table 3).

Table 1 Multivariate analysis for the development of superficial pressure ulcers

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>OR (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep medication and tranquillizers</td>
<td>0.50 (0.23-0.82)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Urinary catheter</td>
<td>4.91 (1.16-19.33)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Diabetes</td>
<td>4.23 (2.07-7.73)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Fever (&gt;38°Celsius)</td>
<td>0.77 (0.64-0.94)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Braden score</td>
<td>0.79 (0.65-0.94)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Type of mattress</td>
<td>1.24 (0.96-1.62)</td>
<td>0.16</td>
</tr>
<tr>
<td>Presence of incontinence diagnosis</td>
<td>1.99 (0.77-5.14)</td>
<td>0.67</td>
</tr>
<tr>
<td>Paralysis</td>
<td>2.06 (0.92-4.65)</td>
<td>0.16</td>
</tr>
<tr>
<td>Endocrine diagnosis</td>
<td>0.99 (0.97-1.01)</td>
<td>0.09</td>
</tr>
<tr>
<td>Fever (&gt;38°Celsius)</td>
<td>1.99 (0.77-5.14)</td>
<td>0.16</td>
</tr>
<tr>
<td>Urinary catheter</td>
<td>2.06 (0.92-4.65)</td>
<td>0.08</td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td>0.99 (0.97-1.01)</td>
<td>0.13</td>
</tr>
<tr>
<td>Length</td>
<td>12.35 (1.09-133)</td>
<td>0.23</td>
</tr>
</tbody>
</table>

Risk factors indicative of a higher risk for developing superficial pressure ulcers (Category II) were being admitted to an internal medicine ward (OR= 4.24), the presence of incontinence-associated dermatitis (OR=3.11), non-blanchable erythema (OR=2.99), and an increasing Braden score (OR= 0.77) (Table 2).

Table 2 Multivariate analysis for the development of superficial pressure ulcers

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>OR (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ward type</td>
<td>4.24 (1.10-16.29)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>IAD</td>
<td>3.11 (1.58-6.34)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Non-blanchable erythema</td>
<td>2.99 (1.15-7.80)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Braden score</td>
<td>0.77 (0.63-0.93)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Mattress</td>
<td>1.52 (0.63-3.78)</td>
<td>0.38</td>
</tr>
<tr>
<td>Gastro-intestinal diagnosis</td>
<td>0.67 (0.15-3.10)</td>
<td>0.38</td>
</tr>
<tr>
<td>Age</td>
<td>1.00 (0.97-1.04)</td>
<td>0.80</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.70 (0.19-2.62)</td>
<td>0.68</td>
</tr>
<tr>
<td>Body temperature</td>
<td>1.58 (0.91-2.74)</td>
<td>0.11</td>
</tr>
<tr>
<td>Sleep medication/ tranquillizer</td>
<td>1.99 (0.79-5.10)</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Discussion
Despite the application of standardised preventive measures, patients still develop pressure ulcers. The identification of patients at increased risk can be improved by taking into account specific predictive factors. Factors associated with an increased risk of developing a superficial pressure ulcer differed from those for developing a severe ulcer.

Clinical relevance
The results of this study may open the discussion for the development, validation, and implementation of a stepped-care-model approach. This approach will support health care providers to tailor prevention to specific pressure ulcer risk profiles.

Acknowledgements
The authors would like to acknowledge the support of the late Professor Tom Defloor. His contribution in this study was of great value.

Conflict of Interest
No conflict of interest.

References
Pressure ulcer risk assessment and preventive care in Norway and Ireland – what difference does a risk scale make?

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² Faculty of Nursing & Midwifery, RCSI, Dublin, Ireland
³ Seating and mobility consultant, Norway

Introduction

Pressure ulcers are common, even though most pressure ulcers can be prevented through structured risk assessment and implementation of appropriate preventive initiatives. Risk assessment should combine both clinical judgement and risk assessment scales to detect individuals at risk of developing pressure ulcers¹. It is evident, however, that clinicians find that risk scales are often time consuming and confusing². Additionally, scales have not yet been proven to reduce pressure ulcer incidence³, leaving it unclear whether they contribute to pressure ulcer prevention or not. This study explored nurses and social educators risk assessment and preventive practices in two countries, in Ireland, where risk scales are used in combination with clinical judgement and Norway where risk assessment is solely based on clinical judgement.

Methods

Two semi-structured Focus group interviews were conducted, in Norway (7 nurses and 2 social educators) and Ireland (5 nurses). The transcribed data were subject to an inductive content analysis. Categories and themes emerging from the data were discussed by the authors to verify the findings and any disparities between care settings were discussed before consensus was agreed.

Results

Risk assessment practice differed between Norway and Ireland. Norwegian nurses were unfamiliar with the scales and assessed patients using clinical judgement alone. Nurses in Ireland assessed using risk scales and clinical judgement on patient admission. Thereafter nurses re-assessed patients clinically. Independent of the disparate risk assessment practices, knowledge of risk factors, risk patients and preventive strategies concurred in the two countries. However, it was found that there were discrepancies in documentation practices. Nurses in Ireland were care plan oriented, whilst Norwegian nurses did not discuss the importance of care plans for pressure ulcer prevention. In both countries documented care plans were partly unused and were therefore not necessarily reflecting the care provided. An important additional finding was a lack of staff competence in pressure ulcer prevention in both countries.

Discussion

It is argued that risk factors will vary depending on the care setting studied³. However, according to this study, despite the care setting or nurses risk assessment practices, patients considered at risk were immobile, with poor nutritional and skin conditions. Regardless of whether or not clinical judgement was combined with a numeric risk assessment scale, the preventive strategies were the same; turning schedules, pressure relief, supply of equipment, skin assessment and specific care. For risk assessment to be effective, it needs to be followed up with appropriate, implemented care plans. However, this study found that this is not always the case. Care plans were not always recorded, and for those patients with care plan, these were not necessarily used and therefore did not always reflect the care provided. The missing link between risk assessment and care plans, and the missing link between care plans and provided care, should concern clinical practice as it might lead to erratic prevention practice. Furthermore, a lack of competence could affect both care planning and care provided.

Clinical relevance

It is evident that the role of risk scales for pressure ulcer risk assessment and preventive care is unclear. Clinical judgement seem to play an important role in the overall care offered, however, it relies on carers’ clinical competence.

Acknowledgements

This work is partly funded by a grant from the Norwegian Nurses Organisation (NSF), 2012. Karin Bakkemo and Jana Myrvold are acknowledged.

Conflict of Interest

The authors have no conflict of interest to declare

References

Converting enthusiasm into clinical practice – an industry perspective

Martin Abel

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Concepts, guidelines and practical solutions for the best possible medical care under the prevailing circumstances – that is what patients and treatment providers, but also healthcare authorities, constantly strive for. Their common objective is provide a standard of care in public health that is adapted to both the economic situation of the healthcare system and the ethical and moral principles prevailing in the respective country.

This is the field on which research and development-centric international manufacturers must perform. To provide appropriate solutions and concepts for each customer, manufacturers must be able to precisely identify the (sometimes widely divergent) needs of their (sometimes equally divergent) target groups.

From a medical point of view, a holistic approach is required to improve patients’ lives, working closely with treatment providers, the patients’ relatives and the authorities – focusing on healing the patient or improve his or her health while ensuring an adequate quality of life.

The development of a new product or concept is therefore best realized together by a team consisting of stakeholders from all the domains mentioned (‘co-creation’). Joint analysis and discussion will help discover solutions that are not based solely on the principles of ‘Evidence Based Medicine’ but also consider the aspects of practicability and economic feasibility (‘Best Medical Practice’) (Fig. 1).

Therefore, any manufacturer must develop new offerings at different levels to meet the needs of the target market:

• New products offering a well-defined and adequate basic performance
• Additional benefits beyond the generic product properties
• Services
• Concepts for implementation into existing or new healthcare systems (jointly with treatment providers and health insurers) or social structures

Basic needs should be covered by basic properties of the product. During implementation, various additional value propositions for products and services should stimulate enthusiasm for new ideas and developments.

In this way, today’s targeted clinical research for medical products invariably starts with the concept evaluation phase. Customer and market needs are identified and described using a team strategy, and first-line approaches to a clinical review of the product claims for a new product are described. Aspects considered therefore include not only the performance, efficacy, effectiveness and safety of the product but also aspects related to quality of life, health economic benefits and clinical practicality (‘daily practice’). Therefore, health economic studies and ergonomic evaluations (usability checks) must figure prominently in all development efforts.

Real-life and register studies are suitable tools for gauging the success and evaluating the concepts and products, once introduced in the market. But they are equally important for permanent improvement and further development. For manufacturers, new developments are invariably a major challenge, not least because resultant economic benefits must be demonstrated. Nevertheless, the welfare of the patient and the manufacturer’s associated ethical responsibility always come first.

Fig.1 Best Medical Practice

Conflict of Interest

Dr Martin Abel is an employee of Lohmann & Rauscher.
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"Translating enthusiasm into clinical practice – an educational perspective"

Nicola Waters*

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Introduction

Although those working directly with patients have long recognized the debilitating impact of pressure ulcers (PU’s), the amount of time devoted to the subject in formal education environments often remains limited [1]. In the current era of fiscal responsibility PU occurrence has come under intense scrutiny and their prevention and management is increasingly linked to quality improvement and cost effectiveness [2]. As professional accountability in this area increases, so too does the need for educational approaches that promote better understanding of strategies to improve patient and system outcomes. Yet pressure ulcer prevention and management can hardly be described as topics that have traditionally inspired much excitement amongst those whose interests lie outside of skin and wound management. The task of translating enthusiasm into what is often perceived by teachers and students alike as a less than glamorous subject, can present considerable challenges.

Methods

Recognition of an increasing need to raise awareness and understanding of pressure ulcer prevention and management has led one Canadian university to explore creative ways to incorporate the topic into educational initiatives involving a variety of disciplines and settings. A collaborative approach between educators, clinicians, researchers and innovators has seen the topic of pressure ulcer prevention and management move beyond traditional classroom settings.

Results

Creative initiatives for incorporating the topic of PU prevention and management into educational programs include:

- Community-based student-led research initiatives
- Introduction of a simple mnemonic to reinforce the importance of patient-centered assessment and treatment [3]
- Skin assessment and pressure ulcer care as a focal point for stimulating discussion of ethical issues
- Connecting health care staff, educators and students from a wide variety of disciplines with local inventors of pressure ulcer technologies through an innovations in skin and wound care symposium
- Hands-on learning experience with innovative technology
- Raising PU awareness amongst internationally educated health professionals new to Canada

Discussion

A renewed focus on pressure ulcer-related practice is creating an unprecedented need for education in the area. Increased professional accountability for prevention and effective management of PU’s provides educators with an exciting array of opportunities to creatively translate enthusiasm about the subject. Initiatives introduced through one educational institution are encouraging students to recognize that they can make a difference not only in the lives of those at risk of or living with PUs but also as champions of fiscal responsibility.

Clinical relevance

Content learned during these diverse educational sessions has been enthusiastically translated into the workplace. Further research is underway to measure the direct impact of these initiatives on patient and health system outcomes.

Conflict of Interest

None

References

POSTERS
## Posters: Authors and Titles

Poster viewing throughout the meeting in Foyer, Level 02

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<th>Presenter</th>
<th>Title</th>
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The Use of Hemoglobin Saturation Ratio as a Means of Measuring Tissue Perfusion in the Development of Heel Pressure Sores

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Introduction
The heel is a common site of pressure wounds. The amount of pressure and time needed to develop these wounds is dependent on various factors including pressure surface, patient's anatomy, and co-morbidities. We studied the use of the hemoglobin saturation ratio as a means of assessing heel perfusion in various pressure settings. This technology has previously been used in the assessment of lower extremity perfusion and for breast reconstruction flap monitoring [1 and 2].

Methods
The mixed perfusion ratio in the heels of five volunteers was assessed on three pressure surfaces and at off-load as a baseline using the ViOptix T.Ox™ Tissue Oximeter (ViOptix; Freemont, CA; Fig. 1). The surfaces studied were stretcher pad, plastic backboard without padding, and pressure reduction gel. Each surface was measured for five minutes with a real time reading.

Results
On the stretcher, the average StO2% decrease was 26.2± 10 (range 18-43). The average StO2% decrease on the backboard was 22.8 ± 12.3 (range 8-37), and 24.0 ± 4.8 (range 19-30) on the gel pad. The StO2% drop had a leveling off with stretcher, and gel pad but with backboard had a continued slow drop at 5 minutes.

Discussion
This study demonstrates that hemoglobin oxygenation ratio can be used to assess a tissue’s direct perfusion in the setting of tissue pressure and can also be used to better assess the effects of pressure reduction surfaces. Using this method, a comparison of surfaces reveals a continued drop with a hard surface and plateau with all other surfaces. A comparison of gel versus stretcher shows a comparable reduction in tissue perfusion and therefore a similar pressure and shear reduction effect. While oxygenation ratios can be used to assess pressure precautions in skin care, further studies will be needed to determine time to skin breakdown as they pertain to pressure and tissue oxygenation.

Clinical relevance
This technology can be used as a screening tool to see which patients have decreased perfusion to certain parts of the body, and are thus more likely to develop a pressure wound.

Acknowledgements
We appreciate the help of the staff of Winthrop University Hospital.

Conflict of Interest: None

References

Fig. 1: The tissue oximeter used in this study.
Outcomes of Fat Grafting in Non-Healing Wounds

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Introduction
Non-healing wounds are responsible for significant morbidity and hospital cost [1]. Traumatic and radiation-induced lesions can be especially difficult to treat. Advances in stem cell therapy have revolutionized the means by which plastic surgeons treat these wounds. Human adipose tissue, which can easily be harvested from the abdomen by liposuction, contains adult mesenchymal stem cells that not only have the potential to differentiate into a variety of different cell lineages, but they also have the capability of secreting angiogenic growth factors that can facilitate wound healing [2]. Therefore, grafting fat to areas of chronic wounds may provide the injured tissue with the needed mediators essential to wound healing.

Methods
We conducted a retrospective chart review of three patients with chronic, non-healing wounds who underwent autologous fat grafting as part of their management plan.

Results
The patients ranged in age from 52-67 years of age. Two were female and one was male. Two of the patients had wounds secondary to radiation therapy for cancer and one developed a chronic wound from low-impact trauma. All three underwent autologous fat transfer from their abdomens to the sites of their wounds. All of our subjects experienced improvements with their wounds post-operatively.

Discussion
Fat grafting can be a useful technique to utilize in the management of non-healing wounds, as the adipose tissue contains cells that produce the chemical mediators needed for wound healing. These mediators are often lacking in non-healing wounds.

Clinical relevance
Fat grafting can be a useful technique to implement in the management of chronic, non-healing wounds. It is minimally invasive and low-risk.

Acknowledgements
We appreciate the help of the staff of Winthrop University Hospital.

