EPUAP 2014
17th Annual Meeting of the European Pressure Ulcer Advisory Panel

27 - 29 August 2014 · Stockholm, Sweden

PRESSURE ULCERS FROM BIRTH TO DEATH
Prevention, Treatment and Rehabilitation

PROGRAMME AND ABSTRACT BOOK

Organised by the European Pressure Ulcer Advisory Panel in cooperation with the Swedish Association of Tissue Viability Nurses SSiS and Sophiahemmet University
The mission

To provide the relief of persons suffering from or at risk of pressure ulcers through:

- research in prevention and treatment of pressure ulcers
- raising awareness on the importance of prevention and treatment of pressure ulcers
- influencing pressure ulcer policy in all European countries
- working towards an adequate patient centered and cost effective pressure ulcer care

www.epuap.org

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DEAR PARTICIPANTS,

Finally, after a year of intense planning, the 17th conference of EPUAP is about to take off. It is a thrilling and challenging experience.

I would like to sincerely thank everyone involved in the planning of this event; Codan Consulting – the company who organized the conference, the Swedish organizing committee, SSiS, Visit Stockholm, Stockholm County Council, the City of Stockholm and Sophiahemmet University. We also thank the companies, sponsors and exhibitors for their valuable support.

We hope you will enjoy our beautiful city, the “Venice of the North”, of which we will try to give you some glimpses in the social programme.

Most importantly, we hope that you will enjoy the scientific programme, carefully planned by the Scientific Committee of EPUAP. We think this is one of the most interesting and exciting programmes which we have ever presented at an EPUAP conference.

The programme is a mixture of key lectures, free paper sessions, symposia, workshops and poster sessions addressing the main theme of the conference Pressure Ulcers from Birth to Death – Prevention, Treatment and Rehabilitation.

This year the conference has attracted more than 500 participants from 32 countries all over the world, which is a new record for EPUAP!

So, we wish you a real good time in Stockholm, returning to your respective country inspired and more knowledgeable and ready to take on the big challenge of providing an even better prevention and care of persons at risk of, or with manifest pressure ulcers.

Prof. Christina Lindholm  
Chair of the EPUAP 2014 Annual Meeting

Prof. Amit Gefen  
President of EPUAP

Prof. Dimitri Beeckman  
Chair of the Scientific Committee

Susanne Dufva  
President SSiS

Carina Bååth  Eila Sterner  Lena Karlsson  Madeleine Stenius  Lena Gunningberg  BrittLouise Andersson  Ammi Hommel
About EPUAP

The “European Pressure Ulcer Advisory Panel” was created in London in December 1996 to lead and support all European countries in the efforts to prevent and treat pressure ulcers. At its inaugural meeting in London in December 1996, which included experts from many European countries, the group of over twenty agreed their mission statement and the initial Executive Board and Trustees.

The mission statement reads: “To provide the relief of persons suffering from or at risk of pressure ulcers, in particular through research and the education of the public and by influencing pressure ulcer policy in all European countries towards an adequate patient centred and cost effective pressure ulcer care.” A very important activity for the EPUAP is our annual conference. These meetings are aimed at bringing together clinical care practitioners, researchers and people from industry, to discuss the current status of the problem in Europe and the world and to discuss new developments in pressure ulcer prevention, treatment and care.

About Swedish Society of Wound Care Nurses SSiS

SSiS is a professional organization under the umbrella of the Swedish Nursing Society.

The aim is to work on a nation based level to improve wound management in Sweden.

The Society is also official partner to different authorities concerning wound related questions.

SSiS has 350 members. The Council consist of both academically qualified and clinically active nurses.

Every year SSiS organizes a conference on different themes, attracting approximately 200 nurses. Next conference will be in April 2015 in Stockholm with the theme “wound management and technology”.

This year’s close cooperation with and support of the EPUAP conference is a welcome event for SSiS, providing international contacts and extended educational options.

We welcome speakers and participants from all over the globe to this truly inspiring conference.

EPUAP Executive Board
Amit Gefen,
President
Michael Clark,
Immediate Past President
Jane Nixon,
Treasurer
Dimitri Beeckman,
Chair Scientific Committee
Cees Oomens,
Deputy Chair Scientific Committee
Liset Schoonhoven,
Chair Guidelines Committee
Jan Kottner,
Co-Chair Guidelines Committee
Zita Kis Dadara,
Chair Public Relations Committee
Christina Lindholm,
Chair 17th Annual Meeting EPUAP 2014

EPUAP Trustees
Dan Bader, United Kingdom
Guido Ciprandi, Italy
Jeannie Donnelly, Northern Ireland
Lena Gunningberg, Sweden
Hilde Heyman, Belgium
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Elia Ricci, Italy
Marco Romanelli, Italy
Jos Schols, Netherlands
Jakub Taradaj, Poland
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José Verdú Soriano, Spain
Erik de Laat, Netherlands

Local Organising Committee
Christina Lindholm, Chair
Lena Gunningberg
Ami Hommel
Carina Bååth
Eila Sterner
Madeleine Stenius
Lena Karlsson
Britt Louise Andersson
**WEDNESDAY 27.08.2014 PROGRAMME**

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<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tr>
<td>08:00</td>
<td>Registration, badge and bag collection - Registration area</td>
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<tr>
<td>08:00 - 09:30</td>
<td>Morning coffee &amp; tea - registration and exhibition area</td>
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<tr>
<td>09:30 - 10:15</td>
<td>Opening Ceremony in the Auditorium Left Side, Chairs: Christina Lindholm, Dimitri Beeckman</td>
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<td>Opening festivity: Traditional Swedish horn blowing, Jan Johanson</td>
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<td>Opening of the conference by Barbro Westerholm, member of the Swedish House of Parliament</td>
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<td>From off - piste to off - load: a patient experience, Ronny Persson</td>
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<td>Opening by the President and the local organiser, Amit Gefen, Christina Lindholm</td>
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<tr>
<td>10:15 - 12:00</td>
<td>Key sessions, Chairs: Christina Lindholm, Dimitri Beeckman</td>
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<td>The skin in a gender perspective, Åsa Boström</td>
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<td>Pressure ulcers in neonates and a paediatric population, Guido Ciprandi</td>
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<td>Pressure ulcers in palliative care patients, Christina Lindholm</td>
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<td>Pressure ulcers after surgery, Anni Hommel</td>
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<td>Reconstructive surgery of pressure ulcers, Jakob Lagergren</td>
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<td>Pressure ulcers in a rehabilitation unit, Claes Hulling</td>
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<td>Geriatric experiences in the prevention of pressure ulcers, Dag Salaj</td>
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<tr>
<td>12:00 - 13:15</td>
<td>Lunch break and exhibition viewing</td>
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<td>13:15 - 14:45</td>
<td>Key lectures, Chairs: Michael Clark, Jan Kottner</td>
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<td>Risk factors in context; from conceptual framework</td>
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<td>to risk assessment in practice, Jane Nixon</td>
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<td>The effect of sustained loads on cells and tissues, Cees Oomens</td>
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<td>Contoured foam cushions in spinal cord injury care: Cinderella’s shoe does not fit anymore, Amit Gefen</td>
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<td>Microclimate, Dan Bader</td>
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<td>Nutrition and pressure ulcers, Jos Schofs</td>
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<td>14:45 - 15:30</td>
<td>Coffee break and exhibition viewing</td>
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<tr>
<td>15:30 - 16:00</td>
<td>EPUAP Initiatives Key lectures, Chairs: Amit Gefen, Jeannie Donnelly</td>
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<td>Launch of the 2014 International Guideline for Pressure Ulcer Prevention and Management, Lisette Schoonhoven</td>
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<td>PuClas3 show, Dimitri Beeckman</td>
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<td>Stop Pressure Ulcer Day, Zita Kis Dadara</td>
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<tr>
<td>16:00 - 17:00</td>
<td>Free paper session 1: Pressure Ulcers in Trauma and ICU Patients, Chairs: Marco Romanelli, Guido Ciprandi</td>
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<td>Pressure ulcer prevention in critical ill neonates and infants, Anne-Barbara Schluer</td>
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<td>Pressure Ulcers and Pain Due to the Extrication Collar and Headblocks in Trauma Patients, Witske Ham</td>
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<td>A prospective cohort study of the clinical effectiveness of multi-layer soft silicone dressings in the prevention of heel pressure ulcers in trauma and critically ill patients, Nick Santamaria</td>
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<td>The Impact of a 5-Layered Silicone Bordered Foam Dressing on Intensive Care Unit (ICU) Patients’ Sacral Pressure Ulcer Incidence: A Randomized Clinical Trial, Peggy Kalowes</td>
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<td>17:00 - 17:30</td>
<td>Official opening of the exhibition and refreshments (in the exhibition area)</td>
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<td>19:00</td>
<td>Welcome reception at the Stockholm City Hall, Nobel Prize Hall</td>
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<tr>
<td>16:00 - 17:00</td>
<td><strong>Free paper session 2</strong>: Pressure Ulcers in Older Persons, <em>Chairs: Cees Oomens, Hilde Heyman</em></td>
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<td>Higher mortality if admitted with a pressure ulcer to a nursing home – Results of a cohort study, <em>Nils Lahmann</em></td>
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<td>Pressure ulcers on a static air mattress: incidence and risk factors, <em>Brecht Serraes</em></td>
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<td>A randomised control trial into the impact of prescribed seating in pressure ulcer prevention for nursing home residents, <em>Olivia McVey</em></td>
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<td>A clinical evaluation of a specifically designed alternating support surface device for achieving the 30 degree tilt in older individuals at risk of pressure ulcer development, <em>Zena Moore</em></td>
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## Thursday 28.08.2014 PROGRAMME

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<tr>
<td>08:00</td>
<td>Registration, badge and bag collection – Registration area</td>
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<td>08:00 - 09:00</td>
<td>Free paper session 4: Pressure Ulcers: Learning from the Lab and Applying to the Patient, Chairs: Jos Schols, Lena Gunningberg</td>
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</table>