Conflict of Interest: None

References
The Use of Acellular Dermal Matrix and Split-Thickness Skin Grafting in the Treatment of Heel Pressure Sores

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Introduction
The heel is the most common site for pressure wound development in hospitals [1]. Risk factors for these wounds include advanced age, malnutrition, and immobility [2]. Moreover, they can be difficult to prevent and treat, especially in patients who are elderly, malnourished, or have underlying medical conditions. In many circumstances, these wounds are extensively debrided or the patient ultimately undergoes partial calcaneectomy and other amputations, thereby severely limiting the patient’s ambulation.

Methods
We conducted a retrospective chart review of five patients whose calcaneal pressure ulcers were treated with the regimen of acellular dermal matrix and split-thickness skin grafting.

Results
Of the five patients, three were male and two were female. They ranged in age from 50-95 years of age. Their comorbid conditions included diabetes, peripheral artery disease, and coronary artery disease. Their heel pressure sores were debrided in the operating room; the wounds were treated with acellular dermal matrix. Two weeks later, the patients returned to the operating room for autologous skin grafting to the neodermal bed.

The patients tolerated the procedure well and there were no complications. In the post-operative months, four of the patients’ wounds healed completely (Fig. 1) and the individuals had a return to normal ambulation. One patient experienced partial graft loss, but the wound became smaller and is healing appropriately.

Discussion
Although further research with larger sample sizes is needed, based upon our experience, we feel that the combination of acellular dermal matrix and split-thickness skin grafting is a beneficial means of surgically treating heel pressure sores and preventing calcaneal osteomyelitis.

Clinical relevance
The regimen of acellular dermal matrix plus split-thickness skin grafting can be an effective means of treating heel pressure sores.

Acknowledgements
We appreciate the help of the staff of Winthrop University Hospital.

Conflict of Interest: None

References

Fig. 1: Heel pressure sore photographs from one of the patients. A) Demonstrates a heel pressure wound before debridement. B) Demonstrates the same wound after debridement, placement of acellular dermal matrix, and split-thickness skin grafting.
Management of Hand Pressure Sores

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Introduction
Pressure ulcers are a major source of morbidity for the elderly and those with chronic disease [1]. They most commonly occur on the sacrum, heel, and ischium. However, an uncommon location for such wounds is the palm of the hand. They typically occur in flexion contractures of the hand on the setting of spasticity or chronic contractures. Similar to other pressure sores, immobility is a risk factor [2].

Methods
We conducted a retrospective chart review of two patients with palm pressure wounds from hand contractures.

Results
Both patients’ wounds were full-thickness, with one wound covering the palmar surfaces of the hands from the index to ring fingers. The second patient had a fingertip wound at the paronychia. The fingers in that patient were inflexible and dressings could not be applied secondary to the contractures.

In the first patient, the contractures (Fig. 1) were the result of finger pressure from spasticity resulting from cerebrovascular accident. After the failure of splinting therapy, the patient was treated surgically by tendon release and splinting. All wounds healed completely with no recurrence.

The second patient had finger wounds secondary to spasticity from a closed head injury. Splinting alone was unsuccessful. This patient was healed with botulinum toxin injections to the profunda and superficialis muscles. The hand spasticity improved and the finger wounds healed spontaneously with splinting.

Discussion
Hand ulcers secondary to spasticity are often difficult to treat. Botulinum toxin injections and surgery can be useful means of treating these wounds.

Clinical relevance
Although hand pressure sores secondary to spasticity are unusual, it is important for clinicians to be aware that with tendon lengthening and botulinum toxin injections to the affected muscles, the sores will be able to begin to heal.

Acknowledgements
We appreciate the help of the staff of Winthrop University Hospital.

Conflict of Interest: None

References
Intangible costs in pressure ulcers: informal caregiver perception

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**Introduction**
In the health field every aspect of a problem is often translated in terms of money and the only worry is about the costs, without taking into account other qualitative or ethical considerations. Whether to include the indirect costs that an illness causes or not, has been, and remains, an issue that seems still far from being resolved. Any economic evaluation you want to receive its proper name should identify, measure and assess all significant costs. People agree on identifying intangible costs associated with an illness, but they do not try to value it in terms of money because of the difficulty they find when evaluating these concepts related to levels of pain and anxiety, a problem that does not exist in relation to the so-called direct costs. Prevention of pressure ulcers means not only financial savings of up to 2.5 times the treatment, but also it prevents intangible costs of pain, discomfort, suffering and self-image disturbances in patients who suffer them, with ethical connotations as they know that many can be avoided [1].

**Methods**
A qualitative study was developed through a structural survey among caregivers of patients with PU, delving into the emotions and / or feelings that triggers this process between them. The caregivers of patients with PU of a Health Centre from Lanzarote participated in this study. Those patients affected by pressure ulcers needed home care, and the ethical aspects where safeguarded when treating them. 25 caregivers were interviewed in the first quarter of 2013 and they worked with 19 patients.

**Results**
92% were women, with an average age of 57 years, caring for patients over 65 years. Most of them were dependent for all activities of daily life and with an average of 2.4 per patient PU. The time of the interviews ranged from 35-45 minutes. All caregivers say the PU produce “pain” and “suffering” to the patients. With regard to the feelings generated by PU among caregivers, noting that 23 caregivers (n = 25) believe that the situation experienced by these patients is "UNFAIR and WORRING" they are "TIRED" of requesting funding to improve the situation, while 3 of them are "HOPEFUL" and expect to get aid from the local institutions. About the impact on family, caregivers report that these wounds "TRANSFORM" family dynamics, patients "LOST" everyday life and relationships "ALTER" between patients and their families. At the same time, caregivers reported a "DEFICIT OF KNOWLEDGE" about this disease and asked for "SPECIFIC TRAINING" and "ECONOMIC RESOURCES".

**Discussion**
Injustice, concern and hope, pain and suffering, are feelings reported by the caregivers of patients with PU as “intangible costs”. The PU interferes with the family, modifying or deconstructing aspects of daily life of the group. It is important to consider the need for training and information for caregivers on these issues related to the treatment of pressure ulcers, requiring the external support of institutions.

**Clinical relevance**
Injustice, concern and hope, pain and suffering, are feelings reported by the caregivers of patients with PU as "intangible costs".

**Acknowledgements**
We appreciate the help of the program PCT-MAC (2007-2013) of the Union European for to finance this study.

**Conflict of Interest**
Don’t to exist.

**References**
**Poster #6**

Friday August 30th

**Dressing Friction Bench Testing: Identifying Appropriateness of Testing Procedures**

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**Introduction**

The prophylactic use of wound dressings in pressure ulcer prevention has been gaining increasing clinical awareness and scientific support in literature; however, bench testing of the frictional properties of dressings is confounded by variables such as bulk modulus, skipping, and blooming.

**Methods**

Two standards, ASTM D 1894-01 [1] and BS 3424-10 [2]: 1987, and a modified method based on BS 3424-10: 1987, were compared for appropriateness of testing frictional properties of wound dressings (Table 1). A commercially available dressing was tested using the modified BS 3424-10:1987 method and the ASTM D 1894-01 standard.

**Table 1-** Summary of test parameters for methods used to characterize dressing frictional properties.

<table>
<thead>
<tr>
<th></th>
<th>ASTM 1894-01</th>
<th>BS 3424-10:1987</th>
<th>Modified BS 3424-10:1987</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sled Width</td>
<td>63.5 mm</td>
<td>100 mm</td>
<td>42.3 mm</td>
</tr>
<tr>
<td>Sled Length</td>
<td>63.5 mm</td>
<td>150 mm</td>
<td>65.2 mm</td>
</tr>
<tr>
<td>Sled Depth</td>
<td>8 mm</td>
<td>Unreported</td>
<td>26.4 mm</td>
</tr>
<tr>
<td>Sled Mass</td>
<td>200 g</td>
<td>700 g</td>
<td>627.4 g</td>
</tr>
<tr>
<td>Sled Material of Construction</td>
<td>Metal block; no specified finish</td>
<td>Flat, smooth, or polished</td>
<td>Ground/ polished steel</td>
</tr>
<tr>
<td>Sled Speed</td>
<td>150 mm/min</td>
<td>600 mm/min</td>
<td>70 mm/min</td>
</tr>
</tbody>
</table>

**Results**

As shown in Figure 1, large significant differences in the coefficient of friction are observed between test methods (alpha = 0.05).

**Discussion**

Elimination of confounding variables is critical to obtaining reliable coefficient of friction results. Two major confounding variables are present in dressings:

- **Bulk Modulus:** The elastomeric immersion and displacement of the dressing by the test sled as it moves across the surface. Bulk modulus is a function of the loft of the dressing, and provides cross sectional shear relief; however, in many instances, bulk modulus confounds frictional data by making the friction seem artificially (and undesirably) large.

- **Skipping:** High speeds of sled displacement causes artificial dynamic friction readings as the sled skips across the surface.

- **Blooming:** Slip properties generated by additives designed to make the surface slippery exude to the surface of the dressing to reduce the friction of the dressing.

The modified BS 3424-10:1987 method provides a more accurate estimate of the coefficient of friction. The modified BS 3424-10:1987 method takes bulk modulus into account by reporting bulk modulus effects as shear stress. Skipping is eliminated in the modified method by reducing the sled speed. ASTM D 1894-01 [1] warns that “…blooming action may not always be uniform on all areas of the film surface…these tests may be limited in reproducibility.” BS 3424-10:1987 is better suited to address blooming action, and this translates to the modified method.

**Clinical relevance**

Frictional data must accurately represent a product without bias caused by confounding variables to be effective as a development or clinical tool.

**Acknowledgements**

This research was funded by Mölnlycke Health Care.

**Conflict of Interest**

None.

**References**

[1] ASTM D 1894-01- Static and Kinetic Coefficients of Friction of Plastic Film and Sheeting.
Interactive treatment for deep pressure ulcers: how to fill the cavity

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Introduction
The superficial pressure ulcers, like all chronic skin lesions, need only re-epithelialization: the production of granulation tissue is not required because there is no loss of tissue. However, when the wound is deep, it is necessary to fill the loss of tissue before the epidermis formation for two reasons: first, because it is not possible to allow a superficial healing leaving an open cavity below; the second is that the growing of epidermis inside the cavity will cause the definitive chronicity of the lesion. We also know that fill completely a cavity with dressing materials can cause compression and worsening of the wound [1]. Our target is therefore promote granulation very quickly, fill the loss of substance as soon as possible and avoid any problem.

Methods
We treated deep pressure ulcers with an interactive and bioactive dressing, a calcium salt of hydrogenated oxidized cellulose, with the aim to verify the possibility to completely fill the cavity with the dressing material. The cover was made with a highly absorbent non-adherent pad: dressing change every 48-72 hours, according with the exudate/leakage. Controls were performed weekly. We verified the rapidity of growth of granulation tissue (considering the complete filling of the cavity) and the absence of adverse effects (especially compression). Currently we treated seven cases, but the study is still ongoing; the goal is to recruit 20 patients.

Results
After the initial evaluations, the study showed absolutely important results, especially in terms of absence of adverse events; in no lesion we found signs of compression even if the wound was completely filled by the dressing material, even pressed into the cavity. We also observed an appreciable filling speed with growth of viable and effective granulating tissue in a few days. In table 1 you can see the depth of wounds and the filling time in days.

Discussion
There are almost three points we need to discuss:
• the dressing demonstrated to be really effective because of its interactivity with MMPs: this property allows to the wound a safe and effective growing, free from inhibitor enzymes [2];
• the absence of compression signs confirms that this material is really “easy handling” and it can be used to fill completely the wounds;
• the reason of this “no compression effect” is that the dressing is completely resorbable [3].

Clinical relevance
The relevance of this work is the demonstration that it’s possible to fill completely a wound without any problem: you only need to use the correct dressing that must be smooth, conformable and resorbable.

Conflict of Interest
None

References
**Introduction**

Regenerative Medicine is the branch of medicine that uses cellular and/or biological therapies for tissue repair; its aim is the identification of various classes of cells and molecules that are involved in the processes of tissue repair and that represent the basis of the physiological cells turnover. Regenerative Medicine is therefore based on the clinical use of stem cells and/or biological products which have the ability to induce the competent cells migration in the damaged tissue and to stimulate cellular proliferation. This process, dynamic and interactive, involves some cellular lines, chemical mediators and the extracellular matrix [1]. In daily practice there is often the block of the repair process due to excess of proteases, metabolic or nutritional deficiencies, deficiencies in essential ingredients for the formation of the matrix. Aim of this work was the evaluation of a new “bioactive dressing” based on a new molecular entity, T-LysYal, in pressure sores.

**Methods**

T-LysYal is a molecular complex containing lysine hyaluronate, thymine and sodium chloride. We enrolled patients with recalcitrant pressure sores (3rd and 4th stage) and we are still enrolling; actually we have data about more than 50 patients. Primary dressing is a thin layer of T-LysYal cream on the wound bed and edge; moist gauze as secondary dressing, covered with dry gauzes. The observation period is 4 weeks and the evaluation parameters are the following: effective granulating tissue development, area reduction (or healing time), comfort and safety.

**Results**

All treated lesions responded quickly with production of viable granulating tissue within 7-14 days. The mean area reduction was greater than 60% at the end of the observation period. We did not detect any adverse reaction or allergy; no patient reported induced pain, indeed, who had pain before noted its rapid reduction after the application of T-LysYal.

**Discussion**

The use of T-Lysyal affects both in terms of time, both in terms of duration but especially in terms of quality, in the inflammatory response; enhances cell proliferation, angiogenesis and the formation of effective granulating tissue [2]. T-LysYal influences the evolution of the inflammatory response to tissue regeneration.

**Clinical relevance**

The clinical relevance of this work is the demonstration that this new material can reactivate recalcitrant wounds due to the interaction with receptors and inflammation (Fig.1)

**Acknowledgements**

We appreciate the help of SILDEHA that provides dressing materials (repaLysYal).

**Conflict of Interest**

None

**References**

Introduction
The pressure-relief is carried out for the redistribution of weight over a greater surface. The alternating pressure system is based on the inflation-deflation of the different sections of the mattress, random or governed by a system of sensors. Many surfaces use the system 2:1, alternating a more swollen section to a less swollen one. There is then a 4:1 system. The aim of this work is to evaluate its effectiveness.

Methods
We enrolled patients with Norton score less than 10 and we compared different antidecubitus surfaces (standard air, technological alternating pressure, dynamic floatation, interactive compensation) with an alternating pressure mattress with 4:1 system. We detected the pressure (by Computerized Imaging System Pressure - Xsensor), the decrease of oxygen saturimetry at the sacral level after 2 hours of pressure (by a brilliance saturimeter) and the observational skin variations; these measurements were repeated after 7 days of use of the surface [1].

Results
The standard air mattresses showed the worst performance with a net decreasing in oxygen saturation; the alternating pressure mattresses and the dynamic floatation ones showed similar performances, slightly lower than those of mattresses with interactive compensation. The best performance was the one of the alternating pressure mattresses with 4:1 mechanism. In Table 1 are reported the mean values of pressure and decreasing of oxygen saturimetry after 2 hours of pressure; after 7 days the values worsen with all surfaces, except those regarding the mattresses with 4:1 system.

Discussion
The technological antidecubitus surfaces offer good guarantees in terms of pressure relief, but it is necessary to assess the criticality of patients and the treatment duration before choosing the most suitable mattress [2]. The alternating pressure mattress with 4:1 system showed a better performance, especially in terms of oxygen saturation.

Clinical relevance
The relevance of this work is the demonstration that in case of prolonged treatment it is recommended the use of alternating pressure mattress with 4:1 system to avoid the peripheral oxygenation worsening.

Acknowledgements
We appreciate the help of Zuccato that provided the Talley mattresses.

Conflict of Interest
None

References
It is a time of crisis, time to invest in prevention and reduce costs in PU

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Introduction
In Spain there are around 100,000 people affected by at least one pressure ulcer and 85% of them are more than 65 years old. In addition, chronic wounds represent a cost of more than 1.687.000.000 € / year to the National Health System of Spain. Studies in Spain show that about half of all older people who suffer from pressure ulcers remain in their homes and are attended by primary healthcare teams. Over sixty percent of these injuries have occurred in their homes and these are the most severe [1].

Methods
A study was developed in order to quantify the different variables involved in the cost of a pressure ulcer, establishing total costs and costs separated by other variables such as human resource costs, and materials used (cure "type"), with reference to national and international studies.

Results
Advanced age (83 years), physical impairment (bedridden 24 hours) and cognitive (mixed dementia), require that the nursing staff is transferred daily to the patient's home (22 km) to conduct and / or evaluate a cure in a humid environment, valuing the dimension, collision, consumables, and the possibility of infection. Depending on the state of the patient, 3-5 cures / week are performed (price dressing € 7.51), and taking into account: the cost of disposables, time Nursing (€ 0.33 / minute) and physician (0.571 € / min) and other aspects of healing, the daily cost of PU Category III in a patient with dementia is usually somewhere around: € 40.49 / day, provided that there is no infection of the wound bed. If we consider the last study conducted in Spain in 2010 on chronic wounds, a Category III PU Primary Health Care usually takes to heal from 143.4 + / - 287.7 days, with the average cost of treating this PU of € 8,730.63.

Discussion
The time required for nurses to cure a Category III PU in a rural area of a Spanish province represents 41% of total expense. More cures than the established protocol “Moist Wound Healing” were performed because of the economic funding problem that leads, sometimes, to a lack of the material required for this type of healing and they had to switch to Cures in Humid Environment with "Traditional Cures" (not recommended in international reference guides).

Clinical relevance
The time required for nurses to cure a Category III PU in a rural area of a Spanish province represents 41% of total expense.

Acknowledgements
We appreciate the help of the program PCT-MAC (2007-2013) of the Union European for to finance this study.

Conflict of Interest
Don’t to exist.

References
Introduction
The National Health Service (NHS) in the UK faces many challenges. Economic pressures are unprecedented with a ceaseless drive for improved quality and productivity in the system and organisations could face financial penalties in 2013-14 if targets to significantly reduce incidence of pressure ulcers are not met. NHS service providers measure incidence of pressure ulcers using the ‘Safety Thermometer’ and contractual penalties have been invoked in 2012-13 where complete data sets have not been fully reported. Safety Thermometer data shows that 6.6% of included patients suffered a pressure ulcer between April and July 2012, representing the biggest single cause of harm to patients in NHS care (1). This figure represents considerable numbers and reflects escalating resource requirement. Valid reporting of pressure ulcers has challenged clinical resources particularly within tissue viability services, leading to potential escalation of risk in other areas for example surgical wound and leg ulcer management. Health professionals may not be able to access information systems cross-organisationally as patients interface providers and this can directly impact decisions to admit patients into acute services, subsequent length of stay, and clinical resourcing.

Methods
NHS organisations are increasingly calling on industry partners to work together with clinical teams in the interest of patients (2). The development of a software package to enable targeted sharing of patient information across NHS provider services is an example of such innovation and service redesign. Tissue viability teams from primary and secondary care Trusts developed a software program and patient information system with an industry partner to share information about patients on their respective caseloads who had developed pressure ulcers. The web based information includes demographic data, medical information, ulcer aetiology and management plans. The system incorporates built in messaging and contact lists for secure communication between health care professionals, and enables enhanced clinical and strategic decisions about patient management.

Results
The individual teams were able to alert patient transfer between service providers, minimise administration cost and clinical time in tracking information and validating ulcer category. The teams were also able to make rapid informed decisions about potential safeguarding concerns.

Discussion
The immediate impact of the pilot study has been the reduction in cost of administration and released clinical time.
Potential trend data will include:
• Numbers of patients developing pressure ulcers by care provider.
• Validated ulcer category
• Ulcer location
• Clinical outcomes: time to healing
• Associated mortality and morbidity
• Equipment provision
• Patient engagement/qualitative information

The optimised system will be fully mobile via ipad with potential app. development

Clinical relevance
The ‘live’ data platform will enhance clinical management, significantly reduce administration costs, inform resource allocation and enable targeted patient engagement.

Acknowledgements
We appreciate the help of:
The tissue viability teams from the University Hospital of North Staffordshire NHS Trust and Staffordshire and Stoke-on-Trent Partnership Trust
The Staffordshire Cluster pressure ulcer steering group
IT solutions team at Paul Hartmann Ltd.

Conflict of Interest
There are no conflicts of interest.

References
Heel Pressure Ulcers, Where Now?

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Introduction

Pressure ulcers are defined as any localised injury to the skin and/or underlying tissue, usually over a bony prominence, as a result of pressure in conjunction with shear (EPUAP 2009). In response, to this problem in the UK, the Department of Health has driven the pressure ulcer agenda as never before to the forefront of quality and adopted a zero tolerance approach to pressure ulcers. Avoidable pressure ulcers are now a key quality indicator of nursing care, which is intrinsically linked to financial reward through initiatives such as the Commissioning for Quality - an innovation which links proportional elements of providers’ income to the achievement of local quality improvement and goals: namely, reduced incidence of avoidable hospital-acquired pressure ulcers and reduced risk of harm to patients. In fact, until now, there have been very few clinically proven products commercially available for use in the NHS which eliminate or reduce friction and shear. Hence the failure to reduce the incidence of heel pressure ulcers over the past 10 years - despite huge investments in pressure relieving equipment.

Methods

In this article the author will discuss a trial of “Parafricta® Booties” (distributed by H&R Healthcare Ltd.), conducted in one NHS Trust over a 12 month period. Results demonstrate that the introduction of this product has resulted in a significant reduction (32%) in the number of hospital-acquired, avoidable heel pressure ulcers, (namely heel blisters, grade two). Parafricta® Booties are made from an innovative, patented fabric which is smoother than silk, thus reducing the ‘jerk’effect on skin from movements. Throughout January 2012 to December 2012 St Helens & Knowsley Teaching Hospital NHS Trust evaluated patient outcomes in response to implementing the Bootie version of this product, (namely 232 units of product) with the objective of comparing the incidence of avoidable hospital-acquired pressure ulcers with the previous year (January 2011 to December 2011).

Results

During the period discussed a total of 56 booties were originally purchased for trial and then 3 months later a further 176 were purchased (due to the positive interim results). The majority of the products were issued, as per request, by the equipment pool in the Trust and a number were issued and allocated to six individual high-risk wards. Whilst this makes it difficult to establish precisely how many patients benefited from the booties during the twelve months discussed, what we can report is that a minimum of 600 allocations of the booties were made during the year from the equipment pool. As can be appreciated the Trust has thousands of admissions per month and a 32% reduction in such a small sample size is very promising.

Discussion

The main results which emerged from this trial generally supported the use of Parafricta® Booties as an intervention in the prevention of friction and shear induced pressure ulcers to the heel area. During the trial period no other new education and training initiative relating to heel pressure ulcers were developed. The financial implications of such a reduction are huge and provide a cost effective solution to effectively prevent friction and shear related pressure ulcers, which have largely been a neglected area of innovation over the past 20 years. Thus, implementing the use of the Parafricta® booties has proved a sound strategy for ensuring a reduction in not only pressure ulcer incidence but also harm - in keeping with the QIPP quality agenda and the Department of Health (DOH) operating framework for 2012/13.

Clinical Relevance

As a consequence the use of this product is now advocated for at-risk patients and is measured against Tissue Viability Key Performance Indicators.

Acknowledgements

We appreciate the help of H&R Healthcare

Conflict of Interest

References


Monitoring Skin Surface Temperature on 4 Bed Mattresses

Mark Green
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Introduction

The prevention of pressure ulcers remains a key objective in healthcare due to the pain and suffering caused to patients and the costs associated with the treatment and time involved.

The factors underlying the aetiology of pressure ulcers are numerous and not all are clearly understood. One of these elements, the microclimate, has been identified as having a link with pressure ulcer development.

‘Skin surface or tissue temperature’ and ‘humidity or skin surface moisture at the body support surface interface’ are used to describe microclimate in relation to pressure ulcers.

A small rise in skin temperature by 1° increases metabolic activity and raises the demand for oxygen in the skin tissue by about 10%. This increased need for tissue perfusion in patients already at elevated risk of tissue damage due to poor blood flow related to pressure and shear may therefore develop tissue damage earlier.

The aim of this initial testing was to see how skin surface temperature reacted on four mattress support surfaces as a prerequisite to designing further investigations into skin surface temperature on active mattresses.

Methods

Each of the four mattresses was exposed/allowed to operate at a room temperature of 22°C for 2 hours prior to testing to allow for environmental acclimatisation. The test subject of 115Kgs with a tympanic body temperature of 37°C lay semi-recumbent on each surface for 45 minutes. The subject wore stretch cotton pyjama bottoms and a cotton t-shirt, a hospital sheet was placed on the mattress.

The skin surface temperature was measured using the FSA Temperature Mapping System placed directly under the seated area of the subject. The test was completed without top bedding for 30 minutes and a continental quilt in place for the final 15 minutes.

Results

Table 1: Skin surface temperature at the sacrum

<table>
<thead>
<tr>
<th>Interval (min)</th>
<th>No bedding</th>
<th>With bedding</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>28.8</td>
<td>30.0</td>
</tr>
<tr>
<td>5</td>
<td>30.9</td>
<td>31.6</td>
</tr>
<tr>
<td>10</td>
<td>31.6</td>
<td>32.3</td>
</tr>
<tr>
<td>15</td>
<td>32.3</td>
<td>33.1</td>
</tr>
<tr>
<td>20</td>
<td>33.1</td>
<td>33.4</td>
</tr>
<tr>
<td>25</td>
<td>33.4</td>
<td>33.7</td>
</tr>
<tr>
<td>30</td>
<td>33.7</td>
<td>33.9</td>
</tr>
<tr>
<td>35</td>
<td>33.9</td>
<td>34.0</td>
</tr>
<tr>
<td>40</td>
<td>34.0</td>
<td>34.1</td>
</tr>
<tr>
<td>45</td>
<td>34.1</td>
<td>34.2</td>
</tr>
</tbody>
</table>

The skin surface temperature increased overtime on all surfaces tested. Both active mattresses demonstrated a slower increase in temperature with the 2 deck mattress maintaining a lower reading.

Discussion

A rise in skin temperature increases the metabolic demand and may therefore increase the risk of tissue damage from the effects pressure and shear. An increased skin temperature beyond 33°C may also bring on sweating in the area of contact with the support surface. The moisture if prolonged can cause the skin to become softened and macerated and more susceptible to breakdown, the moisture on the skin also increases friction between the skin and the support surface.

It is reported that temperature affects the strength of the stratum corneum and that the mechanical strength at 35°C it is 25% less than at 30°C.

Further investigation is required to monitor temperature over a longer period of time, and to expand the work to include the interactive effects of microclimate devices.

Clinical relevance

This type of testing can give early indications of a mattresses suitability for use with patients who cannot move frequently enough to allow air circulation and cooling to the skin.

Conflict of Interest

Test equipment, products and sponsorship provided by Linet Group SE.

References

Battery Backup and Active Patient Transfer
Reduce the risk – Maximise the benefit

Mark Green
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Introduction
Patient's identified at risk or with existing pressure ulcer damage are allocated an appropriate support surface to meet their needs in preventing any further deterioration of skin integrity.

Active mattresses are one of the main support surfaces used and these differ in their features and function, however one common element is the need for an electrical power supply, usually supplied by a cable from an electrical socket.

Pressure ulcer damage can occur within a relatively short period of time in the immobile patient if pressure relief is not maintained1.

The Problem – failure to maintain pressure relief during power supply outage.
Many situations can result in the power supply being stopped.
• Patient moved on the bed to new area
• Long waiting periods in other investigation or procedure departments
• Accidental removal from the supply socket
This increases the risk of hospital acquired pressure ulcers due to the period of time without pressure relief and highlights the need for some form of active transport as a feature of a mattress when away from a power source.

Power failure in the home care setting can also increase risk were no backup power supply is available.

Battery backup product search
The websites of 23 companies supplying active mattresses requiring power supply were reviewed to see what the availability of battery backup products was. 4 of the 23 companies were USA based only, and 1 was an Australian supplier, of the remaining 18 suppliers found within Europe, only 4 (22.2%) had products with battery backup for mattress functions.

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Pressure Ulcer Risk Category</th>
<th>Battery Life (Hours of use)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier One</td>
<td>High Risk</td>
<td>8 hours</td>
</tr>
<tr>
<td>Supplier Two</td>
<td>Very High Risk</td>
<td>Not given</td>
</tr>
<tr>
<td>Supplier Three</td>
<td>Very High Risk</td>
<td>8 hours</td>
</tr>
<tr>
<td>Supplier Four</td>
<td>Very High Risk</td>
<td>12 hours</td>
</tr>
</tbody>
</table>

Table 1. Battery backup product information

• Supplier One – Mattresses for the highest risk and most severe pressure ulcer damaged patient were not available with battery backup.
• Supplier Two – No indication on the website or in the literature as to battery usage hours.

Supplier Four battery testing results
1. A fully discharged battery was charged for 3.5 hours, this was then able to achieve a runtime of 24 hours in active mode (alternating)

Fig. 1: Voltage logger after 3.5 hours charge
2. A fully discharged battery was charged for 2 hours, this was then able to achieve a runtime of 18 hours in active mode (alternating)

Fig. 2: Voltage logger after 2 hours charge

Discussion
Test and usage hours should be available to help determine the suitability of a product for different settings, i.e. recent power supply failures in home care settings.
The use of active transport should be further investigated to ensure patient safety 24 hours a day.

Clinical relevance
The need for a battery back-up for support surfaces used with the highest risk group of patients is essential in preventing pressure ulcer development in periods were power supply is not available.

Conflict of Interest
Author receives a consultancy fee from Linet UK.

References
Introduction
Pressure ulcers are a common complication after a spinal cord injury (SCI) [1]. Pressure ulcers cause personal suffering, obstacles in rehabilitation and psychosocial impacts on patients lives [2]. The aim of this study is to identify the frequency of pressure ulcers in patients with SCI in the acute phase and to investigate if the Norton scale [3] is useful for assessment of the risk for pressure ulcers.