- Buttock pressure management of able-bodied people seated on a rigid surface for two hours, Olivier Chenu
- Evaluating the Sensitivity of Actimetry to detect Postural Changes in Seated Individuals, Peter Worsley
- Does the calcaneus morphology have an influence on the risk of posterior heel ulcer?, Vincent Luboz
- Simulation and Discussion of the Microclimate in Heel Protector Boots, Evan Call

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<tr>
<th>Time</th>
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<tr>
<td>09:00 - 10:00</td>
<td>Key lectures, Chairs: Dan Bader, Jose Verdu Soriano</td>
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- The skin in a lifespan perspective, Jan Kottner
- Recent health economic data from a systematic review of international literature, Dimitri Beeckman
- Neglect - shame or blame, Agnetha Folestad

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<th>Time</th>
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<tr>
<td>10:00 - 10:45</td>
<td>Coffee break and exhibition viewing</td>
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<td>10:45 - 11:45</td>
<td>EPUAP Experienced and Novice Investigator Awards 2014, Introduction to the Awards by the Chair of the Scientific Committee, Dimitri Beeckman</td>
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</table>

- Experienced Investigator Award: Wound healing from past to future: What can we learn from history?, Christina Lindholm
- Lactic acid bacterial symbionts in honeybees – an unknown key to honey’s antimicrobial and therapeutic activities, Alejandra Vásquez
- Novice Investigator Award: Pressure ulcer care: the Netherlands vs. Germany 0 - 1, Esther Meesterberends

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<tr>
<td>11:45 - 13:15</td>
<td>Lunch break and exhibition viewing</td>
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<tr>
<td>12:45 - 13:15</td>
<td>Annual General Meeting of the EPUAP</td>
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<td>13:15 - 14:15</td>
<td>Session for physiotherapists / occupational therapists, Chairs: Richard Goossens</td>
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- The five why’s about seating, Milja Vaitilo
- Position changes - why, when and how often, Ulrika Kallman
- Cognition and compliance with pressure ulcer prevention, Dorothy Riedel
- Characterization of walk and seating in young adults with spina bifida; Challenges and possibilities, Martina Bendt

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<tr>
<th>Time</th>
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<tr>
<td>10:00 - 11:00</td>
<td>Industry Workshop</td>
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<td>08:30 - 09:30</td>
<td>Industry Satellite Symposium</td>
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- Does the calcaneus morphology have an influence on the risk of posterior heel ulcer?, Vincent Luboz
- Simulation and Discussion of the Microclimate in Heel Protector Boots, Evan Call

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<tr>
<td>13:15 - 14:15</td>
<td>Free paper session 7: Biomechanics and Etiology, Chairs: Lena Gunningberg, Jos Schols</td>
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</table>

- The Role of Mathematics in Ulcer Development and Wound Healing, Fred Vermolen
- A novel MR compatible indentation setup to study the etiology of pressure ulcers and related deep tissue injury, Jules Nelissen
- Discrimination between diabetic patients with and without diabetic foot ulcer based on testing the cutaneous microcirculation in response to low pressure, Dominique Signeau – Roussel
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<th>Bergsmannen</th>
<th>Spelbomskan</th>
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<tr>
<td><strong>Free paper session 5: Innovative Approaches for Risk Assessment, Chairs: Hilde Heyman, Geert Vanwalleghem</strong></td>
<td><strong>Free paper session 6: Pressure Ulcer Research and Basic Science, Chairs: Zita Kis Dudara, Lenche Neloska</strong></td>
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<tr>
<td>Pressure ulcer prevalence and prevention practices – a comparison between formal risk assessment and assessment using clinical judgement alone, Zena Moore</td>
<td>PRESSURE 2 Trial: Considerations on the design of the trial and the decision making process at the interim analyses, Sarah Brown</td>
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<tr>
<td>Improving the risk assessment of pressure ulcer by nurses for elderly with psychiatric disorder a pilot project, Florence Basin</td>
<td>The Effect of a Bacteria and Fungi Binding Mesh Dressing on the Bacterial Load of Pressure Ulcers Treated with Negative Pressure Wound Therapy (NPWT), a Pilot Study, Marino Ciliberti</td>
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<tr>
<td>Is pain a predictor of Category 2 pressure ulcers? Analysis of skin site level data from the PURPOSE Pain Cohort Study, Isabelle Smith</td>
<td>Numerical Study of different Types of Supporting Structures regarding the Prevention of Deep Tissue Injuries, Alexander Siefert</td>
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<tr>
<td>Early pressure ulcer prevention and Intervention for patients undergoing fasttrack surgery, Brigitte Skovgaard</td>
<td>A clinical comparative study on 940, 808 and 658 nm laser therapy in pressure ulcer healing: early and long term results, Jakub Taradaj</td>
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**09:30 - 10:30 Industry Workshop**

**11:00 - 12:30 Industry Workshop**

**Workshop:** The implementation of the 2014 pressure ulcer guidelines in clinical practice, Lisette Schoonhoven

**Workshop:** Pressure Ulcer Classification: PuClas3, Dimitri Beeckman

See the industry satellite symposia and workshops at page 91
## Thursday 28.08.2014 PROGRAMME

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<th>Time</th>
<th>Auditorium / Left side</th>
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<tr>
<td></td>
<td><strong>EWMA: Working together for better wound care education in Europe, Salla Seppänen</strong></td>
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<td><strong>EPUAP: Integrating pressure ulcer prevention and management in educational curricula: current status, views and joint initiatives, Trudie Young</strong></td>
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<td><strong>EWMA: EWMA Managing wounds as a team document, Zena Moore</strong></td>
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<td>15:15 - 16:00</td>
<td><strong>Coffee break and exhibition viewing</strong></td>
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<tr>
<td>16:00 - 17:15</td>
<td><strong>Key lectures, Chairs: Nihls Lahman, Jakub Tarafaj</strong></td>
<td><strong>16:00 - 17:00 Industry Workshop</strong></td>
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<td><strong>SSiS scholarship</strong></td>
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<td><strong>Telemedicine in pressure ulcer prevention and management, Rolf Jelnes</strong></td>
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<td><strong>The National Register of Wounds, RiksSar (RUT), Ruth Öien</strong></td>
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<td><strong>Swedish National Prevalence Study Initiative 2009 - 2014, Agneta Andersson</strong></td>
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<td><strong>Mobile pressure ulcer team, Karin Hagqvist and Mona Johansson</strong></td>
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<td>19:30</td>
<td><strong>Conference Dinner, Solliden Restaurant</strong></td>
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<td>Bergsmannen</td>
<td>Spelbomskan</td>
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<tr>
<td><strong>Free paper session 8: Patient Safety, Quality of Care and Policy (1)</strong>, Chairs: Lena Gunningberg, Lisette Schoonhoven</td>
<td><strong>14:15 - 15:30 Student free papers session: Clinical and Applied Science, Chairs: Lenche Neloska, Marco Romanelli</strong></td>
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<tr>
<td>Home-care wound care – a EWMA document, Sebastian Probst</td>
<td>Patients and nurses experiences of using the 30 degree tilt for the prevention of pressure ulcers, Urmila Victor</td>
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<td>What Percentage of Hospital-Acquired Grade 3 and 4 Pressure Ulcers are Avoidable?, Fiona Downie</td>
<td>Evidence-based skin care at a university hospital in Germany - Andrea Lichterfeld</td>
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<tr>
<td>Do patient safety culture items affect pressure ulcer prevalence in a sample of Norwegian hospitals?, Ida Marie Bredesen</td>
<td>RNs knowledge of PU risk factors and prevention in internal medicine of a University Hospital In Iceland, Iris Gisladottir &amp; Arna Pórhunddottir</td>
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<td>Pressure Ulcers due to Stroke patients receiving Percutaneous Endoscopic Gastrostomy, Gunnel Wärn Hede</td>
<td>Role of Braden scale scoring as a prognostic tool for pressure ulcers, Kumar Madhaver</td>
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<tr>
<th>16:00 - 17:15 Student free papers session: Basic Science, Chairs: Zita Kis Dadara, Jeannie Donnelly</th>
<th>16:00 - 17:00 Workshop: Pressure Ulcer Prevention Pathways (PUPPS): Active Monitoring Model of Care Incorporating PURPOSE T’, Susanne Coleman</th>
<th>16:00 - 17:15</th>
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<tbody>
<tr>
<td>Heel Ulcers: Simulations of Injurious Tissue Loads and Remedial Local Drug Delivery, Rinat Friedman</td>
<td>Heel Ulcers: Simulations of Injurious Tissue Loads and Remedial Local Drug Delivery, Rinat Friedman</td>
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<tr>
<td>Changes in topography and structural properties of healthy aged skin after loading, Gabor Dobos</td>
<td>Changes in topography and structural properties of healthy aged skin after loading, Gabor Dobos</td>
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<tr>
<td>The quest for smart materials to protect the fragile skin: Computational modeling of how shear and microclimate influence skin that rubs against clothing, incontinence pads, diapers etc., Mor Ben-Or Frank</td>
<td>The quest for smart materials to protect the fragile skin: Computational modeling of how shear and microclimate influence skin that rubs against clothing, incontinence pads, diapers etc., Mor Ben-Or Frank</td>
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<tr>
<td>Development of biomarkers for the Wound Fluid RT-PCR method to detect critically colonised and infected wounds, Mayumi Asada</td>
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<tr>
<td>Biomechanical simulation of the Charcot neuroarthropathic foot with plantar ulcer, Antoine Perrier</td>
<td>Biomechanical simulation of the Charcot neuroarthropathic foot with plantar ulcer, Antoine Perrier</td>
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See the industry satellite symposia and workshops at page 91
**Friday 29.08.2014 PROGRAMME**