Methods
Prospective cohort study. All newly diagnosed patients with SCI admitted to the SCI rehabilitation unit within 9 months were included in the study (n=31). The entire body was examined once a week by the same two nurses. For assessment of the risk for pressure ulcer the Norton scale was used. Pressure marks were graded according to the EPUAP guidelines.

31 patients were enrolled in the study and 205 inspections were carried out mean 7 (range 2-16) examinations/patients. Mean age was 50 years. Indicators that can lead to increased risk of pressure ulcers; BMI, infection, hypotension, edema, and renal dysfunction were documented.

Results
When admitted to the ward, 18 of 31 patients had pressure ulcers. Those who had pressure ulcers on arrival had been waiting longer (29 days) before they were admitted to the SCI unit compared to those without pressure ulcers (13 days). 15 of those who had pressure ulcers were estimated to have a low risk for pressure ulcers according to the Norton scale.

Patients with ASIA A had more pressure ulcers. Only 1 of those patients did not get pressure ulcers throughout the hospital stay. Patients with renal dysfunction had pressure ulcers to a greater extent (table 1).

Table 1: Summary of the most important data

<table>
<thead>
<tr>
<th>Group</th>
<th>With pressure ulcer</th>
<th>No pressure ulcers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parapares (N=13)</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Tetrapares (N=18)</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>ASIA A (N=14)</td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>ASIA B (N=6)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>ASIA C (N=7)</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>ASIA D(N=4)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Low Cystatin-C GFR</td>
<td>9</td>
<td>2</td>
</tr>
</tbody>
</table>

113 pressure ulcers were recorded during hospitalization in this 31 patients (table 2).

Discussion
The occurrence of pressure ulcers in SCI is common. 18 of 31 patients had already pressure ulcers on arrival at the ward. The important preventive work should begin before admission to SCI unit.

Clinical relevance
During this cohort study more accurate systematic inspections and documentation was performed compared to usual clinical routine. In health care we should focus on those with reduced sensibility and renal dysfunction to avoid pressure ulcers in our SCI patients.

Acknowledgements
We appreciate the participation of the patients with SCI and help of all personnel on the ward.

References
Head, Shoulders, Hips and Heels A Multi-Modal Approach to the Reduction of Pressure Ulcers in Infants, Children and Young People

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2 Great Ormond Street Hospital for Children NHS Foundation Trust, United Kingdom.

Introduction
Pressure ulcers are not commonly associated with very young babies and children. However, they do occur within paediatric practice and children continue to be vulnerable to this type of skin injury and the resultant pain and discomfort. The UK National Institute of Health and Clinical Excellence (2005) [1] identify individuals at ‘extremes of age’ as at risk of developing pressure ulcers.

Great Ormond Street Hospital for Children NHS Foundation Trust (GOSH) is an acute specialist trust in London, providing a full range of specialist paediatric health services. An increase in the number of pressure ulcers was identified in early 2012. A large scale improvement project was initiated. In the first year of the project, the average rate of reported hospital acquired pressure ulcers fell from a baseline of 0.77 per 1000 bed days to a rate of 0.52 per 1000 bed days, representing a 33% fall.

Methods
The Pressure Ulcer Prevention and Management team was formed. Operationally, the team members provide a responsive service to the wards. A new Clinical Educator joined the team and worked closely with the pre existing Tissue Viability Nurse to seek innovative solutions, utilise improvement methodology and implement sustainable change across the organisation. A multi-professional group formed to oversee the teaching, to analyse the Trust wide incidence data and to design targeted interventions. Following indepth analysis of the pressure ulcer data, six work streams were developed and implemented:-

• A creative publicity campaign for staff
• Launch of the Glamorgan Paediatric Risk Assessment Tool
• Introduction of a Paediatric SSKIN Care bundle
• Investment in new prevention technologies such as new dermal pads (Aderma®) and specialist beds
• New interactive teaching programme for staff
• A new Root Cause Analysis (RCA) tool adopted by the Risk Management team

Results

Table 1: Hospital-Acquired Pressure Ulcers per 1000 bed days

Discussion
There have been significant changes in practice as a result of each intervention. Nurses have reported a shift in practice and have a new confidence in their role towards the prevention of pressure ulcers and the early implementation of prevention strategies.

The Glamorgan Paediatric Risk Assessment Tool and the GOSH paediatric SSKIN care bundle, based upon the SKIN process tool developed by Ascension Health [2] ensures children’s skin integrity is checked and documented daily. Close monitoring of pressure ulcer incidence is continuing to enable the hospital to provide children with the best possible care.

Clinical relevance
Infants, children and young people in hospital are risk of developing pressure ulcers causing concern in children with serious co-morbidities. However, our interventions have resulted in smaller and less severe pressure ulcers and a reduction in overall incidence.

Conflict of Interest
There are no conflicts of interest

Acknowledgements
We appreciate the help of staff at Great Ormond Street Hospital for Children NHS Foundation Trust (GOSH)

References
Introduction
We again analyzed prevalence of pressure ulcer (PU) based on the federal statistic. With the introduction of Diagnosis Related Groups (DRGs) in 2005 for reimbursement this is the most valid data base for principal and additional diagnoses for hospitalized patients in Germany. We tried to point out changes in prevalence and localization of PU of the affected patients in the period from 2005 to 2011.

Methods
The national statistic (DRG-statistic) published by the Federal Statistical Office includes data from all hospitals in Germany that use the DRG-system. These hospitals are legally obliged to deliver extensive data on hospital treatment, including demographic data, diagnoses, comorbidities, complications, and procedures to the "Institute for the Hospital Remuneration System" which uses the data for yearly adaptation of the German DRG-system and transmits them to the Federal Statistical Office. For 2005 to 2011 all diagnosis were coded with the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10), which was adapted for Germany by the German Institute for Medical Documentation and Information (DIMDI) as ICD-10 German Modification (ICD-10-GM) version 2005 to version 2011. Pressure ulcers were coded as L89.- given all 5 digits of the code. This code implies information regarding the grade of the pressure ulcers (depicting the depth) und the variety of localizations.

Results
Total number of cases hospitalized with the principal diagnosis PU increased from 9,941 in 2005 to 12,581 in 2011 (increase of 26.5%). Within this population the rate of PU grade 4 increased disproportionally from 46% in 2005 to 59% in 2011. Total number of cases hospitalized for other diseases but having the additional diagnosis PU increased from 239,760 in 2005 to 412,029 in 2011 (increase of 71.8%). Within this population the rate of PU grade 2 was the most frequent grade. Its rate increased disproportionally from 39% in 2005 to 47% in 2011. In 2005 a total of 16,071,846 cases were treated as full in time patients in German hospitals. Thus 0.062% (9,941) was referred with PU as principal diagnosis and 1.5% (239,760) had at least one additional diagnosis PU. In 2011 a total of 18,691,076 cases were treated as full in time patients in German hospitals. The rates of cases with PU as principal diagnosis were 0.067% (12,581) and that of additional diagnosis 2.2% (412,029).

Discussion
In conclusion, in Germany the rate of cases hospitalized with the principal diagnosis PU as well as the additional diagnosis increased from 2005 to 2011. Thus, PU is still a relevant problem. This increase in absolute numbers of PU is explained by the aging population only in part. After age-adjustment the incidence rates per 100,000 inhabitants of PU as principal diagnosis still increase. In all, our data do not support the results presented from Kottner et al. 2009 who analysed the results of seven point pressure ulcer prevalence studies conducted in 225 German hospitals and concluded that PU prevalence rates decreased from 13.9% (year 2001) to 7.3% (year 2007) (p<0.001) and when non-blanchable erythema were excluded from 6.4% to 3.9% (p=0.015).

Clinical relevance
Data from the DRG-statistic of the years 2005 to 2011 present a good overview about the problem of PU handled in acute hospitals in Germany. Analyzes of the data might be a reasonable tool future quality improvement.

Conflict of Interest
none
**Influence of training and professional experience in knowledge about caring for bed sores**

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2 University of Açores, Portugal

**Introduction**
At present, there is some controversy whether the prevalence of pressure ulcers is an indicator of the quality of care or not. To improve the quality of care and avoid the diversity of clinical practice to the PU, scientific societies and institutions have published clinical practice guidelines on the prevention and treatment of these chronic wounds [1]. However, this knowledge is often not divulged among nursing professionals, so, sometimes, the treatment of chronic pressure ulcers is not performed in an appropriate way.

**Methods**
A transversal study was undertaken through a questionnaire designed ad hoc. on skills to perform in the prevention, recommended by the Clinical Practice Guidelines developed on the PU. The studied sample consisted of 20 Spanish nursing professionals who work in hospitals. Data collection period February 2013.

**Results**
There is no significant difference between the attitude presented by professionals with the evidence-based practice by gender (60% female) and the years of professional experience (average 12.76 years). Both men and women think it is difficult and complicated to adapt the “practice nurse” to “guideline recommendations” because nurses find it difficult to get those guidelines at work and they also do not have enough time to put those recommendations into practice. Only 30% of respondents have had specific training in chronic wounds over the last five years. The 66% do not have enough knowledge about the risk factors responsible for the emergence of a PU, especially issues relating to the etiophysiopathology. The performances of Nursing recognized by more than 50% of respondents are: postural changes, skin care and pressure relief devices.

**Discussion**
Although the guidelines provide specific knowledge about how to deal with pressure ulcers, they do not guarantee that nursing professionals master and incorporate the recommendations into their daily work when dealing with pressure ulcers. The knowledge contained in the guides is not made widely known among colleagues, mainly due to lack of training and institutional support. The keys to prevention are poorly recognized by more than half of respondents. It seems that nowadays, it is difficult to change clinical practice in the nursing staff as there is a barrier between "practice and knowledge".

**Clinical relevance**
It seems that nowadays, it is difficult to change clinical practice in the nursing staff as there is a barrier between "practice and knowledge".

**Acknowledgements**
We appreciate the help of the program PCT-MAC (2007-2013) of the Union European for to finance this study.

**Conflict of Interest**
Don’t to exist.

**References**
Introduction
International regulations relating to fire retardants widely used in medical support fabrics are changing. These changes will place restrictions on, or completely ban, some products you may currently be purchasing/using.

This will necessitate some changes in the materials used in the manufacture of mattresses in order for the articles to be compliant and available to purchase in the near future. The changes primarily relate to a halogen based flame retardant that is known as DecaBDE or more precisely Bis(pentabromophenyl) ether, CAS 1163-19-5.

The Legislation
On 19 December 2012, DecaBDE was added to the Candidate List of Substances of Very High Concern (SVHC). This was on the grounds of the chemical being classified as persistent, bioaccumulative and toxic as well as very persistent and very bioaccumulative.

DecaBDE is currently used in some of the patient support surfaces that are supplied to you either as a fire retardant component of the mattress cover material, or in the foam core. This does not mean that DecaBDE cannot be used, but that anyone supplying an article above the threshold level shall provide the recipient of the article with sufficient information to allow safe use of the article. This must include, as a minimum, the name of the SVHC. In this context a 'recipient of an article' is somebody who will use or handle it as part of their work. This does not include consumers.

The definition of recipient would clearly include the nursing staff within a hospital, so all suppliers should supply you with the information if the product contains an SVHC and the safe handling and care.

Restriction of Hazardous Substances (RoHS) (EU) - DIRECTIVE 2011/65/EU [2]
The RoHS directive bans the use of polybrominated diphenyls, including DecaBDE at certain levels in electronic and electrical equipment sold in the EU. Although this legislation came into force in February 2008 medical equipment was initially exempt. In June 2011 however, this exemption was removed and Medical Devices fall within the scope of RoHS with effect from 22 July 2014.

This means that new electrical and electronic medical devices that contain DecaBDE above the threshold limit cannot be sold after this date. The maximum permitted concentrations are 0.1% or 1000 ppm by weight of homogeneous material. Existing materials do not need to be removed from service but they must be disposed of in accordance with the WEEE (Waste electronic and electrical equipment) directive 2012/19/EU [3]. Clinical waste still need to be disposed of appropriately.

Although the TSCA does not state that DecaBDE must no longer be used in the manufacture of products, the EPA aims to support and encourage the voluntary phase-out of manufacture and import of DecaBDE in the USA. As such, it has received commitments from principal manufacturers and importers of DecaBDE to: initiate reductions in the manufacture, import and sales of DecaBDE, with all sales to cease by 31 December 2013.

Ensuring Compliance
EUROPE
If you are a nurse or specifier you should ensure that none of the RoHS chemicals are present above the threshold level in any electrical or electronic equipment that you purchase after 22nd July, 2014. You should ensure that you have a statement on the presence of any Substances of Very High Concern (SVHC) above the minimum concentration on new purchases with immediate effect. If the material is present you should be provided with sufficient information to allow safe use of the article.

USA
After December 2013 you should be purchasing items that are free of DecaBDE. You should ask your suppliers to confirm that this is the case.

ALL
In any tender specification you should ensure that the supplier is providing all the required information under this legislation and the easiest way to do this will be to request material that does NOT contain DecaBDE.

References
Do registered nurses know how to categorise pressure ulcers?

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Introduction

There is a renewed enthusiasm for reducing the numbers of pressure ulcers that are developed in our care. In England this is translated with the Harm Free Care initiative, called “The Safety Thermometer” which collates prevalence data. Every month, on one given day, organisations have to report the number of pressure ulcers developed under their care as well as the number of patients who have been admitted with existing pressure ulcers. Ulcers have to be categorised using the EPUAP classification system (2009) and this data is then used by the Commissioning for Quality and Innovation (CQUIN) to set individualised quality target and if not met, financial penalties are incurred.

But how effective are registered nurses in categorising pressure damage?

Methods

For the past 24 months tissue viability has lead a number of training initiatives to ensure that all registered nurses understand and use EPUAP classification correctly: monthly pressure ulcer updates; online presentation; online quiz; link nurses teaching; printed cards with pressure ulcer photographs demonstrating EPUAP classification distributed to all the wards; at hoc training with individual nurses at time of patient’s visit; training on the recently introduction of a modified Skin Bundle and intentional rounding, initiatives that we have called Time2Turn and FOCUS.

All pressure ulcers are reported via DATIX, a web-based incident reporting tool. Ulcers are reported as Category I, II, III, IV, Unable to categorise (full thickness tissue loss, depth unknown) and Moisture Lesions. Suspected Deep Tissue Injuries are categorised as Category III. Both Unable to categorise and Suspected Deep Tissue injuries are revisited at weekly intervals until depth of damage is ascertained.

In February 2013, a Health Care Assistant was appointed to review all the ulcers reported on DATIX, take digital photographs and report findings to the Tissue Viability Specialist Team for final classification.

Results

From the middle of February 2013 until the end of June 2013, 883 DATIX were reviewed. Forty seven (n=47) patients were not seen as eighteen (n=18) patients had already been discharged and twenty nine (n=29) were too sick to be seen.

<table>
<thead>
<tr>
<th>Reason for ulcer not been reported accurately</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Not seen</td>
</tr>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

Table 1: Results of the audit

Three hundred and seventy three (n=373; 42.24%) of ulcers were correctly categorised, however, 463 (55.4%) of all DATIX submitted were inaccurate.

Two hundred and eighty nine (n=289; 35.3%) ulcers were wrongly classified. Furthermore, ninety (n=90; 10.8%) had ulcers reported as pressure damage, when in fact they had leg ulcers, diabetic foot ulcers, skin tear or other dermatological lesions. Twenty four (n=24; 2.9%) wrongly reported that the ulcer had developed prior to admission or vice versa whilst fifty four (n=54; 6.5%) were duplicate DATIX, where the ulcer had in fact already been reported.

Nurses were unable to distinguish the differences between Category I, II and Moisture lesions in what are superficial ulcers and between Category III, IV, and Suspected Deep Tissue Injuries which are deep ulcers.

Discussion

The literature \cite{1,2} is starting to question whether we should continue to spend such time and effort in accurately classifying pressure ulcers or whether it would be a better use of precious resources to simplify the process by classifying ulcers as superficial or deep. Whilst moisture lesions are not technically due to pressure, they are prevented and treated in the same way; they also constitute a harm caused to the patient and should be considered as seriously as pressure damage.

References

A novel lifting sheet has minimal impact on the off-loading performance of an active (alternating) pressure-redistributing (PR) mattress?

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Birmingham City University, UK ²

Introduction
Physical repositioning, although of undisputed benefit to the patient, exposes the caregiver to significant risk of injury. Even where lifting devices are used, repeated sling placement and removal can, at times, be uncomfortable and, for the sickest patients, medically inappropriate. As regular repositioning is a key clinical intervention, it is important to consider how this activity might be achieved with greater reliability, safety and comfort. One option is to improve accessibility, by retaining lift equipment in situ beneath the patient. However, this is contrary to current guidelines [1], largely due to uncertainty about the impact the fabric, seams and straps may have on the mechanical forces and microclimate conditions at the skin-fabric interface. As ‘active’ mattresses are typically prescribed to mitigate prolonged mechanical loading, this preliminary investigation asks whether lifting sheets can be designed so that their retention beneath the patient has no greater impact on mattress performance than a simple cotton bed sheet.

Methods
A 100% Egyptian-cotton, non-fitted, standard hospital bed sheet (A) and a lightweight, microfibre (99% polyester) lifting device, designed as an alternative to the standard sheet (B), were compared to a reference standard – an ‘active’ PR mattress with no sheet (C). A 1.5cm², air-filled sensor [2] was placed over the sacral apex of an inflated cell. Following an equilibration period, continuous interface pressure data were recorded for 3 inflation-deflation cycles. Tests were repeated x3. Mean pressure indices were calculated using the percentage time-per-cycle maximum pressure was below a nominal threshold of 30 mmHg.

Results

<table>
<thead>
<tr>
<th>Device</th>
<th>Mean % time pressure &lt;30 mmHg per 10-minute cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) 100% cotton hospital sheet</td>
<td>52.7%</td>
</tr>
<tr>
<td>B) Microfibre lifting sheet</td>
<td>91.4%</td>
</tr>
<tr>
<td>C) None</td>
<td>68.7%</td>
</tr>
</tbody>
</table>

Discussion
As pressure is the primary pathology behind pressure ulcer development [1], it is important that any interface layer placed beneath the patient does not detract from the PR performance of the mattress; something that might occur with fitted, inflexible or tightly tucked sheets or incontinence pads.

This study suggests that, although the cotton bed sheet (A) has some limiting effect on performance, as might be expected with any interface layer, it is considered standard clinical practice and the effects can be moderated by having the sheet loosely draped so as not to interfere with cell inflation and deflation. In contrast, data reported for the lifting sheet (B) indicated better performance than no sheet (C). This can possibly be explained by a lower coefficient of friction attributable to the polyester fabric, enabling the sensor to glide smoothly in response to cell movement. Whether this relates to lower shear on the tissue, though potentially beneficial, remains to be determined. The investigation might conclude that, for pressure at least, the retention of this lifting device might have no detrimental effect on the mechanical load to the skin. However, there are other areas that might be expected with any interface layer, it is important to consider how this activity might be achieved with greater reliability, safety and comfort. One option is to improve accessibility, by retaining lift equipment in situ beneath the patient. However, this is contrary to current guidelines [1], largely due to uncertainty about the impact the fabric, seams and straps may have on the mechanical forces and microclimate conditions at the skin-fabric interface. As ‘active’ mattresses are typically prescribed to mitigate prolonged mechanical loading, this preliminary investigation asks whether lifting sheets can be designed so that their retention beneath the patient has no greater impact on mattress performance than a simple cotton bed sheet.

Conflicts of Interest
Authors provide consultancy services to manufacturers (mattresses and lifters). No company had influence over the design or conduct of this investigation.

References
Ein Pilotprojekt: „Bewegung rein, Druck raus!“
Gesundheitskompetenz fördern

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Einleitung:


Die durchschnittliche Behandlungsduer beträgt 6 Monate und verursacht 27.000€ an Mehrkosten. Grundsätzlich kann man davon ausgehen, dass die Prophylaxe etwa 90% an Kosten erspart (Leitlinie AWA).

Zahlen sind sehr beeindruckend, doch entscheidend ist was die betroffenen Personen psychisch und physisch durchleiden müssen. Jede Bewegung und Aktivität wird als Qual bezeichnet und ist von starken Schmerzen begleitet. Der Kontakt zu anderen Menschen wird gemieden. Depressionen sind eine häufige Folge. Pflegende Angehörige geben oft ihr eigenes Leben fast gänzlich auf. Finanzielle Verluste durch teilweise oder vollständige Aufgabe der Arbeit, sowie Auswirkungen auf die Pension sind weitere Folge. Zusätzlich kommen bei einem Dekubitus:

- Kosten für professionelle Hilfe und Hilfsmittel
- Verbandsmaterial
- Grosse Mengen an Wäsche etc.
- Aufwendige Wege/Papierkrieg zur Beratung/
- Beschaffung/Bewilligung
- Schlafmangel durch nächtliche Pflege und Sorgen
- Druck/Vorwürfe durch das Umfeld.

Dekubitus gilt noch immer als Pflegefehler. Deshalb muss es Ziel der Patienten und Pflegenden sein, ein solches Druckgeschwür zu vermeiden.

Methoden:

Elemente aus „Kinaesthetics“ (Lehre von Bewegung, Wahrnehmung, Bewegungsempfindung; (Hatch/Maietta, 2003) bilden die Grundlage des Workshops für pflegende Angehörige. Folgende Aspekte fliesen mit ein:

- Bewegung mit wenig Kraft trainieren
- Körperwahrnehmung fördern
- Anderen helfen ohne sich selbst zu vernachlässigen.

Es ist geplant diesen Workshop abends für eine Gruppe von bis zu 30 Angehörigen mit bis zu 10 Pflege-fachkräften (Ratio 1:3) zwei mal jährlich anzubieten und die Umsetzbarkeit mit den Teilnehmern systematisch zu evaluieren.

Ergebnisse:

Die Planung des Workshops ist abgeschlossen. Zum Zeitpunkt der Posterpublikation liegen noch keine Evaluationsergebnisse vor.

Diskussion:

Es wird erwartet, dass durch solche Workshops pflegende Angehörige Aspekte der professionellen Pflege kennen lernen und das der Austausch untereinander („vernetzen“) hilft, Druck abzubauen. Menschen die pflegen, erhalten Fachwissen sowie Tipps und Tricks, die Zuhause leicht anwendbar sind. Dies soll helfen, physischen und psychischen Druck reduzieren und einen Dekubitus zu verhindern.

Klinische Relevanz:

Das Pflegeteam der Gailtal–Klinik ist professionell geschult und setzt dies jeden Tag in der stationären Betreuung um. Durch informative Workshops im Haus, gibt die Pflege ihr Fachwissen an die Bevölkerung weiter. Dies trägt dazu bei, Druck zu reduzieren, präventiv zu wirken und die Gesundheitskompetenz zu fördern.

Referenzen:

AWA Leitline Dekubitus – Prophylaxe und Therapie (Seite 4)
Pressure ulcer prevention in hospitals and nursing homes: a three-year comparison
Silvia Schönherr 1*, Ruud JG Halfens 2, Christa Lohrmann 1

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2 Department of Health Services Research, Focusing on Chronic Care and Ageing, Maastricht University, the Netherlands

Introduction
Although it is widely known that pressure ulcers (PUs) lead to serious consequences for those who are affected, there are still enormous deficits regarding PU-prevention being reported in clinical practice [1]. Audit & feedback may promote improvements in practice [2], but there is only limited information on the effect of audit & feedback on PU-prevention in health care institutions. The aim of this secondary data analysis is to compare PU-prevalence and prevention in hospital patients and nursing home residents in Austria over three years of audit & feedback.

Methods
The Austrian version of the Prevalence Measurement of Care Problems is a multicentre, cross-sectional study which is performed annually in hospitals and nursing homes [3]. The measurement involves a comprehensive audit and feedback system using standardized questionnaires. Six hospitals and four nursing homes participated continually for three years.

Results
The prevalence of PU dropped both in hospitals and nursing homes from t1 to t3 (Figure 1). All measured preventive interventions, except moisturizing, significantly increased in nursing homes (Table 1). The use of PU mattresses in patients and residents at PU risk increased from 58.8% (t1) to 84.7% (t3) in hospitals and from 76.7% (t1) to 86.1 (t3) in nursing homes.

Discussion
PU-prevalence decreased in hospitals and nursing homes participating repeatedly in the measurement, while an increase in preventive interventions as well as in the use of PU mattresses was observed.

Clinical relevance
With the help of audit & feedback, regularly participating institutions were able to identify their individual resources, deficits and needs and further implement changes in clinical practice. These implemented changes, together with an increased level of awareness, may have contributed to these results.

Acknowledgements
We appreciate the help of all participating institutions, nurses, patients and residents.

Conflict of Interest
There is no conflict of interest.

References
Debridement using a monofilmant fibre pad to aid in the accurate categorisation of pressure ulcers

Joanna Swan 1, Rommel Orig 2

1 Queen Elizabeth Hospital Birmingham NHS Foundation Trust, UK, Joanna.Swan@uhb.nhs.uk
2 Queen Elizabeth Hospital Birmingham NHS Foundation Trust, UK

Introduction

Within the authors Trust and across the UK, accurate categorisation of pressure ulcers has become crucial. Many UK organisations implement complex documentation and a root cause analysis when a category 3 pressure ulcer is identified. The European Pressure Ulcer Advisory Panel (1) state that a category 3 pressure ulcer can contain the devitalised tissue slough where a category 2 pressure ulcer does not. Less experienced clinicians often categorise pressure ulcers that contain a yellow material as category 3 despite this material not being slough. For experienced clinicians pressure ulcers that contain superficial slough may not present as having full thickness dermal loss and therefore question category 3 damage. A more experienced clinician can identify these ulcers as being superficial in nature. Callaghan and Stephen-Haynes (2) found that when they used a monofilament fibre pad as part of the assessment process in pressure ulcers their community nurses found that in 11 out of 12 cases it helped them to more accurately categorise the pressure ulcer.

Methods

Patients in an acute hospital setting were selected when the category of pressure ulcer was not clear between a category 2 and 3 and where debridement was required to assist in the categorisation process. Debridement was facilitated by using a monofilament pad as it has been reported to be a quick, simple, effective method of debridement causing virtually no pain to the patient (3). Data was collected on a specially designed data collection form. Any imaging was taken using either digital or the Eykona 3D camera system to assist the measurement process and add accuracy and objectivity.

Results

Data on 10 patients has been collected to date and the results are summarised in Table 1. Data collection continues and it is hoped to reach 20 by the end of July 2013. Debridement with the monofilament pad revealed a more superficial pressure ulcer in 60% of cases. No more than 2 minutes of debridement was required to reveal the actual wound bed in 80% of cases. Debridement was prematurely discontinued in 2 cases due to the patients experiencing heightened anxiety and some pain. It was felt that the site and the superficial nature of these pressure ulcers contributed to the increased pain levels.

<table>
<thead>
<tr>
<th>Patient number</th>
<th>Ulcer location</th>
<th>Estimated category 3 before debridement</th>
<th>Actual category after debridement</th>
<th>Debridement time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>panus</td>
<td>3</td>
<td>3</td>
<td>2min</td>
</tr>
<tr>
<td>2</td>
<td>heel</td>
<td>3</td>
<td>3</td>
<td>1min</td>
</tr>
<tr>
<td>3</td>
<td>neck</td>
<td>3</td>
<td>2</td>
<td>1min 20sec</td>
</tr>
<tr>
<td>4</td>
<td>buttock</td>
<td>3</td>
<td>2</td>
<td>1min 15sec</td>
</tr>
<tr>
<td>5</td>
<td>hip</td>
<td>3</td>
<td>2</td>
<td>2min</td>
</tr>
<tr>
<td>6</td>
<td>penis</td>
<td>3</td>
<td>2</td>
<td>1min</td>
</tr>
<tr>
<td>7</td>
<td>chest</td>
<td>3</td>
<td>2</td>
<td>1min 30sec</td>
</tr>
<tr>
<td>8</td>
<td>sacrum</td>
<td>3</td>
<td>2</td>
<td>55 sec</td>
</tr>
<tr>
<td>9</td>
<td>buttock</td>
<td>3</td>
<td>3</td>
<td>2min</td>
</tr>
<tr>
<td>10</td>
<td>hip</td>
<td>3</td>
<td>3</td>
<td>2min</td>
</tr>
</tbody>
</table>

Pressure ulcers containing thicker and more tenacious slough are not suitable for a quick, one off debridement treatment with the monofilament pad but may respond to a number of consecutive treatments.

The monofilament pad proved to be a very quick and easy to use debridement technique ideal to assist pressure ulcer wound assessment at the bed side.

Clinical relevance:

The use of a monofilament pad in the debridement of pressure ulcers with superficial slough provides clinicians with a clear view of the wound bed. This allows accurate grading and therefore the ability to provide safe and appropriate patient care.

Conflict of Interest

The monofilament pads and the Eykona camera were provided by Activa Healthcare.

References

Modified Silicone Foam with Gradient Elasticity for Pressure Ulcer Prevention

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2 KANEKA Corporation, Japan, 3 Yamaguchi Prefectural University, Japan

Introduction
A new foam material (Mocci35N, KANEKA) which has gradient elasticity structure has been developed. It is manufactured from a modified silicone and foaming and curing occurred simultaneously at gravitational condition. As effects of gravity, foaming cell size changed at each upper, middle, bottom layers in vertical direction. Foam diameters (FD) at the upper layer was the smallest and the second was at bottom layer. FD of the middle lay was the largest. FD was changed gradually in vertical and this caused a characteristics of gradient elasticity. We investigated the mechanical tendencies of the material toward pressure ulcer prevention. Moreover, elasticity change was measured according to temperature.

Methods
Original material size was 200(W)x200(D)x55(H) mm. To measure tensile property, samples, which size was 100(L)x20(W)x10(t), were cut out from upper, middle and bottom layers. In addition, weight of each sample was measured by an electric force balance. Central part (40 mm length) of each sample was elongated until 65 mm by a tensile tester. Hardness of samples was measured by a durometer (Asker type F, Japan) at 23 and -20 degrees C.