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<td>Registration, badge and bag collection - Registration area</td>
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<tr>
<td><strong>09:00-10:00</strong></td>
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<tr>
<td><strong>Key lectures, Chairs: Jane Nixon, Jeannie Donnelly</strong></td>
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<td>International initiatives and experiences, Terence Ryan</td>
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<td>Pressure ulcers: an African initiative, Katarzyna Trok</td>
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<td>Pressure ulcers in the darkly pigmented skin, Madeleine Stenius</td>
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<tr>
<td><strong>Free papers session 9: Pressure Ulcer Epidemiology, Chairs: Lisette Schoonhoven, Geert Vanwalleghem</strong></td>
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<tr>
<td>Pressure Ulcers in Iceland prevalence, seriousness and prevention, Guðbjörg Pálsdóttir</td>
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<td>The effect of a simple three-step pressure relieving strategy for preventing pressure ulcers: an explorative longitudinal study from 2002-2011, Martin van Leen</td>
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<td>10:00 - 10:45</td>
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<tr>
<td><strong>Coffee break and exhibition viewing</strong></td>
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<tr>
<td><strong>10:45 - 12:00</strong></td>
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<tr>
<td><strong>Clinical case discussions: interactive session, Chairs: Michael Clark, Marco Romanelli</strong></td>
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<td>Pressure ulcers in the amputation stump and how they can be avoided, Anton Johannesson</td>
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<td>Pressure ulcers in the paediatric population, Guido Ciprandi</td>
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<td>A multidisciplinary approach to prevention and treatment of pressure ulcers in palliative care, Lenche Neloska</td>
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<td>Successful management of a non-healing pressure ulcer for an immuno-compromised child with a bacteria binding gel dressing, Anna Sahlqvist</td>
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<td>09:00 - 10:30 Workshop: Debridement: Why - When - When not? Carolyn Wyndham - White</td>
<td>Free paper session 10: Patient Safety, Quality of Care and Policy (2), Chairs: Michael Clark, Marco Romanelli</td>
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See the industry satellite symposia and workshops at page 91
SCIENTIFIC WORKSHOPS

EPUAP WORKSHOP:
The implementation of the 2014 pressure ulcer guidelines in clinical practice

Implementation of guidelines in clinical practice requires a systematic approach. This approach should target relevant barriers and facilitators for use of the guidelines. This workshop will focus on the identification of these barriers and facilitators and the development of a matching implementation strategy.

Speaker: Lisette Schoonhoven
Date: 28 August 2014
Time: 13:15 – 14:15
Meeting room: Bergsmannen

EPUAP WORKSHOP:
Pressure Ulcer Classification: PuClas3

The new PuClas version includes an update of the classification system according to the latest 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.

Speaker: Dimitri Beeckman
Date: 28 August 2014
Time: 13:15 – 14:15
Meeting room: Spelbomskan

WORKSHOP:
Pressure Ulcer Prevention Pathways (PUPPS): Active Monitoring Model of Care Incorporating PURPOSE T'

The NIHR PURPOSE Programme of research, highlighted the limitations of pressure ulcer risk assessment practice and the standard 'assess, plan, implement and evaluate' model of care (Nixon et al. Submitted). This prompted the development of a new evidenced-based risk assessment framework - PURPOSE T and an active monitoring model of care incorporating primary and secondary Pressure Ulcer Prevention Pathways (PUPPs). The workshop will present the new Risk Assessment Framework PURPOSE T and allow delegates to practice using the tool. PUPPs will also be introduced.

Speakers: Susanne Coleman
Date: 28 August 2014
Time: 16:00 – 17:00
Meeting room: Spelbomskan

DEBRIDEMENT WORKSHOP:
Why – When – When not?

Participants will gain knowledge about wound evaluation, the goals of debridement (when and why), limits, dangers, and related measures. Attendees will be able to practice sharp debridement and learn the necessary practical skills.

Speaker: Carolyn Wyndham - White
Date: 29 August 2014
Time: 09:00 – 10:30
Meeting room: Bergsmannen
25th Conference of the European Wound Management Association

EWMA 2015
LONDON · UK
13-15 MAY 2015

WOUND CARE – SHAPING THE FUTURE
A PATIENT, PROFESSIONAL, PROVIDER AND PAYER PERSPECTIVE
20th November 2014

STOP PRESSURE ULCER DAY

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How can you get involved?
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## Oral presentations overview

(Bold = presenting author)

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Introduction

There is greater awareness that paediatric patients in critical ill neonates and infants in different care settings, such as paediatric intensive care units (PICUs) and according to different risk factors, such as medical devices, different pressure ulcer prevalence rates have been published. Pressure ulcer prevalence rates in neonates and infants vary from 11% to 61.5% [3, 4]. Risk factors for hospitalized neonates and infants include a PICU stay and mechanical ventilation support. Thus, critically ill patients of younger age are at very high risk of developing pressure ulcers [5, 6]. Therefore the aim of this study was to implement specific prevention strategies to decrease pressure ulcer risk in neonates and infants treated on a PICU.

Methods

In 2013 a longitudinal study was conducted in a Swiss PICU setting including all neonates and infants in critical life conditions admitted to a PICU which needed mechanical ventilation support. All neonates and infants where measured every 12 hours if they had (1) any mechanical ventilation support, (2) any other device which can cause pressure in the face area, and (3) if they developed a pressure ulcer (including category). The assessment was performed in all patients until PICU discharge or until death of a patient. Mechanical ventilation support devices included tracheal tubes, continuous positive airways pressure masks (with and without prongs), masks, nasal tubes and tracheostomy. After a first phase lasting 4 months, a new fixation strategy to secure tracheal tubes and underpadding any marks was implemented.

Results

In 2013 a total of 245 neonates and infants with the need for mechanical ventilation support where included in this study. In the first study phase the incidence of pressure ulcer (ind. category 1) was 44%. After implementing the specific prevention strategies with underpadding any marks and a new fixation technique to secure tracheal tubes the incidence decreased to 25.5%.

Discussion

Incidence rate for pressure ulcer development in neonates and infants in a PICU setting are high. This is in line with previous published incidence rates in these setting [5, 6]. Ventilation support devices such as CPAP or mechanical ventilation increased the risk of pressure ulcers. Neonates and infants with congenital heart defects and after cardiac surgery procedures where the patients most at risk for pressure ulcer development. With an easy to apply, but adapted to the study population, intervention the pressure ulcer incidence in the study group decreased.

Clinical relevance

The prevention of pressure ulcers in this patient group must start early to avoid any further harm to their already vulnerable skin. Therefore these children need evidence based and appropriate preventive measures to decrease their pressure ulcer risk. Underpadding, careful fixation and positioning of medical devices, especially ventilation support devices, in these highly vulnerable patients are mandatory and easy to apply to decrease the risk of pressure ulcers.

Acknowledgements

We appreciate the help of Prof Dr. Bernhard Frey and Dr. V. Cannizzaro and the PICU team at the Children’s University hospital Zurich, Switzerland.

Conflict of interest

None.

References


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A prospective cohort study of the clinical effectiveness of multi-layer soft silicone dressings in the prevention of heel pressure ulcers in trauma and critically ill patients

Nick Santamaria 1,2, Marie Gerdtz 1,2, Wei Liu 1,2, Stephanie Devincenzi 1,2, Ai Wei Ng 1,2

1 University of Melbourne, Australia, nick.santamaria@mh.org.au
2 Royal Melbourne Hospital, Australia

Introduction
Pressure ulcer prevention (PU) in critically ill patients is challenging for clinicians due to a multiplicity of physiological and environmental factors. We have previously demonstrated that the use of prophylactic soft silicone multi-layer dressing can significantly reduce the incidence of sacral and heel PUs in this group of patients [1]. The mechanisms underpinning the effectiveness of these dressings are believed to relate to their multi-layer construction modifying pressure, friction, shear forces and the management of moisture.

Methods
We conducted a 10-month prospective cohort study with a historical control cohort (n=221) from a recent ICU project [2] as a comparator. A total of 191 critically ill and trauma patients were enrolled into the study in the ED. Each patient had a soft silicone multi-layer dressing applied to each heel in ED on admission and maintained in place throughout their ICU stay. The heels were inspected daily by a member of the research team and dressings were replaced every three days or if they became dislodged. All patients were cared for on the same low air loss beds throughout their stay in ICU. The end point for the study was the incidence rate of heel pressure ulcers. Analysis was based on intention to treat and multiple demographic and physiological factors. We have hypothesised that the use of prophylactic soft silicone multi-layer dressings in preventing PUs in critically ill patients is challenging for clinicians due to a multiplicity of factors (Table 1). The intervention cohort had a longer length of stay in ICU which could be considered as a greater risk for these patients of developing a PU.

Clinical relevance
The findings of this study highlight and support our earlier work on the clinical effectiveness of multi-layer silicone dressings in preventing PUs in critically ill patients. These dressings appear to effectively reduce pressure, friction and shear forces at the heels. Patients were included when they first contacted the outpatient wound care dietician. They were all health insured by one health care insurance company Cooperation VOZG. A standard six-step procedure for performing cost studies was used to calculate the costs [4-6]. Given the skewed cost data non-parametric bootstrapping was used to test for statistical differences.

Results
172 patients were included in this study. The incidence of wound care related costs between the year before and after admission to the wound clinic resulted in a reduction of €2,621 per patient in the base case analysis. The results show that the use of multi-layer dressings was cost effective compared to standard single-layer dressings.

Discussion
In this study the reimbursement data of patients of one health insurance company and specifically only those made under the Dutch Health Insurance Act were available. Because of its observational design it is not possible to conclude on the real clinical efficacy of the intervention. Nevertheless this study is a first attempt of a cost analysis of an equipollent (outpatient) wound clinic as an innovative way of responding to the increasing number of chronic wounds in the Netherlands. The calculations show that savings in wound care are possible.

References

Clinical relevance
The emergence of outpatient wound care clinics reflects the increasing incidence and prevalence of chronic wounds as well as the costs to the health care systems. These patients represent. For the attention paid at the wound care quality is essential to establish a financially viable enterprise.

Conflict of Interest
First author AALM. None of the authors declares any conflict of interest.