Results
Results of the tension test showed almost linear characteristics by additional 25 mm elongation. Fig. 2 indicates relationship between sample weights and max load of additional 25 mm elongation from 40 mm. Positive coefficient of correlation was found between weights and loads from Fig. 2. This means small FD causes high densities of samples and higher density accounts for lower elasticity. Durometer outcomes also supported it. Moreover, hardness change caused by temperature from -20 to +24 degrees C is from 23 to 19, respectively. When we measure the hardness of the medial forearm region, the instrument showed almost 40.

Discussion
Foaming of the modified silicone made several types of diameters and this caused phenomenon of gradient elasticity at upper, middle and bottom layers. We have measured twisting elastic test and the result showed almost as same as tension test result. After collapsing almost foams by compression, the material characteristics reflect like a silicone gel itself rather than aka polyurethane foam at bottoming out condition. In the view point, the material may be suitable to applications for wheelchair cushion, bandage cushion, mattress and so on.

In the future, we have to research more, especially dynamic characteristics of the material and effects of cushion using it at IT region.

Conflict of Interest
The research was partially supported by KANEKA Corporation as a joint research.

References
Introduction

Monitoring assists bedside staff to make informed decisions increasing the quality of patient care which improves outcomes. Knowing that pressure is the main causative agent of a pressure ulcer, a good prevention program should incorporate ways to monitor the pressure beneath individual patients. The need for individualized monitoring is high as every patient presents with different body types and different comorbidities that put them at high risk for pressure ulcer development.

Methods

Continuous bedside pressure mapping (CBPM) systems were installed in January of 2012. The CBPM systems gave bedside caregivers the ability to see a visual image of real time pressures under patients and monitor that pressure continuously. Patients with existing wounds and at high risk for pressure ulcer occurrence had CBPM systems placed on their mattresses. Caregivers used the pressure images on the monitors to effectively reposition patients and utilized the alerts on the monitors to turn patients by their individually determined turn schedules.

Results

From January through June 2012 no hospital acquired pressure ulcers (HAPU) occurred. These 6 months accounted for a total of 7,014 patient days. For a historical comparison, in 2011 from January to June, accounting for 7,166 patient days, 16 HAPUs occurred. Caregivers found the CBPM systems easy to use and also found that family and patients were less likely to refuse repositioning and turning as they could now see the high pressures below the patient that needed lessened.

Discussion/Clinical relevance

Innovative objective pressure monitoring practices with CBPM systems have assisted our pressure ulcer prevention program to obtain the goal of zero HAPUs. Dynamic physiologic skin monitoring shows promise in decreasing the occurrence of pressure ulcers in a high risk patient population.

Conflict of Interest
Kristen Thurman is the Director of Clinical Services for Wellsense USA, Inc.

References
Introduction
Biofeedback is a process that enables an individual to learn how to change physiologic activity for the purposes of improving health and performance. Precise instruments measure physiologic activity and these instruments rapidly and accurately ‘feedback’ information to the user. The presentation of this information — often in conjunction with changes in thinking, emotions, and behavior — supports desired physiologic changes. For decades, patients have been repositioned in bed without any feedback confirming that their positioning is effective. A new continuous bedside pressure mapping (CBPM) system now offers caregivers feedback through a visual image of where pressures exist beneath patients.

Methods
Bedside caregivers were asked to reposition patients to the best of their abilities, using pillows and positioning aids without the visual feedback from the CBPM system. Once positioned, caregivers were shown the image of where pressures existed and then were able to reposition the patient to alleviate areas of higher pressures. Data from the CBPM device, in the form of visual screenshots and peak pressure values, were obtained after each episode of repositioning.

Results
Screenshots displayed lower pressures when the feedback from the CBPM system was utilized by caregivers. Lower peak pressure measurements were also evident after the visual image from the CBPM system was made available to the bedside caregivers.

Table 1: Peak Pressures
without & with CBPM Feedback

<table>
<thead>
<tr>
<th>Patient</th>
<th>Peak Pressure (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>120</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td>4</td>
<td>60</td>
</tr>
<tr>
<td>5</td>
<td>40</td>
</tr>
<tr>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
</tr>
</tbody>
</table>

Average peak pressure:
- Without CBPM: 78 mmHg
- With CBPM: 47 mmHg

Discussion/Clinical relevance
With the biofeedback from the CBPM system, caregivers were able to more effectively reposition patients. Effective patient repositioning plays an important role in minimizing pressure under bedbound patients, which is an essential component of preventing pressure ulcers.

Conflict of Interest
Kristen Thurman is the Director of Clinical Services for Wellsense USA, Inc.

References
Prevalence of occipital pressure ulcers in immobile patients with acquired brain injury and in residential care centers.

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2 University of Antwerp, Belgium

Introduction
Pressure ulcers are a common problem in immobile patients. Pressure ulcers most often develop over the sacrum, ischial tuberosities, trochanters, femoral condyles, malleoli, and heels [1]. Occipital pressure ulcers (OPU) are not seen as a common problem but can be observed in immobile patients in ICU [2]. We believe that other immobile patients are also at risk for OPU.

The aim of the present study is to measure the prevalence of OPU in immobile patients with Acquired Brain Injury (ABI) and in Residential Care Centres (RCC).

Methods
The prevalence measurement was carried out at 8 centers for ABI in Belgium and in 3 RCC (Antwerp region). The study population in centers for ABI compromised of patients in Permanent Vegetative State or Minimal Responsive State. Residents with Bradenscore Mobility 1 were included in RCC.

The occiput was observed using a standardized registration form. The pressure ulcers were classified according to the EPUAP classification [3].

Results
In 58 patients the inclusion criteria were met, 32 ABI and 26 in RCC. OPU grade 1 was observed in 7 patients in RCC (27%). In patients with ABI there was no OPU observed.

The main characteristics of the population are represented in table 1.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>ABI</th>
<th>RCC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex female</td>
<td>34</td>
<td>81</td>
</tr>
<tr>
<td>Age (years)</td>
<td>49 (14.16)</td>
<td>85 (8.9)</td>
</tr>
<tr>
<td>Residence time (years)</td>
<td>6.3 (4.7)</td>
<td>3.3 (3.06)</td>
</tr>
<tr>
<td>BMI</td>
<td>21.93 (3.79)</td>
<td>21.57 (2.76)</td>
</tr>
<tr>
<td>Thick hair</td>
<td>63</td>
<td>46</td>
</tr>
<tr>
<td>Damp hair</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Matted hair</td>
<td>13</td>
<td>12</td>
</tr>
</tbody>
</table>

Discussion
The results in the present study demonstrate that OPU grade 1 are a problem in immobile residents at RCC. Non-blanchable erythema (pressure ulcer grade 1) can be an indicator for pressure ulcer prevention [4] since pressure ulcers grade 1 can quickly evolve to higher grades. Further research is necessary to find out or this is the case for OPU in RCC and what type of prevention is needed.

Clinical relevance
These results contribute to the knowledge on pressure ulcers that were not developed on the most common locations and can be of importance in the development of future preventive strategies.

Acknowledgements
We would like to thank the nursing staff of the different centers for the opportunity to collect our data.

Conflict of Interest
None

References
Poster #29

Friday August 30th

ECONOMIC CRISIS AS A DETERMINANT IN INFORMAL CAREGIVER PROFILE USERS WITH PRESSURE ULCERS IN A RURAL AREA IN SPAIN

Rodríguez de Vera BC ¹, Jiménez Diaz JF ¹, Hernández Martínez S ², Hernández Martínez FJ ¹, Quintana Montesdeoca MªP ¹

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² Hospital de La Ribera (Valencia), Spain

Introduction
Today's society has assumed a set of demographic changes that has altered the situation of informal carers [1], by reducing the number of family members available to provide care and increasing users who need ongoing health care [2]. In home care, specifically in patients with pressure ulcers (PU), the health care professional should include the patient and caregiver, as this is the key to the whole process of treatment, prevention and health promotion in patients with PU [4,5]. There are more and more dependent people who demand outside help, which is usually provided by people around them [6]. These are called "informal caregivers".

Methods
A qualitative, exploratory and descriptive methodology was developed, through a semi-structured interview to 30 informal caregivers of patients with PU requiring continuing care at home. The ethical aspects of the interviewees were safeguarded. Data collection period: March 2013.

Results
The profile of the informal caregiver of patients with pressure ulcers corresponds to a largely female population (84%), aged between 26-64 years. 60% have no relationship with the user. Regarding marital status: 64% are married and with reference to the level of studies, 14% have university degrees, 75% of carers receive financial remuneration, including those who have a degree, 28% of carers receive daily external support for basic care, and 56% occasionally during weekends. By sex, there is no difference in terms of the time they are providing care, 32% have spent more than five years performing this task.

Discussion
The informal caregiver of patients with pressure ulcers in a rural area of Spain has a profile corresponding to an adult woman, married and with no relationship with the patient. Due to the economic crisis, there is a significant percentage of graduates (two psychologists, one historian and one biologist) who receive financial remuneration for being caretakers of patients with PU. There is no evidence of gender differences in relation to seniority as a caregiver.

Clinical relevance
The informal caregiver in rural area of Spain is an adult woman. Due to the economic crisis there is a percentage of graduates caretakers of patients with PU.

Acknowledgements
We appreciate the help of the program PCT-MAC (2007-2013) of the Union European for to finance this study.

Conflict of Interest
Don’t to exist.

References
Quality Indicators existence and Pressure Ulcer prevalence in Austrian hospitals and nursing homes

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2 Faculty of Nursing, Port Said University, Port Said, Egypt

Introduction
Pressure ulcer (PU) is seen as a quality indicator and one of the most important indicators of effective nursing practice [1]. Quality indicators are used to measure the quality of health care and may be used as a tool to guide the process of quality improvement in health care settings [2]. An international survey study of PU in five European countries revealed a prevalence of 18% in hospitals [3]. The aims of this secondary data analysis are to assess the existence of PU-related quality indicators in Austrian hospitals and nursing homes and the period prevalence of hospital-acquired PUs as well as nursing home-acquired PUs.

Methods
The Austrian version of the Prevalence Measurement of Care Problems is a multicentre, cross-sectional study which is performed annually in hospitals and nursing homes [4]. For data collection purposes a standardised and tested questionnaire is used. From 2009 to 2012 data from 9861 hospital patients and 3577 nursing home residents were obtained.

Results
The prevalence of hospital-acquired PU is 45% from the total PU-prevalence in hospitals, whereas nursing home-acquired PU accounts for 75% from the total prevalence in nursing homes (Table1).

Table 1: Prevalence of hospital- and nursing home-acquired pressure ulcer (%)

<table>
<thead>
<tr>
<th></th>
<th>Hospital Prevalence</th>
<th>Nursing Home Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N / %</td>
<td>N / %</td>
</tr>
<tr>
<td>PU at risk group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>including grade 1</td>
<td>296</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>10.2%</td>
<td>7.4%</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>4.5%</td>
<td>2.4%</td>
</tr>
<tr>
<td></td>
<td>5.6%</td>
<td>4.6%</td>
</tr>
<tr>
<td>PU at risk group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>excluding grade 1</td>
<td>186</td>
<td>169</td>
</tr>
<tr>
<td></td>
<td>6.4%</td>
<td>6.3%</td>
</tr>
<tr>
<td></td>
<td>69</td>
<td>102</td>
</tr>
<tr>
<td></td>
<td>2.4%</td>
<td>4.6%</td>
</tr>
</tbody>
</table>

Table 2 shows that 5-6 quality indicators of PU exist in both settings: PU-prevention committee, PU-agreement guidelines, management protocols/guidelines for PU-prevention products, instruction for caregivers with regard to prevention and treatment of PU grade 2, and regular updating of prevention and/or treatment protocol of PU.

Discussion
In spite of the existence of five to six quality indicators in hospitals and nursing homes, the prevalence of nursing home-acquired PU (excluding grade 1) changed to the worse from 2009 to 2012. On the other hand, the prevalence of hospital-acquired PU slightly changed to the better from 2009 to 2012. Therefore it can be stated that the appropriate compliance of quality indicators by nursing staff, particularly in nursing homes, requires more attention.

Clinical relevance
The appropriate compliance of quality indicators by nursing staff might reduce acquired pressure ulcer in both settings, but is especially recommended for nursing homes.

Acknowledgements
We appreciate the help of all participating institutions, coordinators, nurses, patients and residents.

Conflict of Interest
No conflict of interest

References
Functionality of Different Type Mattresses in the Prevention of Pressure Ulcers

Esa Soppi 1*

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Introduction
Evidence exists pointing to the direction that various types of mattresses have different ability to prevent the development of pressure ulcers [1]. Little is known about the inherent properties of the mattresses causing different clinical properties of presumed efficacy, although their pressure relieving and redistributing properties are considered essential. We examined the pressure redistributing properties of different mattresses as well as the behavior of skin temperature, capillary blood flow, and tissue oxygen tension changes as a function of time when test persons were exposed to interface pressure without a change in position.

Methods
FSA Pressure Mapping Systems (1024 sensing cells) together with FSA 4.0 software (Vista Medical) was used to measure interface pressure and contact area between the test subjects and five different mattresses (conventional polyurethane hospital mattress, air filled overlay, Repose®), higher-specification foam mattress, Visco 400®, alternating mattress, Aerocare® in static mode and Carital Optima®). In addition skin temperature, capillary blood flow (laser Doppler) and tissue oxygen tension using an oxygen sensitive probe, which was placed subcutaneously [2], were measured from 10 healthy volunteers when they were laying on conventional hospital mattress and Carital Optima®. The volunteer study with invasive procedures was approved by appropriate Ethical Committee.

Results
The results show that with Carital Optima the contact was by far the largest meaning simultaneously the lowest mean interface pressure (Table 1).

Table 1. Contact areas between the test person and different mattresses

<table>
<thead>
<tr>
<th>Mattress</th>
<th>Polyurethane</th>
<th>Repose®</th>
<th>Visco 400®</th>
<th>Aerocare®</th>
<th>Carital Optima</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact area (cm²)</td>
<td>3328</td>
<td>3879</td>
<td>4100</td>
<td>4172</td>
<td>5400</td>
</tr>
</tbody>
</table>

The contact area between the conventional polyurethane hospital mattress was only about 62 % of that of Carital Optima®. The contact areas of the other mattresses were between the two.

Discussion
The differences in contact areas between various mattresses means also differences in average interface pressures between the mattresses. These differences are also reflected to physiological parameters such as skin temperature, capillary flow and subcutaneous oxygen tension, which apparently have impact on the performance of different mattresses clinically [3].

Clinical relevance
The study helps to understand the root causes of clinical difference between various types of mattresses.

Acknowledgements
Collaboration with Professor Jukka Takala M.D. is greatly appreciated.

The study is financially supported by Carital Ltd.

Conflict of Interest
Esa Soppi is the Chairman of Board of Carital Group which develops, manufactures, and markets pain and pressure relief special products internationally.

References
Introduction
At least severity of illness, immobility, nutrition, and pressure ulcer (PU) risk class are assumed to reflect the risk for pressure ulcer development [1]. To highlight the pressure ulcer risk we examined the significance of specific risk indicators in patients in acute and long-term care facilities.

Methods
Trained wound care specialists (N=28) evaluated patients (N=468) in 23 acute (N=280) and long term care (N=188) facilities and carried out risk assessment. Other relevant information such as personnel resources, care parameters and mattress usage were also recorded. Shape Risk Scale (SRS) was used as the risk assessment scale [2].

Results
Altogether among 468 patients there were 68 patients with PUs (Table 1).

Table 1. The prevalence of pressure ulcers by the type of facility

<table>
<thead>
<tr>
<th>Type of facility</th>
<th>Patients N</th>
<th>PUs % (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute care</td>
<td>280</td>
<td>12.9 % (36)</td>
</tr>
<tr>
<td>Long-term care</td>
<td>188</td>
<td>17.0 % (32)</td>
</tr>
<tr>
<td>All</td>
<td>468</td>
<td>14.5 % (68)</td>
</tr>
</tbody>
</table>

Prevalence of PUs was 14.5 % ranging from 35 % in extremely high risk group to 0 % in lowest risk patients as defined by the SRS risk scale [2].

Only 6 % of the patients with PUs were on extremely high risk mattress. 40 % of patients had a mattress which corresponded with their risk class. 62 % of the patients who were at risk (risk class higher than low), had a standard foam (polyurethane) mattress.

The characteristics of facilities did not explain the PUs, for example staff to patient ratio was equal.

When the patients were grouped into two risk pools, about 60 % of patients in both “high” (PUs: 22.4 %) and “low” risk (PUs: 9.9 %) groups had standard polyurethane hospital mattress.

More patients in “high” risk groups with pressure ulcers needed assistance in moving and eating (half in sitting position) than in the “low” risk group.

Discussion
Although there was 4.1 percentage difference between the acute and long-term care, the characteristics of the care facility as such do not seem to be important in the PU development. The risk category and its classification characteristics, however, are decisive. In addition, it seems that the choice of mattress based on risk classification is highly important. Furthermore, the results show that when the effect of mattress is eliminated, the patient characteristics as need of help in moving and eating, together with application of sitting position, are becoming decisive.

Clinical relevance
The results show that the pressure ulcers risk assessment with a relevant risk scale is important. The results of risk assessment should lead to immediate actions, such as placing the individual patients onto an appropriate mattress as guided by her/his risk class. Additionally adequate nutrition and avoiding sitting position are important.

Acknowledgements
The study is financially supported by The Finnish Wound Care Society.

Conflict of Interest
Esa Soppi is the Chairman of Board of Carital Group, which develops, manufactures, and markets pain and pressure relief special products internationally.

References
Prevention of Infection in Skin and Wounds from Fecal Incontinence

V. Suchi-Swager

Wound coordinator nurse, Rambam-Health Care Campus, Israel, v_swager@rambam.health.gov.il

Caring for acutely or critically ill patients with fecal incontinence is a daunting task that consumes substantial caregiver time and erodes patient comfort, self image, and strength. Fecal incontinence can be one of the most physiologically, psychologically, and socially debilitating condition affecting patients. Hundreds of million dollars are spent each year for controlling fecal incontinence. The development of hospital acquired infections can more than double healthcare costs and significantly increase length of stay.

Medical conditions that can result in fecal incontinence include diabetes mellitus, stroke, spinal cord trauma, and degenerative neurological diseases. Two iatrogenic causes of diarrhea in hospitalized patients are clostridium difficile intestinal infection and tube feedings. 20% of hospitalized patient are colonized (creating a large reservoir for new infections).

Using a Bowel management system zassi - BMS in critically ill patients with severe burns, necrotizing fasciitis and septic shock associated with necrotizing fasciitis can minimize infections.

The catheter-based system is designed to effectively and reliably divert, collect, and contain potentially harmful and contaminated fecal waste from bedridden or immobilized patients in all healthcare settings. The system helps protect patients and caregivers from fecal contamination and reduce the risk of both skin breakdown and spread of infection, such as clostridium difficile by providing a level of sanitation and skin and wound protection.

We will present Utilization of the “Zassi” Bowel management system in our hospital.
Until 2010, the monitoring of pressure ulcers in Slovak hospitals was poor. Documenting of pressure ulcers was unsatisfactory. Patients were often admitted with no record of having a pressure ulcer. Hospitals reported only few cases with approximately 5-10 pressure ulcers per annum.

Basic preventive methods were in many cases abandoned which resulted in pressure ulcers. Yet patients or their relatives did not complain. A nurse published a blog with a few photographs of patients with pressure ulcers, called: “I feel like to scream for patients in the capital of Slovakia.” A reporter of a daily newspaper significantly contributed to the topic of pressure ulcers. He published a series of articles and started a wide public discussion which raised serious questions.

Those involved had to answer these questions in the media. The Minister of Health commented that pressure ulcers were not an issue because it was evident that they did not occur. However, many serious issues have arisen. The Ministry of Health had to work out methodological guidelines for prevention and treatment of pressure ulcers.

Since 1.1.2012 pressure ulcers have been monitored more precisely. On the occasion of the “Declaration of Rio de Janeiro - Stop pressure ulcers” day the Ministry of Health was questioned by media about the current situation- developments and issues in the prevention and occurrence of pressure ulcers. Media present this topic regularly and stress out the importance to focus on the prevention and treatment of pressure ulcers.
Introduction
Midlands and East SHA Ambition was to ‘Eliminate all avoidable category 2, 3 and 4 pressure ulcers by December 2012’. The QIPP Safe Care (Safety Express) programme sought to reduce hospital and community acquired pressure ulcers to deliver harm free care with potential national annual savings of £154m (NHS Midlands and East) 1. A strategy to support the achievement of this was to develop in-line with Nice and EPUAP guidelines 2,3 “Time for a change clock” was introduced. This was seen to be a means for staff to visibly recognize and become aware of which patients required a position change and when, negating the need to sift through paper work to identify when a patients turn was next due.

Method
A clock face with movable fingers based on the “Your Turn” public awareness campaign to prevent pressure ulcers was produced and placed above every bed space 3 (Fig 1) At each position change the fingers of the clock face are placed at the time the position change is next required. This allows for a truly individualised turning program that is easily recognisable and reflects the care needed by the patient whilst both in bed or sitting out in a chair. The clock face enable’s the clinical staff and carers to see exactly when the next turn is due on first contact with the patient.

Results
Since the implementation of this simple visual aid, the response for all staff has been positive. They have found the tool very practical reducing the need to trawl through the notes. In particular ward 10 have been pressure ulcer free since the introduction of the tool. Patient and carers’ are encouraged to take an active role in either by informing staff on the ward to turn the patients and encouraging patients themselves to change position. This has also raised public awareness that individual care was being delivered at the bed side

The impact of this tool
• Repositioning all patients identified as being at risk of pressure damage can be seen by all
• The multidisciplinary team are now actively involved in supporting turning regimes
• Improved productive ward practices
• Supported training to all staff
• Has demonstrated a reduction in avoidable pressure damage by 40%
• Raised public awareness to the patients and carers

Discussion:
During the National pressure ulcer awareness week in November 2012, the next turn clocks were distributed across the Trust. The feedback from all members of staff has been very positive, and has shown that a simple visual aid can improve patient outcomes and support a reduction in avoidable pressure ulcers by 40%.

Conclusion
The implementation of this very practical approach to the delivery of care has contributed to a more structured and productive use of clinician’s time. An enhanced patient healthcare experience will reflect on quality of care across our organization and will have a positive impact on the ambition to eliminate all Category 2, 3 and 4 pressure ulcers. This strategy has now been incorporated and rolled out across the acute organisation, integrated care and nursing homes.

Clinical relevance
Using a simple but effective tool has raised awareness to family and carers’ that action is being taken to reduce pressure ulcers in Walsall

Acknowledgements
We appreciate the help of Aspen Medical Europe Ltd.

Conflict of Interest
None
Introduction
Reactive hyperemia is a response to tissue ischemia and can be used to measure its severity. The aim of this study was to evaluate the relative contribution of applied pressure, skin temperature and shear stress on reactive hyperemic response in the skin tissue. Findings suggest that pressure and skin temperature affects the severity of tissue ischemia, although shear has no significant effect. Further investigation on the relative contributions the three variables over different ranges and depths may help prevent of prevent pressure ulcers.

Methods
A repeated measures design was employed. The reactive hyperemic response was measured following each of 21 combinations of three pressures (0, 60, and 100 mmHg), three temperatures (28, 32, 36°C), and three shear forces (0, .98, and 1.96N). Participants were 10 adults (five male, five female; age 46-73) without hypertension, diabetes, or any vascular or cardiopulmonary or vascular diseases. A computer-controlled indenter was used to control the pressure, shear force and temperature on the skin. A laser Doppler flowmetry probe located at the center of the indenter measured skin blood flow. Participants lay prone while the tests were performed at the sacrum. Three different indices were used to assess the magnitude of the reactive hyperemic response: peak minus baseline (preload) perfusion, normalized perfusion (peak/baseline), and perfusion area (perfusion integrated over time within the reactive hyperemic spike). Fixed effects linear regression analysis was used to determine the contributions of independent variables interface pressure, shear, and skin temperature. Rank regressions were also conducted on all three dependent variables.

Results
Fixed effects linear regression analysis indicted pressure and temperature are predictors of the normalized peak skin blood flow (pressure: P=0.003, temperature: P=0.003), and perfusion area (pressure: P<0.001, temperature: P<0.001), and peak minus baseline perfusion (pressure: P=0.003, temperature: P =0.003), and perfusion area (pressure: P<0.001, temperature: P<0.001). However, shear stress was not a significant predictor of any of the dependent variables (normalized peak skin perfusion (P=0.525), perfusion area (P=0.323), or peak minus baseline perfusion (P=0.149). Nonparametric ranks regression, conducted due to slight non-normality among residuals, did not change any of the conclusions.

Discussion
Findings from this analysis suggested that skin temperature in combination with pressure predicts the reactive hyperemic response in the upper 2-3 mm of the tissue. Shear stress does not appear to contribute to the sacral ischemia that drives the response.

Clinical Relevance
Since deformation at weight-bearing areas often results in blood flow occlusion, actively lowering the temperature may reduce the severity of ischemia and lower pressure ulcer risk. Although shear does not appear to contribute to ischemia in the dermal tissues interrogated b laser Doppler, further work is needed to investigate the effect at deeper layers. Additionally, it may contribute by a non—ischemic mechanism.

Acknowledgments
The authors thank the participants of this study which was funded by Hill-Rom.
EPUAP Exhibitors
PROFILES
Activa

Debrisoft® - A unique, active debridement product with the ability to quickly remove wound debris, necrotic material, slough, and hyperkeratosis allowing you vision and clarity to accurately assess the wound.

“Works like magic”, “incredible results”, and “absolutely outstanding” – a sample of many quotes from users of Debrisoft®.

ArjoHuntleigh

...with people in mind

ArjoHuntleigh is a global medical equipment supplier offering our customers a broad range of integrated solutions for the care of people with reduced mobility and related conditions.

At the centre of our activities, we place the residents and patients that are cared for using our equipment. We also place great value on the welfare of the healthcare professionals that care for them. Our products, programmes and services are designed with these people in mind.

We offer solutions covering these interrelated areas of care:

- **Patient handling** – patient lifters, hygiene systems and disinfection
- **Therapy and prevention** – therapeutic surfaces, DVT prevention, wound healing and therapy
- **Medical beds** – beds, stretchers and couches for all healthcare applications
- **Diagnostics** – assessment and monitoring products for clinicians
- **Bariatric care** – comprehensive solutions for heavier patients

Our aim is to provide solutions that:

- improve the quality of life for residents/patients
- create a better working environment for the nursing staff
- reduce the cost of care

To support these aims ArjoHuntleigh focuses on working in partnership with the customer to provide the very best clinical outcomes for their residents/patients. The best outcomes are achieved by educating the resident/patient and carer, by providing appropriate evidence-based therapeutic devices and by assisting the customer in measuring the economic and clinical success of their strategies.

Aspen Medical

Aspen Medical’s woundcare division provides a comprehensive range of innovative dressings for the management of acute and chronic wounds. Our products are cost effective and include technologies designed to improve healing and manage complex wounds.

Our vision ‘Every patient will benefit from an Aspen product’ is driven by a desire to improve patient experience through collaboration with clinicians and patient groups.

Examples of our wound dressings include PolyMem, a polymeric membrane dressing incorporating a cleanser and moisturiser with anti-inflammatory and pain reduction properties; Sorbsan, the UK’s number 1 alginate dressing for 30 years, known for its conformability and haemostatic properties; Sorbsan Silver, offering all the benefits of Sorbsan in an antimicrobial solution; and Sorbaderm, a cost effective, skin friendly barrier cream and no-sting barrier film.

For further information please visit www.aspenmedicaleurope.com or telephone Customer Services on 01527 587700 or 0800 032 3399.
Care of Sweden – Medical technology since 1992

Care of Sweden develops, manufactures and markets medical devices and services for the professional health care sector. Our focus is in the prevention and treatment of pressure ulcer, and competency in the company is very high.

The company was founded in January 1999 and is one of the leading Scandinavian companies in the business. Headquarters is centrally located in Tranemo, Sweden.

We supply a wide range of mattresses, cushions and pillows and our customers are municipalities, county councils and private healthcare providers throughout the country. Export is a fast-growing part of our business and we are represented in more than 25 countries. We offer training courses in several areas, such as prevention of pressure ulcer, care bed knowledge, evacuation and more.

Care of Sweden, with the greatest possible respect for the environment, develops and markets easy-to-use, secure and affordable high-quality products, especially bed products for healthcare, and offers a high level of support and service. We are certified to ISO 9001, ISO 13485 and ISO 14001.

Crawford HC

Crawford Healthcare is a rapidly growing international company, dedicated to making cost-effective woundcare, dermatology & diagnostic products. New from Crawford’s is KerraPro Pressure Reducing Pads range. The shaped pads, made from 100% super silicone, are designed to help prevent pressure ulcers in at-risk patients as part of a pressure ulcer prevention programme. They dissipate 97% of pressure¹ and are clinically proven to return Category 1 pressure injuries to a healed state within a 4 week time period².

Other products in the Crawford woundcare range include: KerraMax Care super-absorbent dressings for improving patient care; Flaminal the first enzyme alginogel to manage wound infection, balance moisture & debride and deslough; KerraPed Plantar Ulcer, an off-loading therapeutic shoe system designed to mechanically off-load pressure from the ulcer and peri-ulcer area; Kerraped all purpose boot; Kerraheel foam dressings; KerraBoot and Kerraglove. Crawford dermatology products include QV emollients, suitable for dry or sensitive skin conditions and SunSense the number 1 prescribed sunscreen brand.