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Table 1: Patient characteristics and outcomes

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<tr>
<td>Age</td>
<td>64 (11.9)</td>
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<tr>
<td>Male/Female</td>
<td>123/68</td>
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<td>MAP (mmHg)</td>
<td>89 (2.8)</td>
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<td>Temp (°C)</td>
<td>36.5 (1.9)</td>
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<tr>
<td>HR (bpm)</td>
<td>95 (24.3)</td>
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<tr>
<td>BP (mmHg)</td>
<td>129 (4.1)</td>
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<td>APACHE III</td>
<td>16.2 (4.5)</td>
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<tr>
<td>Length of stay (days)</td>
<td>12.0 (3.9)</td>
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<td>ORI</td>
<td>107 (12.0)</td>
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<td>Pressure Ulcers (%)</td>
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Copyright © 2014 by EPUAP
Higher mortality if admitted with a pressure ulcer to a nursing home – results of a cohort study

Nils A. Lahtmann

Introduction
Pressure ulcers (PUs) are chronic wounds that mostly occur in critically ill or frail patients as those usually suffer from multiple risk factors, e.g. impaired mobility or disturbed perfusion. Hospital-acquired PUs have been found to be related to increased mortality. While the prevalence of pressure ulcers on hospital admission among nursing home residents transferred to the hospital is known to be high, there is a lack of evidence regarding the prevalence on admission to a nursing home and how it does affect mortality. The aim of this study is to compare the mortality of nursing home residents with and without pressure ulcers on admission, whether or not individuals who have been admitted to a nursing home.

Methods
307 nursing home residents in 11 nursing homes in Berlin were enrolled in a cohort study. Detailed information about the methodology can be found open at Meisterberendt et al. (1). Study nurses examined individuals according to a standardized study protocol once a week for 3 months after residents’ admission to the nursing home. After that the residents was visited every 6 month for 2.5 years. Kaplan-Meier analysis and Cox Proportional Hazard will be used. For statistical significance an alpha of < 0.05 was chosen.

Results
Mean age was 83.4 (sd. 9.2) years, 69.4% were female. The median Braden Score on admission was 18.1 (sd. 3.8). The prevalence of PU on admission was 15.3% (n=47). Figure 1 shows the survival curve of the Kaplan-Meier analysis. Mean average survival in days after admission of residents without pressure ulcers was 592.6, whilst in residents with pressure ulcers it was 360.8. The log-rank Chi squared test was 147 (df=1), indicating high statistical significance. Table 1 shows the results of the Cox proportional hazard regression. Controlled for age, sex and mean Braden Score the hazard ratio was 1.8 (95 CI 1.1 – 2.4).

Discussion
The strong bivariate association between pressure ulcer prevalence on admission was still present after controlling for age, gender and Braden Score. When present on admission to a nursing home, residents with PU more than 1.6 years, which corresponds to the results of the multivariate analysis of an Hazard Ratio of 1.8.

Clinical relevance
Pressure ulcers have a high impact on mortality in nursing home residents.

Conflict of Interest
None

References
ABSTRACTS OF ORAL PRESENTATIONS

Proceedings of the 17th Annual European Pressure Ulcer Meeting
Stockholm, Sweden

A clinical evaluation of a specifically designed alternating support surface device for achieving the 30 degree tilt in older individuals at risk of pressure ulcer development

Zena Moore 1*, Urima Victor 2

1 Royal College of Surgeons in Ireland, zmoore@rcsi.ie
2 Health Service Executive, Ireland

Introduction
Pressure ulcers are a common and debilitating concern arising due to unrelieved pressure and shearing forces. Therefore, pressure ulcers are largely seen in those with activity and mobility problems. Although any one of any age could develop a pressure ulcer their condition can be sufficiently poor, pressure ulcers are more common in the older population. Indeed, it is this population that shows the greatest propensity for mobility and activity problems.

For those who cannot reposition themselves, they will require assistance in order to redistribute pressure and shear. The EPUI/NPUAP guidelines state that repositioning should be undertaken using the 30 degree tilt. However, achieving planned goals in repositioning can be challenging in a climate of reduced staffing combined with increased demand due to poor nurse/patient ratios. Advances in technology have seen a change in the type of equipment available for pressure ulcer prevention. One such advancement is a pressure redistribution alternating support surface with an additional modality which moves the patient into the 30 degree tilt position. This clinical evaluation aimed to determine the effectiveness and staff acceptance of this device specifically among older individuals at risk of pressure ulcer development.

Methods
This clinical evaluation took place in a Health Service Executive long stay nursing home setting in Ireland, from April – May 2014. Approval to undertake the evaluation was granted by the hospital’s clinical governance team. Participants were included if they were at risk of pressure ulcer development, using the activity and mobility components of the Braden scale; considered to be unable to reposition the support surface and had no medical condition that would preclude the use of the 30 degree tilt. The patient was nursed on the device and repositioned every 3 hours; follow up was for a period of 2 weeks. Daily skin assessments were undertaken by the tissue viability nurse. The primary outcome of interest was the ability of the device to maintain the individual in a 30 degree tilt. The secondary outcomes of interest were: patient comfort, patient acceptability, staff acceptability and pressure ulcer development.

Results
Twenty patients participated in the evaluation, 11 men and 9 women with a mean age 85.3 years (SD 9.9 years). Of the participants, 50% were completely immobile, whilst 50% had very limited activity;

furthermore, 30% were bedfast, whereas, 70% were chairfast. Scores for all outcomes were recorded between 1-10, with 1 being the worst score and 10 being the best. The following are the results:

1. Ability of the device to maintain the individual in a 30 degree tilt: Mean 8.5 (mode 9, SD 1.5; min 5, max 10)
2. Patient comfort: Mean 8.10 (mode 9, SD 1.4; min 5, max 10)
3. Patient acceptability: Mean 8.56 (mode 10, SD 1.4, min 5, max 10)
4. Staff acceptability: Mean 8.15 (mode 8, SD 1.3; min 5, max 10)

Other comments received included, two patients preferred their original bad, and in three patients with contractions, it was difficult to centre them in the bed. Over the evaluation period no patient developed a pressure ulcer of grade 2-4.

Discussion
Overall, the device maintained the individual in the 30 degree tilt. Furthermore, the device was comfortable for the individual and staff. Bearing in mind the importance of repositioning using the 30 degree tilt as a component of pressure ulcer prevention, this device has potential to contribute to achieving goals of care. However, for those with contractions the mattress may not be suitable due to difficulties in centering the individual in the bed.

Clinical relevance
This device positions individuals at risk of pressure ulcer development into the 30 degree tilt in a safe and acceptable manner. The indication for use of the mattress is specifically for those who are immobile and thus cannot reposition themselves independently.

Acknowledgements
The authors acknowledge the contribution of the staff and patients to this clinical evaluation.

Conflict of Interest
The repositioning devices were supplied by Medtec Medical, Ireland.

References

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Can a multi-faceted intervention affect pressure ulcer prevention?

Eva Sving1,2, Marianne Hågman1, Anna-Greta Mambirk1, Lena Gunnung1

Centre for Research & Development, Uppsala University County Council of Gävleborg, Sweden, 1Department of Public Health and Caring Sciences, Nursing, Uppsala University, Sweden, 2School of Health Technology, Uppsala University, Sweden

Introduction
Pressure ulcers cause substantial health burdens for patients [1] and has shown to be common in hospital settings [2]. Even though evidence-based guidelines are available, pressure ulcer prevention is lacking [3]. Thus far, there is insufficient knowledge concerning how to successfully implement evidence-based care [4]. The aim of the study was to evaluate whether a multi-faceted, unit-tailored intervention using evidence-based pressure ulcer prevention affects the performance of pressure ulcer prevention.

Methods
A quasi-experimental, pre- and post-test design (Fig. 1) was used at each hospital. The intervention was based on the PARHS framework [5]; a) multi-professional team supported the units, b) one-day training to the nurses, c) repeated quality measurements were conducted by a contact nurse at the unit and the team nurse, d) feedback of results the same day to first-line managers. In the pre- and post-test evaluation, an established methodology [2] was used.

Results
In total 506 patients participated, out of which 105 were at-risk patients (21 %). There were no differences between the pre- and post-test groups regarding gender, age, days at the hospital and days at the unit. Almost 100 % of the patients had pressure-reducing mattresses. Table 1 presents prevention activities for patients at risk.

Table 1: Pressure ulcer prevention for patient at risk

<table>
<thead>
<tr>
<th>Prevalence</th>
<th>Prevention activities</th>
<th>Pretest</th>
<th>Post-test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient with prevention</td>
<td>15 (29)</td>
<td>27 (41)</td>
<td>0.037</td>
<td></td>
</tr>
<tr>
<td>Number of prevention per patient</td>
<td>3 (69)</td>
<td>4 (68)</td>
<td>0.111</td>
<td></td>
</tr>
</tbody>
</table>

Acknowledgements
We appreciate the help of financial support from the Centre for Research & Development, Uppsala University County Council of Gävleborg and Uppsala- Örebro Regional Research Council in Sweden.

Conflict of interest
None

References
[4] Røling I et al., Czachura Database. 15. CDB2212.

Conflict of interest

The co-authors serve as volunteers, paid personnel, and/or consultants under the terms of contractual agreements with CALNOC. Dr. Donaldson is currently a member of the CALNOC Board of Directors.

Clinical Unit Microsystem Pressure Ulcer Prediction and Prevention

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Introduction
In an effort to understand how characteristics of the clinical microsystem impact hospital acquired pressure ulcer (HAPU) prevention, this study modeled the predictive strength of unit/physician characteristics, nurse workload, nurse expertise, and HAPU preventive clinical processes of care on unit level prevalence of hospital acquired pressure ulcers (HAPUs).

Methods
The investigation used a prospective cross-sectional design. Standardized pressure ulcer prevalence data were submitted in 2009-10 by 789 medical-surgical units drawn from 215 hospitals participating in the Collaborative Alliance for Nursing Outcomes (CALNOC) nursing quality benchmarking registry [1]. Using unit-level data, HAPUs were modeled using Poisson regression with zero-inflation (due to low prevalence of HAPUs) with significant covariates as predictors. Clarke and Donaldson’s conceptual model [2] (2008) was used to guide this study [2].

Results
In a sample with <3% HAPUs, fewer HAPUs were predicted by a combination of unit/physician characteristics (shorter length of stay, fewer patients at-risk, fewer male patients), RN workload (more hours of care, greater patient (bed) turnover), RN expertise (more years of experience, fewer contact staff hours), and clinical processes (more risk assessment completed).