EPUAP

The 16th Annual Meeting of the EPUAP is being held in Vienna, Austria August 28-30th 2013 in collaboration with APUPA the Austrian Society for the Prevention of Pressure Ulcers. The theme this year is ‘Enthusiasm complements Experience and Evidence in Pressure Ulcer Management’. PUCLAS 3, the update of the very popular pressure ulcer classification tool will be launched at this meeting along with PrevPlan. The meeting will be bilingual in German and English.

The Guidelines Development Group continues to meet to update the EPUAP/NPUAP Guidelines for the prevention and treatment of pressure ulcers. They have now been joined by the Pacific Pressure Injury Alliance (PPIA) with members from societies from Australia, New Zealand Hong Kong and Singapore as well as an observer from Japan to make the Guidelines a truly international recommendation. The launch of the update will be in 2014.

The venue for the 2014 annual meeting of EPUAP will be Stockholm Sweden.

The second Focus meeting of the EPUAP will be held in the University of Southampton April 7-9 2014. The theme will be Skin Health and the Microclimate and will be hosted by Professor Dan Bader.
The Stop Pressure Ulcer Day this year will take place on Thursday November 21st 2013 and information regarding this event will be available nearer the event on the EPUAP web site (www.epuap.org).

The second edition of the Science and Practice of Pressure Ulcer Management is now in progress.

**EWMA**

**About EWMA**

**History in Brief**

The European Wound Management Association (EWMA) was founded in 1991, and the association works to promote the advancement of education and research into native epidemiology, pathology, diagnosis, prevention and management of wounds of all aetiologies.

EWMA is an umbrella organisation linking wound management associations across Europe and a multidisciplinary group bringing together individuals and organisations interested in wound management.

EWMA works to reach its objectives by being an educational resource, organising conferences, contributing to international projects related to wound management, actively supporting the implementation of existing knowledge within wound management and providing information on all aspects of wound management.

**Objectives**

1. To promote the advancement of education and research into epidemiology, pathology, diagnosis, prevention and management of wounds of all aetiologies.
2. To arrange conferences on aspects of wound management throughout Europe.
3. To arrange multi-centre, multi-disciplinary training courses on topical aspects of wound healing.
4. To create a forum for networking for all individuals and organisations interested in wound management

**Flen Pharma**

Flen Pharma introduces a new class in wound healing: Enzyme alginogel®.

Enzyme alginogels can be applied to any type of wound, dry or exuding, whether it is simply contaminated or is infected.

Its benefits:

1. Ensures continuous wound debridement
2. Antimicrobial activity that restores the bacterial balance without damaging skin cells
3. Creates and maintains a moist wound healing environment
4. Protects wound edges and epithelial cells

No other class of wound care products achieves this, and no other class of wound care products is suited for all wound types and at any stage.

Enzyme alginogels are T.I.M.E. compatible.
Frontier

Frontier Medical are proud to exhibit their Repose® range of pressure relieving products at this year’s meeting in Vienna. MSH, our Belgium-based European distribution partners, will accompany Frontier.

The Repose® range of pressure redistribution products is extensively used in a wide variety of care settings.

The Repose® range, comprising mattress overlays, cushions and foot protectors provides proven, effective pressure area care and pain relief using high-technology materials unique to the Repose® range.

To demonstrate the efficacy of Repose® the product’s clinical effectiveness has been formally investigated in a significant number of trials both in the UK and throughout Europe.

Repose® continues to provide a unique and unrivalled combination in pressure relief, portability, value for money and clinical efficacy in hospital and community settings throughout the world.

With a product range developed to suit a variety of healthcare settings and a comprehensive product development plan Frontier Medical continues to innovate to meet the pressure area care requirements of our customers.

Visit us at our stand for to learn more about Repose®.

Hartmann

The HARTMANN Group is a major international supplier of healthcare and hygiene products, operating subsidiaries and manufacturing sites across 37 countries worldwide, also boasting a long standing history. In fact, the first antiseptic dressings were developed following correspondence between Sir Joseph Lister and Paul Hartmann Senior.

Partnership, professionalism and a passion for cost effective wound care are at the heart of what HARTMANN do. With a comprehensive range of high performance, clinically proven products, including key brands such as Atrauman®, Cosmopor®, Hydrofilm® and Zetuvit®, HARTMANN have a solution for all phases of the wound healing process.

HARTMANN works in partnership with customers to provide optimum service. The development of new IT solutions to keep pace with modern technologies and support the ever changing healthcare landscape, is at the heart of this service.

Heintel

The Austrian company R. Heintel Medizintechnik GmbH, founded in 1918, is one of the leading companies in the medical supplies sector. The company, based in Vienna, distributes almost 4,000 products from around 50 international suppliers for all disciplines in the medical device sector. This family business, now in its fourth generation and managed by CEO Mag. Markus Pöltenstein (LL.M), is a complete provider of medical supplies for hospitals, clinics, nursing care facilities and services. Find out more about Heintel Medizintechnik at www.heintel.at
Hill Rom

Hill-Rom® is a leading worldwide manufacturer and provider of medical technologies and related services for the health care industry, including patient support systems, safe mobility and handling solutions, non-invasive therapeutic products for a variety of acute and chronic medical conditions, medical equipment rentals, and information technology solutions. The comprehensive product and service offerings from Hill-Rom are used by health care providers across the health care continuum and around the world in hospitals, extended care facilities and home care settings to enhance the safety and quality of patient care.

Visit Hill-Rom® at EPUAP 28-30 August 2013

- Experience Hill-Rom® Progressive Mobility™ Therapy using the Progressa™ Bed System, which highlights the benefits of early mobilisation of patients including prevention of pressure ulcers
- Discover how the ClinActiv® MCM™ Next Generation Therapy Surface system combining MicroClimate Management with unique I-mmersion™ Therapy can provide effective pressure ulcer prevention and treatment, in line with the EPUAP/NPUAP guidelines.
- Learn more about the standards that now apply to medical device manufacturers (i.e. the revised Medical Device Directive EN 60601-1 3rd edition) and the impact these have on your compliance.
- Understand how our commitment to the concept that mobilising patients early and supporting their independence improves life – through ‘Mobility is Life’

For more information about Hill-Rom and how our solutions can change your life visit www.hill-rom.com

Jarven

Järven Plast & Smide AB was founded in 1976 after years of research and development of waterbeds with the purpose of preventing bed sores. The research was made together with the plastic surgery department of Umeå University, Sweden.

The products of Järven Health Care are built on a combination of our 30-year experience from the demands of the Health Care and the latest in research and development. Our ambition is to offer best possible bed comfort for patients throughout their hospital stay in combination with the best possible hygiene, quality and safety. This has resulted in us being able to offer the best possible total economy and comfortable health care bed for the patient. Järven Health Care is one of Scandinavia’s largest manufacturers of mattresses to the health care.

Joerns

Revolutionizing Care

Joerns is revolutionizing healthcare through design, prevention and advanced healing solutions. We are focused on improving patient and caregiver experiences, placing the well-being of others at the center of everything we do. To maximize the performance of our customers, we bring to market fully integrated services and technologies that provide the highest quality and represent the greatest value.

Design - Transforming care settings and experiences through leading design solutions.

Prevention - Advancing patient care and handling solutions for safer environments.
Healing - Developing innovative solutions for wound management.

To learn more about how Joerns’ comprehensive solutions can meet your operational needs while helping you deliver exceptional care, please visit Joerns.com or call Customer Services

Linet

The LINET Group SE products provide safety and comfort to patients and residents, help staff and provide support for the staff and assist the management to maintain good practice in their hospitals and care facilities. Flexibility, along with an extensive range with unique solutions are essential for making it possible to customise products to meet customer’s specific situation and needs. The portfolio of health and nursing care products includes beds, passive and active mattresses, bedside cabinets and other furniture. The offer of products comes with architectural designs and delivery of turn-key interiors.

Molnlycke Health Care

Mölnlycke Health Care is a world leading manufacturer of single-use surgical and wound care products and services for the professional health care sector.

The Surgical Division offers safe and efficient surgical solutions through a number of services and a wide range of high quality single-use surgical products that help minimise the risk of postoperative wound infections for patients and create cumulative time, effort, and cost efficiencies.

The Wound Care division offers a wide range of wound care solutions, including products with Safetac® technology and the AvanceTM Negative Pressure Wound Therapy System, providing gentle and effective wound healing to patients and caregivers. The wound care assortment also has supplementary portfolios in compression, dermatology, and orthopedics as well as a product for hard-to-heal wounds.

Mölnlycke Health Care is a global company with 6700 employees and manufacturing plants in Belgium, the Czech Republic, Finland, France, Malaysia, Thailand, Poland, the UK, and the US.

Molnlycke Health Care are passionate about working with clinicians to reduce the incidence of Pressure Ulcers.

Nutricia Advanced Medical Nutrition

Nutricia is a specialised healthcare unit of Danone, one of the fastest-growing food companies in the world. Nutricia expands and completes Danone’s mission to bring health through food to as many people as possible, by focusing on support for vulnerable people who are at nutritional risk for health reasons.

Nutricia develops innovative, science-based nutrition concepts that deliver proven benefits and better clinical outcomes for patients, and so help to lower the overall cost of their care. Working in partnership with doctors, health care professionals, and caregivers, the company offers a very broad range of products for many conditions and age groups, especially in paediatrics, in critical care, and in the management of old age and frailty.
Parafricta

APA Parafricta Ltd. welcomes you to the stand to view the products and results of use of Parafricta® products in protecting the integrity of skin, particularly in pressure sore prevention.

The stand will contain copies of studies showing reduction in pressure ulcer incidence and severity, plus cost-effectiveness. In addition, we are holding a symposium on Thursday 29th August from 1530-1700 at which a number of speakers will discuss the topic of friction and shear on the skin.

Many chronic wounds are initiated by frictional shearing of compromised skin in cardiovascular compromised, diabetic or bedridden patients. Friction often dislodges and “rucks” up wound dressings that are in place to treat an ulcer as the patient moves about in the bed or chair. The feature that the static and dynamic friction coefficients of Parafricta® are equal is very significant – this is referred to as an absence of ‘stiction’. Normally static friction is greater than dynamic friction in cotton, linen and other fabrics in contact with a patient’s skin. This causes a jerk or “snatch” when one surface begins to move against another, which is the origin of damage to skin or displacement of a dressing. Parafricta® products can be used to avoid this effect by reducing friction and shear.

Parafricta® is available in the form of Undergarments (to protect the sacrum and buttocks), Bootee (heel and foot), Pillowcase (head) and Fitted Single Bedsheet (trunk). The additional properties of Parafricta® Fabric, it can be washed at very high temperatures without losing its low friction and shear characteristics and is very durable, means it is appropriate for use in the medical application arena.

Contact: George Sampson  CEO
Tel: +44 1252 816900  0800 043 1412 Freephone [UK]
george.sampson@parafricta.com  www.parafricta.com

Polymem

PolyMem is a unique multifunctional dressing specifically designed to reduce a patient’s total wound pain experience, while actively encouraging healing.

In appearance it may look like a foam, but unlike foams it contains added components – each placed in the dressing so that they separately and in synergy (very importantly) can facilitate for healing and pain relief in a very different way than other wound care dressings.

PolyMem is available in different configurations including wound fillers and silver dressings. It is produced in Chicago (USA) and distributed worldwide by a network of carefully selected regional partners.

More information on: www.polymem.eu

Smith & Nephew

Smith & Nephew Advanced Wound Management offers a full range of effective wound care products, combined with a deep understanding of best practice techniques for the prevention and healing of wounds. We seek imaginative solutions that improve wound outcomes for patients and at the same time conserve resources for healthcare systems.
**Stryker Medical**

Stryker Medical makes hospital beds, surfaces and stretchers for the comfort and security of patients, which has made us an undisputed industry leader in patient handling equipment. We're dedicated to improving patient outcomes and reducing the cost of care through products that can help protect against patients falls, healthcare-associated infections and pressure ulcers while maintaining caregiver safety via advanced ergonomic product designs. Stryker designs products with the caregiver in mind, because we believe beds, surfaces and stretchers need to be more than just pieces of equipment. They need to aid care giving, improve safety and enhance healing. More information can be found at [http://www.med.stryker.com/](http://www.med.stryker.com/).

Stryker Corporation has acquired privately held Gaymar Industries, a company that specializes in a broad range of support surfaces and pressure ulcer management solutions as well as temperature management products. Stryker’s Medical division and Gaymar have had a successful 10-year partnership highlighted by the introduction of the Isoflex(r) and XPRT(r) support surfaces, both of which have been widely adopted in the market.

This acquisition enables Stryker to deliver a more robust, comprehensive solution to our customers in the following ways:

- Enhances the Spectrum of Care that Stryker can provide with a complementary portfolio of diverse products across a broader range of clinical applications and price points
- Advances Our Prevention Philosophy of developing innovative products and services designed to help prevent adverse events, which improve clinical and financial outcomes
- Provides A Stronger Clinical Foundation of education, research and training that supports clinicians in their delivery of evidence-based patient care

In 2013, Stryker is pleased to announce the launch of a full new surfaces portfolio.

**TexiSense**

TexiSense designs pressure ulcer prevention devices based on a pressure sensing fabric acting as a second sensitive skin and allowing the objective assessment of situations where tissues’ integrity is at risk. The 100% textile pressure sensor is coupled to a personalized biomechanical model of the vulnerable body region which monitors in real-time internal stress and strain levels. A patient-specific modeling technique makes it possible to take into account each person’s own morphology and adapt the prevention strategy accordingly. The TexiSense devices are designed for people temporarily or permanently deprived of somato-sensory capabilities, or having a limited mobility. In particular, people with diabetes, amputation or medullar injuries are concerned.

**Tomorrow Options**

Tomorrow Options designs, develops and markets electronics portable systems to monitor the movements of people or their body parts during everyday activities in all environments.

Body actions are an important source of information to assess the condition of patients, but also to be used in the efficient treatment or prevention of injuries in athletes. Everyone can benefit from assessing their dynamic movement in order to reduce risks of further problems, avoid pain, minimize effects of disorders or simply improve the wellbeing.
Our devices explore these opportunities, taking advantage of the latest progress made on micro-electro-mechanical-sensors (MEMS), to develop systems that capture, monitor, and analyze human body movements, without provoking any discomfort to the users.

The information gathered is further analyzed with intuitive and easy-to-use software, delivered wirelessly to several stakeholders and integrated with Electronic Records platforms.

WalkinSense, our first product, measures the in-shoe plantar pressure simultaneously with physical activity of the patient or sportsman. It allows medical assessment of lower limbs and biomechanical gait analysis – in all the environments.

MovinSense is a wireless system to monitor the bedridden patients. It supports repositioning helping to prevent pressure ulcers and it detects bed falls.

Our devices incorporate the needs of patients, medical staff and save money for managers.

The company is based in Porto, Portugal, but since the very beginning our goal was to become international. In 2009 we opened a subsidiary in Sheffield, UK, and since that time, we managed to establish a great number of business relationships with partners from all over the world.
European Pressure Ulcer Advisory Panel

Mission Statement (Founded 1997)

“The European Pressure Ulcer Advisory Panel’s objective is to provide the relief of persons suffering from, or at risk of pressure ulcers, in particular through research and education of the public”

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