Discussion
Unit/physician characteristics were potent HAPU predictors, yet generally are not modifiable. RN workload, nurse expertise, and processes of care (risk assessment/interventions) are significant predictors that can be modified to reduce HAPU. Further research is indicated to test these findings in a population with higher HAPU prevalence.

Clinical relevance
Understanding how characteristics of clinical unit microsystems vary within and between units and how these differences may impact crucial processes of care and resulting HAPU development is key to elimination of HAPU.

Acknowledgements
This study was funded, in part, by grants from the Gordon and Betty Moore Foundation, Betty Irene Moore Nursing Initiative and the Robert Wood Johnson Foundation, Interdisciplinary Nursing Quality Research Initiative. The contribution of Mary Foley PhD, RN, FAAN, CALNOC INQUIRY Study Coordinator, is gratefully acknowledged.

References
Can real-time feedback of interface pressure optimise adequate repositioning in bed?

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2 Uppsala University Hospital, Sweden.

Introduction
The use of pressure-reducing mattresses and the timely repositioning of patients is the most effective intervention for preventing pressure ulcers. However, knowledge of this is inadequate among many nurses in hospital settings. An innovative pressure-sensing mattress overlay attached to a monitor (MAP™) claims to provide real-time feedback for nurses and patients about which parts of the body are most exposed to potentially damaging pressure. The aim of this study was to investigate how well registered nurses (RN) and assistant nurses (AN) position bed-ridden patients with regard to pressure ulcer reduction and if the MAP™ could provide staff with a pedagogic tool to optimise repositioning and thereby contribute to the link between theoretical knowledge and practice.

Methods
A quantitative study was performed using a descriptive, comparative design. Both RN (N=19) and AN (N=33) were recruited to the study. Two volunteers, over the age of 70 and with normal body mass index, played the role of patients. The pressure-sensing overlays were placed on Optimel 5 zone mattresses which was covered with a sheet. RN and AN worked in pairs and were instructed to place the “patient” in the best pressure-reducing position, first without watching the monitor and then again after feedback. The patients were instructed to be passive while the nurses laid them in both the supine and lateral positions, giving 4 positions per pair.

Discussion
The resulting mean peak pressures varied considerably between pairs but remained after feedback. We observed that feedback was generated through discussion and reasoning about how best to reposition the “patient” and the nurse then worked together, diverging from their normal routines and testing other ways to reduce pressure. The nurses reported an increased awareness of the importance of small adjustments in positioning for improving pressure reduction. The “patients” reported their comfort as good in all positions but even better after feedback.

Clinical relevance
Real-time feedback of pressure points could be a useful educational tool for both nursing staff and nursing students.

Acknowledgements
We appreciate the help of Kristen Thrum, PT, CWS, Walliance, USA for the loan of MAP™

Conflict of Interest
None

References

Table 1: Peak pressure, number of interventions and comfort

<table>
<thead>
<tr>
<th>N</th>
<th>Peak pressure (KPa)</th>
<th>Number of interventions</th>
<th>Comfort</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN</td>
<td>2.61</td>
<td>2.61</td>
<td>2.61</td>
</tr>
<tr>
<td>AN</td>
<td>2.61</td>
<td>2.61</td>
<td>2.61</td>
</tr>
</tbody>
</table>

Fig. 1: Monitor of the MAP™

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Buttock pressure management of able-bodied people seated on a rigid surface for two hours

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5) AGIM, France

Introduction

It is now well known that deep pressure ulcers are due to excessive pressure intensity (leading to soft tissues internal strains above 50 % for some minutes) and prolonged compression (leading to internal strains above 20 % for about two hours) [1]. Paraplegic people particularly suffers from pressure ulcers in the buttock area because of the immobility of their leg muscles that make them a lot thinner and fragile [2] and because of the sensory dysfunctions that unable them to perceive warning signals thus keeping a risky situation by not moving enough. This paper aims at better understanding why able-bodied individuals put in quite extreme conditions (a seated for 2 hours long on a rigid surface) do not get pressure ulcers.

Methods

Thirty young healthy subjects agreed to stay seated on a rigid surface during two hours while watching a movie. The buttocks/seat interface pressures were recorded at 10 Hz by a Vista Medical pressure mapping system (Orthotide). Subjects were asked to move (e.g. change their postures, release high pressures... ) only if necessary. The study was conducted by the CIC-T and CIC at the Grenoble University Hospital and was approved by an ethics committee (CPP Sud-Est).

Results

The first results focus on the global bi-dimensional Pressure Time curves. Figure 1 shows, for different levels of pressure, the maximum durations they were held.

Fig. 1: For a given level of pressure (x-axis), the curve indicates the longest time one region of the buttock maintained that pressure (y-axis). Black (resp. blue, cyan, orange, red) plot is the median (resp. min, 5th quartile, 95th quartile, max) of data computed for the whole 30 subjects.

Discussion

The experiment presented here aimed at observing the behaviors of young able-bodied subjects seated on a rigid surface for a duration of 2 hours, theoretically sufficient to cause pressure ulcers [1].

Figure 1 shows a very thin interquartile range, indicating that most of the subjects seem to have similar tissue tolerance. To compare this result with the thresholds found by Loerakker et al. [1], internal stresses and strains should be used instead of external pressures. Such a computation of internal stress and strain from external pressure is possible [3] but needs the elaboration of a person-specific biomechanical model based on medical imaging exams.

Clinical relevance

This study aims at understanding the prevention strategies of able-bodied people and estimating the dangerous thresholds of Pressure among Time.

Acknowledgements

We appreciate the help of the staff of the CIC, the CIC-T, and we would like to thank the volunteers.

Conflicts of Interest

Some authors are involved with the TexiSense Company (http://www.texitense.com/home_en).

References


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Evaluating the Sensitivity of Actimetry to detect Postural Changes in Seated Individuals

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Introduction

Changes in posture and mobility are two key strategies in the prevention of pressure ulcers (PUs). Objectively measuring movement is therefore an important factor to identify individuals at risk of PUs. The evolution of accelerometry has now created technology that can monitor movement over prolonged periods (in excess of 10 hours) and data can be collected remotely [1]. Indeed, an initial study has been performed on patients at risk of developing pressure ulcers as part of a risk assessment [2]. However, there is need to assess the accuracy and sensitivity of these accelerometers to measure movements in individuals in lying and seated postures. Accordingly, a study was designed to classify postural changes in a leisure chair using accelerometers.

Table 1 describes the change in trunk angle related to optimal posture measured using the accelerometer. The largest deviation from optimal for the sagittal (A-P) trunk angle was slump (-25.1°) and for frontal (M-L) trunk angle was right lean (-23.1°).

<table>
<thead>
<tr>
<th>Postural Change</th>
<th>Angle (°)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slump</td>
<td>-25.1</td>
</tr>
<tr>
<td>Right Lean</td>
<td>-23.1</td>
</tr>
</tbody>
</table>

Discussion

Present findings suggest that accelerometry can be used to distinguish movement between seated postures in a leisure chair with accuracy of between 67-71%. These values need to be increased to justify the time and expense needed to implement the systems in a clinical environment. However, the use of accelerometers to objectively monitor seated patients at risk of pressure ulcers remains a potentially valuable tool with further research and validation.

Clinical relevance

Accelerometers have the potential to monitor patients at risk of pressure ulcers. This study has provided preliminary data regarding the accuracy of the device to monitor the seated individual.

Acknowledgements

Thanks to ACCORA for supplying the leisure chair.

Conflict of Interest - none

References

Does the calcaneus morphology have an influence on the risk of posterior heel ulcer?

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2 Textisense, France, 3 IDE, France, 4 UJF-Grenoble1/ISIM1/Institut Universitaire de France, France

Introduction
Pressure ulcers (PU) affect almost half of the patients in reanimation or geriatric units. Forty percent of these PU are posterior heel ulcers. The main suspected causes are the excessive pressure intensity (leading to internal strains above 50% for about 10 minutes) and prolonged compression (leading to internal strains above 20% for about two hours) [1]. Prevention through daily examination lacks intensity because of the nature of these deep tissue injuries resulting from internal strains. When visual symptoms appear they are often too late for PU prevention. It is consequently crucial to monitor the internal strains. But is there a difference in terms of strain from a patient to another because of the difference in their calcaneus shape?

Methods
To answer to this question, a lower leg Finite Element (FE) model was elaborated based on a previous foot model [2]. This new model represents the soft tissues of the lower leg as four different sub-domains each modelled using a Neo-Hookean material with Young moduli and Poisson ratios of 200 kPa and 0.495 for the skin, 30 kPa and 0.49 for the fat, 1 GPa and 0.495 for the Achilles tendon, and 60 kPa and 0.49 for the muscles [3]. Fig. 1. Bones are modeled as rigid solids, and different shapes of calcanei are simulated. The FE model rests on a FE model of a cushion with three compartments of varying stiffnesses: under the calf, the Achilles tendon, and behind the heel.

Discussion
The influence of the calcaneus’ morphology is clearly demonstrated by the cluster volumes with deviations of 23.8% and 16.9% in the simulations with stiffer stiff cushions below the heel of the 18 models. The same morphology was used for those models in the proximal section which explains the low deviation (0 and 3.2%) below the calf. Additionally, this lower leg FE model could be used to identify the cushions’ stiffness minimizing the ulceration risk for each individual over time: a very stiff cushion below the heel leads to a cluster volume of 0.02 cm³ that could create a PU in less than 10 minutes, while a softer cushion avoids creating any cluster with internal strains over 50%. In that case, the risk of PU creation is around two hours [1]. Moreover, the largest cluster can be located with the simulations: it is at the interface between the calcaneus and the fat layer when the cushion is stiffer under the heel, Fig. 1, therefore increasing the risk of PU when maintained for a long time.

Clinical relevance
This study quantitatively proves that the calcaneus shape has a strong impact on the risk of PU creation.

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

References

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Pressure ulcer prevalence and prevention practices – a comparison between formal risk assessment and assessment using clinical judgement alone

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Introduction
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. Within many health-care settings, PU risk assessment is an integral component of PU prevention policy. Conversely, in other settings, formal risk assessment is not conducted, indeed, many clinical staff are unaware of risk assessment tools currently available. This disparity provides the opportunity to explore whether there are differences in how patients are risk assessed, either formally or informally, and how this impacts on the provision of prevention strategies and subsequent PU prevalence and incidence rates. An example of two such health-care settings are Norway (limited use of formal structured risk assessment) and the Republic of Ireland (routine use of formal structured risk assessment). Therefore, these two countries were chosen as the sites for research exploring the use and impact of formal structured PU risk assessment.

Methods
This study explored whether the risk assessment method (structured versus clinical judgment) influences pressure ulcer prevalence or prevention strategies. A cross section survey design was employed, with a use of a pre-designed data collection instrument. Following ethical approval and consent, data were gathered from 150 patients in 2 acute care settings, 59 in Norway (clinical judgment) and 121 in Ireland (structured risk assessment). Data collected were analysed using SPSS. Data were at nominal and ordinal level therefore, in the main, simple descriptive statistics were conducted, outlining the demographic profile of the participants, risk status, pressure ulcer prevalence and prevention strategies employed. Inferential statistics were employed only as appropriate. Pressure ulcers were graded according to the EPUAP pressure ulcer grading system, and all grades 1-4 were included. Pressure ulcer prevalence was calculated as the number of persons with a pressure ulcer divided by the number of persons assessed.

Results
49% of patients were male, 50% female with the majority (46%) aged 70-99 years of age. Prevalence was 54% (Norway) and 11% (Ireland). In Norway, the majority of pressure ulcers (89%) were grade 1, whereas in Ireland the majority (50%) was grade 2. Only 8% of patients in Norway were risk assessed on admission compared with 89% in Ireland. Norway had no dynamic mattresses in use, whereas in Ireland (44%) for high risk individuals. Four pressure redistribution cushions were in use in Norway and eleven in Ireland. Of these, all risk of pressure ulcer development, 15% in Norway and 56% in Ireland had a documented repositioning care plan for when in bed, and 0% in Norway and 13% in Ireland for when seated on a chair.

Discussion
There were inconsistencies in approach to pressure ulcer risk assessment and prevention across the 2 clinical settings. Prevalence rates differed however, mainly relating to grade 1 pressure ulcer damage. Even though formal risk assessment is well established in Norway, it is not necessarily followed up with appropriate pressure ulcer prevention. Thus, the method of risk assessment does not seem to influence subsequent care planning, questioning the role of formal risk assessment; however, despite this risk assessment does put a focus on an important clinical problem.

Clinical relevance
Whether risk assessment is undertaken using a formal risk assessment tool, or using clinical judgment alone, does not seem to influence the subsequent care provided to patient for pressure ulcer prevention, neither does it seem to influence pressure ulcer prevalence. It is evident from this study that risk assessment practice need to be revisited to ensure that it is providing meaningful information for practice and patient care.

Acknowledgements
This work is partly funded by a research grant from the Norwegian Nurses Organisation (NNO) (Norak Sykepleierforbund NNO) in 2012. The authors have no conflict of interest to declare.

Conflicts of interest
The authors have no conflicts of interest to declare.

References

Improving the risk assessment of pressure ulcer by nurses for elderly with psychiatric disorder a pilot project

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Centre Hospitalier Universitaire Vaudois, Switzerland, florence.bassin@chu-va.ch

Introduction
In 2013, the annual prevalence of pressure ulcer in the Department of Psychiatry at the advanced age University Hospital in Lausanne was at 23.3% (n=17), 50% of participants did not benefit from systematic preventive measures as established in the program created by the expert pressure ulcer prevention group called in French “Objectif Zéro Escarre” (OZE). The healthcare team has difficulties to establish the risk assessment by using the Braden scale and assess the skin. Manager care has requested the intervention of OZE to support the implementation of best practice and to establish specific recommendations for elderly patients with psychiatric disorders.

Methods
A participatory consultation approach was used to explore the problematic, a focus group was performed (1). The tool used for the animation of the focus group was “Mindmapping” (2). Two nurses assistants and four registered nurses participated. A clinical nurse specialist (CNS) of OZE guided the interaction. Two questions were identified:

1. What is the patient profile identified at risk of pressure ulcer in psychiatry advanced age?
2. What are your main facilities and difficulties in the risk assessment and the implementation of preventive measures?

All participants identified three key words, classified by themes. At the end of the focus group, a photography of each mind mapping was taken. The CNS compared the result of the literature. The CNS have presented the analysis to the focus group and approved the validity of that analysis. Finally, the CNS has proposed some recommendations to improve risk assessment and prevention plan for PU.

Results
The results of the first question of focus group identified the same answers than the physiopathology process of pressure ulcer and the risk factors.

Discussion
The risk factor of PU in psychiatry advanced age is similar as the literature but the impact of the psychological disorder is not described. The Braden scale need to be used to support the clinical judgment and integrated the psychological dimension in the risk assessment (3,4). Strategies for skin evaluation could be tested through different situations of care like patient empowerment and nursing therapeutics. The healthcare team needs some training on risk assessment, preventive interventions and planning continuity of care. Further research need to be made to explore the impact of psychological disorder and risk of PU.

Clinical relevance
The purpose of this project is to improve the risk assessment and established pressure ulcer prevention to elderly person with psychological disorders.

Acknowledgements
We appreciate the help of direction of care of CHUV and nurses who participated at the focus group.

References
Is pain a predictor of Category 2 pressure ulcers? Analysis of skin site level data from the PURPOSE Pain Cohort Study

Isabelle Smith, Sarah Brown, Elizabeth McGinnis, Nikki Stubbs, Jane Nixon

Introduction
Pain is an important symptom which aids the diagnosis of many conditions. A systematic review of health-related quality of life in patients with pressure ulcers (PU) identified that patients' reports of localized skin pain associated with early PU development were 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. Whilst the primary analysis was presented at EPUAP 2013, this abstract presents the skin site level analysis compared with patient level analyses and illustrates why both methods should be considered.

Methods
We conducted a prospective cohort study with 30 days follow-up, in 26 acute and community NHS Trusts involving patients at high-risk of PU development. High-risk was defined operationally as having one or more of the following characteristics: Braden bedfast/ill-defined AND completely immobile/limited mobility; localized skin pain on any pressure area skin site; Category 1 PU on any pressure area skin site. There were 13 pre-defined skin sites assessed for each patient, including the buttocks, sacrum and heels (Figure 1).

Figure 1 Skin site level data structure

We used full stepwise variable selection and a multilevel logistic regression model to assess whether pain is a risk factor for developing a Category 2 PU at the same skin site after adjusting for between patient variation.

Results
There were 602 patients with a combined total of 7,880 potential skin sites assessed, of these 463 (58.2%) were evaluable in the analysis (i.e. all skin sites observed as being healthy, altered or category 1 at baseline with at least one follow up assessment). Overall 223 (39.0%) evaluable skin sites developed a category 2 PU, and the incidence was higher for skin sites with pain at baseline at 10.3% compared to skin sites with no pain at baseline at 1.7%. The final multilevel logistic regression model on the development of a category 2 PU at a skin site level included two variables: skin Status which consisted of two levels: skin alterations (OR 4.65, 95% CI (3.01, 7.18), p<0.001) and category 1 PU (OR 17.30, 95% CI (7.72, 77.20), p<0.001) and the presence of pain on a healthy, altered or category 1 skin site (OR 2.25, 95% CI (1.36, 3.92), p<0.001).

Discussion
This is the first risk factor study to explore the relationship between localized skin pain on a pressure area skin site and category 2 PU development on the same skin site. Replication studies are required, and skin site level analyses should be considered in addition to patient level analyses.

Clinical relevance
The assessment and response to pain on PU free skin sites may be an important part of PU prevention and should be a clinical priority.

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-0607-10056). The views expressed in this presentation are those of the authors and not necessarily those of the NIHR, the Department of Health.

Conflict of Interest
None Declared

References


date

Early stage pressure prevention and intervention for patients undergoing fast-track surgery

Birgitte Brask Skovgaard, Henriette Djuhrus AppelØ

Introduction
National prevalence studies show that patients are in high risk of developing pressure ulcers during their inhospital stay resulting in serious complications in terms of lost/hospitalized quality of life, prolonged bed stay, risks of infections, need for subsequent nursing and medical treatment, increased mortality and economical burden [1, 2]. Having enrolled a Quality Improvement and Patient Safety Program, Elective Surgery Centre, Silkeborg Regional Hospital, decided to focus on early stage pressure ulcer prevention and intervention.

Objectives:
Identifying early stage pressure ulcer prevention and intervention for patients undergoing Fast-track surgery in order to reduce in-hospital stay pressure ulcer.

Methods
We carried out a retrospective study of 44 patients. All subjects were identified in Safety Cross Calendar in the period of December 2012 to August 2013.

The main question behind the study was: Where and how did the damage of pressure ulcers occur within the individual patient pathway? Clinical measurement criteria where: Diagnoses, Body Mass Index (BMI), category of pressure ulcer (3), temperature under surgery <36, individualized risk factor, what was the pressure ulcer placed on the body and what was documented as reason for the pressure ulcer damage. Additional measurement criteria as to on-going nursing intervention where: Which nursing treatment was used; was the ulcer minimized; was the condition of the patient followed up and monitored after hospital discharge?

Results
44 patients had 54 pressure ulcers in category I and II [3]. There were two pivotal findings with clinical relevance:
1. Out of 16 patients who underwent Open Reduction Internal Fixation (ORIF) of Hip Fracture had pressure ulcers on heels and as acon. All subjects had a BMI < 25, before surgery. 5 patients had intense pain providing optimal repositioning.
2. 10 out of 10 patients who underwent Lumbar Spinal Fusion Surgery had post operative pressure ulcers in the forehead. 8 out of 10 patients with BMIs > 25 were positioned in Wilson frame and the surgery time lasted more than two hours.

Conclusion
It is feasible to reduce pressure ulcers on heels and on suram by training the clinical staff by systematic use of easy slide in order to ensure easy and careful repositioning. Findin reducing tools as well as accurate use of the hospital beds function may also help preventing friction in connection with transferring the immobilized patient. Communication of pressure ulcer development, risk assessment, skin inspection results and treatments should be consistent.

More Spine Fusion research of the link between BMIs > 25 and development of pressure ulcers in the forehead (category I and II) is needed to identify early pressure ulcer prevention and intervention. As for now, our patient safety strategy to reduce pressure ulcers in the forehead is: Move patient’s head every hour to the extent possible, change patient’s head position by lifting operating table a few degree when it is (in the Trendelenburg).

Clinical relevance
Persistent focus on auditing, quality assurance and development promotes partnership working between the Multi-disciplinary Team and Senior wards, in order to facilitate safe effective, well documented, timely patient care.

Acknowledgements
We appreciate the help of the staff in our 3 wards (K1, K2 and Patient Home) that made audits possible by recording on Safety Cross Calendar every day all year round.

We also appreciate the help from Herbo Foundation who have made it possibile to submit this abstract.

Conflict of Interest
None

References

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Introduction

Alternating Pressure Mattresses (APM) and High Specification Foam (HSF) mattresses are used routinely in clinical practice, however APMs are considered, by some, to be the superior mattress despite the lack of high level evidence to support their use in the prevention of pressure ulcers (PUs) in high risk patient populations [1].

PRESSURE 2 is a multicentre, randomised, double triangular group sequential, parallel group trial involving up to 6544 patients, comparing HSF and APM in high risk acute [LL] patients for the prevention of new PUs. The primary endpoint is time to developing a new Category 2 or above PU from randomisation to 30 days post treatment phase (maximum 90 days).

Whilst the overall trial was presented at EPUAP 2013, this abstract presents methodological considerations on the design and the decision making process at the interim analyses.

Methods

Whilst the group sequential trial design increases the maximum sample size required compared to a conventional fixed sample size design, it provides an efficient design as the stopping rules allow for early stopping by demonstrating effectiveness of either mattress or fullness of the trial. The use of an early primary endpoint allows information to assess early stopping to be available in a timely fashion.

Considerations in the design of the group sequential trial included the criteria for early stopping and the number and spacing of planned interim analyses.

Statistical stopping boundaries provide guidance to the Independent Data Monitoring Committee on stopping the trial early, however further considerations include the safety profile of each intervention, the economic evaluation and also the availability of information external to the trial.

Results

Two interim analyses are planned at coherent cut points. The first interim analysis is to be conducted when after 300 patients have developed a Category 2 or above PU, corresponding to the minimum number of events required for the economic evaluation. The second interim analysis, after 445 patients have developed a Category 2 or above PU, corresponds to the number of expected events required to stop the trial early for futility.

Discussion

The design and decision making process at the interim analyses allows for at the available clinical, economic and safety data as well as information external to the trial to be considered in the decision on whether to stop the trial early and thereby inform future clinical practice.

Clinical relevance

The design maximises the potential for evidence to be available to guide clinical practice earlier than in a conventional trial design.

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


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The Effect of a Bacteria and Fungi Binding Mesh Dressing on the Bacterial Load of Pressure Ulcers Treated with Negative Pressure Wound Therapy (NPWT), A Pilot Study

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Introduction

A pressure ulcer (PU) is a localised injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear forces and/or friction. Studies developed by the SIC (Statistical Organization on Italian Healthcare) established that approximately two million people suffer from pressure sores and this number may increase as the aging population increases. Prevention is certainly the best approach in PU management: however, once these chronic wounds are present they represent an increased burden for patients and healthcare systems. Thus, it is essential to find cost-effective ways to manage the most severe categories of PU.

Chronic wounds are colonised by a polymicrobial flora. The role of bacteria in wounds depends on their concentration, species composition, and host response. Low concentrations of microbes are considered normal and are not believed to inhibit healing, however, critical colonisation and infection are associated with a significant delay in wound healing.

The clinical benefits of Negative Pressure Wound Therapy (NPWT) are now well recognised. NPWT has become a common method used for treating wounds of different aetologies. Over the past ten years, published articles studying the role of NPWT on the bioburden of chronic wounds have provided contradictory results [2-4].

It is understood that the wound filler may influence the effects of NPWT on wound healing. Foam and gauze are the most frequently used wound fillers for NPWT. Glass and Nanchoel[6] published the results of a literature review on NPWT. They concluded from the available evidence that foam and gauze transmit Negative Pressure efficiently, that there is no clear evidence to favour either dressing, or that there is insufficient evidence to credit NPWT with reduced bacterial wound colonisation. All studies published to date, which report the effect of NPWT on wound microbiology, have been conducted using non-antimicrobial wound filler materials.

Methods: An observational non-comparative single centre study conducted on patients presenting with Pressure Ulcers Category III IV and receiving homecare, who were considered suitable for the centre’s standard treatment with NPWT. No patient showed signs of local wound or systemic infection in the seven days before inclusion in the study, nor received local or systemic antibiotics. Each patient was observed for seven days and received NPWT at -80mm Hg pressure with the BFBB dressing as Wound Contact Layer (WCL). Wound biopsies were performed at Day 0 (B0) at enrolment) before the application of NPWT, then after 48 hours (B1) and then at the end of the seven day observation period (B7). Samples of the BFBB dressing were examined for the bacterial load at 48 hours (D0) and at seven days (D7) respectively. The primary endpoint was the change in the bacterial load of the wounds. The bacterial load was quantified in colony forming units (CFU/ml) and the species recorded.

Results

50 patients in total were enrolled with no withdrawals. No device related adverse events were reported. One patient died of multiple comorbidities, 43 (86%) of the pressure ulcers were on the sacrum. At B0 (enrolment) those groups of wounds were identified by degree of bacterial colonisation. Group A (26%) with negative biopsy results and (19%) with bacterial loads from 10⁴ to 5 x 10⁵ CFU/ml, Group B (18%) 10⁶–10⁷ CFU/ml and Group C with ≥10⁷ CFU/ml. The analysis of variance (ANOVA) did not show any significant difference in bacterial load for Group A over the study period. Statistically significant differences were present for Group B at B1 and B7 (p<0.0001) and for Group C at B1 and B7 (p<0.0001). There was no significant difference found between the bacterial loads of the dressing samples at D1 and D7 (p=0.823).

The most prevalent organisms isolated at B0 were P. aeruginosa (30%), E. coli (26%), S. aureus (13%) and Proteus spp (10%).

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Numerical Study of different Types of Supporting Structures regarding the Prevention of Deep Tissue Injuries

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Introduction

Measurements of the pressure distribution are an indicator for the risk of pressure ulcers. But a comprehensive assessment especially for deep tissue injuries is only possible in combination with information about the internal stress and strain state [1]. An enhancement of experimental studies is possible by the application of the finite element method (FEM) [2, 3]. Thereby the benefits of supporting structures with respect to the mechanical loading can be investigated and evaluated by non-measurable quantities in a much more detailed way. Additionally the simulation has the advantage, that the loading due to patient is reproducible. Consequently the differences in the results are only related to the design and the properties of the supporting structures enabling finally a more precise comparison.

Methods

In the carried out project two different designs of bed systems have been investigated (a foam mattress and a continuous low pressure air mattress with additional kinematical features). The loading was presented by the human body model CASMIR [4]. The comparison of both systems was carried out with two typical bed adjustments:
- Flat and
- Inclination of headrest about 30°

For both mattress types a detailed FE model is generated based on design data.

Results

For each step the pressure distribution (normal and shear) at the surface of the mattress and the internal tissue state in the area of the sacrum are evaluated.

Discussion

The assessment of the risk for deep tissue injuries only by the pressure distribution is limited as the internal tissue state is not considered.

Conflict of Interest

There was no conflicts of interest.

References


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Introduction
Deep tissue injuries (DTI) have a dangerous potential for rapid deterioration. Muscle necrosis releases the heme-containing protein myoglobin [1], which can cause toxic levels of oxidative stress, unless the myoglobin is packaged intracellularly within a specialized antioxidant environment [2]. Extracellular myoglobin is known to cause cell death when concentrated, for example in kidney tissue during clearance from circulation after muscle injury. Not yet studied is the potential for extracellular myoglobin to damage muscle tissue during DTI. This question is particularly relevant for a context of mechanical deformation, firstly, because myoglobin could accumulate extracellularly due to myoblast rupture or pressure-induced plasma membrane permeability [3], and secondly, because oxidative stress causes membrane peroxidation [4] and facilitates the mechanical rupture of membranes [5]. In this work we use computational modeling to simulate a potential role for extracellular myoglobin in inducing oxidative stress, loss of membrane integrity, and extracellular release of additional myoglobin. Our theoretical results illustrate a catastrophic feedback loop of self-propagating death in muscle cells, due to the combined action of oxidation and deformation.

Methods
A computational model of muscle injury dynamics simulated biochemical factors and cell state over time. Fig. 1 depicts the injurious effects included in the model. In addition, for each injurious effect, the model had a homeostatic counter-effect (not shown) such as antioxidants to resolve oxidative stress. Because quantitative measurements are currently not available (and sometimes not feasible with present technology) for many of the phenomena in question, we developed a dimensionless qualitative model as a first step in this research. The purpose of qualitative modeling is at this stage, to explore which parameters can influence development of recovery and self-propagation of cell and tissue damage.

Results
After deformation was applied to the muscle tissue, time-course simulations showed a variable time of latency, with gradual accumulation of non-lethal cell stress, followed by an `explosive’ increase in cell death. When the simulation was repeated with stronger homeostatic counter-effects and faster recovery processes, the system converged to a viable steady-state with low levels of cell death maintained over arbitrary long durations of deformation. The outcomes of the simulations were particularly sensitive to the rate of membrane repair.

Discussion
Computational modeling considered a small number of influences on DTI, as the previous literature had focused mostly on the biomechanics of tissue stretch, and loss on the interplay with impaired cellular function. Future work should consider ischemia can lower pH, which augments the toxicity of extracellular myoglobin [6], repertition can produce peroxides [7], which accelerate myoglobin production of superoxide [8], and infection can introduce LPS (endotoxin), which may exacerbate globin toxicity [9].

Clinical relevance
If oxidative mechanisms are driving muscle tissue injury during DTI, then treatment might be improved by developing dressings that release antioxidants locally. Laboratory testing complemented by additional modeling work will be our next step in this regard.

Conflicts of Interest: None.

References

The Role of Mathematics in Ulcer Development and Wound Healing
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Introduction
Wound development and wound healing are important medical problems and intimately related biological processes. Much of today’s understanding of these processes is based on experimental observations in clinical and in vitro settings. However, in order to gain better understanding of the biological mechanisms and of the interplay between the various factors and variables which are involved in wound development and healing, it is crucially important to convert biological hypotheses into quantifiable relations and data. The quantitative relations often arise in terms of mathematical equations (partial differential equations) or stochastic (random) processes. The combination of all the quantifiable relations defines the mathematical problem to be solved or analyzed by the use of rigorous mathematical techniques. (The representation of the solution to the mathematical problem defines the mathematical model. These models allow to simulate, and hence to visualize, key biological processes, the self-propagation of cell death during DTI, then treatment might be improved by developing dressings that release antioxidants locally. Laboratory testing complemented by additional modeling work will be our next step in this regard.

Biological Modeling

1. Biological Hypotheses
2. Quantification
3. Mathematical Model and Simulations
4. Validation

Experimental Results

Fig. 1: The feedback loop between mathematical modeling, experimental results and hypothesis building.

Methods
The methods that we present are based on mathematical principles such as stochastic processes and partial differential equations, which arise from conservation principles. A class of models that we will consider is cell-based, where cell division, death and differentiation are treated as random processes to model angiogenesis (vascularization), wound healing and contraction. Next to the cell-based models, finite element methods are used to solve the resulting equations for mechanical strains and stresses in the models for pressure ulcer development. A mathematical model for ulcer development is constructed where micromechanical factors are taken into account as well.

Results
We will present some movies visualizing development and healing of wounds which have been constructed using the various modeling principles, where cell-based models show migration and deformation of individual cells in conjunction with wound healing, contraction and the function of the immune system. Further, various finite results of simulations are shown for the development of pressure ulcers. The models also permit to quantify the sensitivity of the simulation results with respect to input data.

Discussion
All the modeling is based on biological hypotheses and mathematical solutions of the mathematical problems. Therefore errors may arise as a result of the over-simplification of reality and of so-called truncation errors of mathematical solution methods that arise from the use of a finite resolution. The biological mechanisms are complicated, e.g. as a result of the interaction between various cell types, biochemicals and the mechanical environment. However an adequate mathematical model should pick the most important key-relations that determine the kinetics. This complexity will also be illustrated in the presentation.

Clinical relevance
The work can be used to visualize and quantify biological mechanisms underlying clinically relevant processes which are related to development of pressure ulcers and wound healing. Further, hypothesis quantification and validation may lead to increased understanding and to improved treatment.

Conflict of Interest

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ABSTRACTS OF ORAL PRESENTATIONS

A novel MR compatible indentation setup to study the etiology of pressure ulcers and related deep tissue injury

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Introduction

The aim of the study was to design, build and test a new Magnetic Resonance (MR) compatible indenter for research on the etiology of pressure ulcer related deep tissue injury in the tibialis anterior (TA) skeletal muscle in a Sprague-Dawley (SD) rat model. The indentation setup was built as technical improvement of the previously used setup [12].

Methods

The indentation device, shown in Fig. 1A, consists of a holder with a rotatable top, on which the indenter can be moved to allow flexible positioning. When fixed, a 7-week-old SD rat (152-220 gram, m:101) was used. The rat was placed in the MR compatible indentation setup. Indentation of the TA muscle, for a period of 2 hours, took place inside the MR scanner (Fig 1B). In vivo MRI: Skeletal muscle injury and physiological changes were assessed with T2 mapping, and angiography protocols. All measurements were performed pre, during and up to 2 hours after indentation.

Results

In Fig. 2 T2 maps pre, during and after indentation of the TA muscle are shown. Increased values compared to pre and during indentation were observed in the T2 map after 1 hour of indentation. The T2 enhancement seems highly structured.

Clinical relevance

(Pre) clinical scientists interested in pressure ulcer research, skeletal muscle damage and muscle/bone MR.

Acknowledgements

This research was supported by the Dutch Technology Foundation STW, the Applied Science Division of NWO, and the Technology Program of the Ministry of Economic Affairs.

References


Discrimination between diabetic patients with and without diabetic foot ulcer based on testing the cutaneous microcirculation in response to low pressure

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Introduction

Predicting the occurrence of diabetic foot ulcer (DFU) is still limited. It is important to validate a new test that would help in preventing and/or limiting cutaneous lesions highly disabling for patients. Our team is behind the discovery of the Pressure-Induced Vasodilation first observed in healthy subjects after topical application of a gradual pressure on the skin leading to cutaneous vasodilatation at the application of pressure. This gain in blood flow delays the onset of ischemia. Over the past five years we have shown that in pathological conditions (eg diabetes), PV was absent and could not protect anymore the skin in response to external pressure in humans but also in rodents. Moreover the combination of peripheral vascular and nerve alteration makes a diabetic patient particularly susceptible to foot ulceration.

The objective of the study was to demonstrate the impact of neuropathy on the cutaneous microcirculation under low pressure in T2D patients with DFU and without DFU.

Methods

The study protocol was approved by the hospital’s medical ethics committee and written consent was obtained from all participants after detailed information was given. The study was performed in T2D patients (50-70 year-old) with DFU (26 patients) and without (26 patients) taking into account the neuropathy score and taking into account lidocain effect. Lidocain, a local anesthetic will inhibit cutaneous nerve fibers on the site of the measurement.

We assessed the microvascular response to low pressure with and without lidocain close to the foot. The slope of the curve will be extracted and then the difference between slopes with and without lidocain will be calculated for each individual. Cutaneous vascular responses to acetylcholine (Ach) and sodium nitroprusside were also measured to inform on maximal vasodilation. NDS and NIS scores were evaluated to inform on neuropathy and nerve sensitivities (mechanical and thermal) were assessed before and after lidocain application to inform on nerve capacities.

Results

As expected the microvascular response to low pressure in both T2D groups was reduced. However, the slope of the microvascular decrease was different from the two groups of patients with a greater disparity for the T2D DFU patients (Fig 1).

Discussion

Within each group lidocain could either worsen or not the slope revealing presence or absence of nerve contribution, respectively (Fig 2). The negative residual slope difference (ΔS) (slope without lidocain – slope with lidocain) was correlated with a high NDS score revealing severe neuropathy whereas the positive residual slope difference (ΔS) was not.

Regarding the vascular response no major differences were observed and it remains to determine a threshold value below which the response is considered at risk.

Clinical relevance

It remains to determine the outcome of the seven subgroups (ΔS vs ΔR) in terms of DFU incidence in the T2D patients and in terms of DFU healing capacity in T2D DFU patients.

Acknowledgements

We appreciate the help of Region Rhône-Alpes and ARC2 for funding the study.

Conflict of interest: none
Home-care wound care – an EWMa document

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2 EWMa, Mikkeli University of Applied Sciences, Finland
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4 EWMa, Reconstructive Surgery, Kaunas, Lithuania
5 TVS, Accelerate CIC, Milton Keynes, UK

Introduction

The aim of this presentation is to give an overview of how wound care is carried out within home care settings. As well as to demonstrate what recommendations should be taken into consideration while developing or evaluating wound care in home care settings.

Taking care of patients with a chronic wound in the home care setting is challenging as Europe has gone through a dramatic shift in the location of service delivery from hospital to home care settings. As a consequence, more wound-patients with complex pathological comorbidities are being treated at home. Therefore, healthcare professionals have to acquire skills and knowledge to manage wounds in the home care setting as there is substantial need for pressure ulcer and chronic wound treatment in home care settings.

Methods

Based on literature reviews in combination with expert opinions from across sectors and areas of expertise a document was elaborated to give an overview of the main current approaches to the organisation of wound care within home care settings, to identify possible barriers, challenges and opportunities for providing modern, cost-efficient, interdisciplinary wound care. The document has been developed in an intersectoral collaboration across European countries and organisations between the Tissue Viability Society (UK), Initiative Chronische Wunden (Germany), HomeCare Europe and EWMa. Thus, the focus is interdisciplinary and not tied to a specific health care system.

Results

To be able to manage and educate patients, a set of minimum education level and competences as well as wound management techniques and the use of advanced wound care products should be available. A list of recommended product types, devices and materials will be presented.

Discussion

Describing recommendations and raising a debate of how to manage non-healing wounds including pressure ulcers at home is of crucial importance for healthcare professionals, providers, companies and policy makers as there is a tendency in home care of going towards employment of non-registered nurses. The document underlines the importance, scope, and level of the appropriate skills and gives recommendations for the interdisciplinary set-up required for wound care in the home-care setting.

Clinical relevance

This document should raise awareness of how to manage wounds at home to health care professionals, providers, patients, informal carers, industry and policy makers.

Acknowledgements

G. Bon, HomeCare Europe; Z. Kis Dadara, EPUAP

Reference


Discussion

The figures presented here clearly identify that over a one-year period, collectively across the five acute UK NHS hospitals with a total of 2900 – 3300 (seasonal fluctuations) beds between them, following a standardised review process, only 43% of all the full thickness pressure damage (grades 3 & 4) sustained were avoidable; this is less than half of the nationally accepted figure that 95% of PUs are avoidable. In addition, it is believed that this reported figure (43%) is still possibly higher than the actual true number, as it has been highlighted that a small proportion of avoidable pressure damage would have been deemed clinically unavoidable, but for the lack of evidenced care delivery documentation being in place.

Conflict of Interest

Nil

References

Do patient safety culture items affect pressure ulcer prevalence in a sample of Norwegian hospitals?

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2 Uppsala University, Sweden, 2 University of Oslo, Norway

Introduction
Patient safety culture, staffing, and other organizational factors may affect pressure ulcer (PU) development. However, research findings are inconsistent [1,2]. The aim of this study was to investigate the effect of patient safety culture on the odds of hospital-acquired PU (HAPU) in a Norwegian data set.

Methods
We utilized data from two cross-sectional studies collected in 2012. Study 1 investigated PU prevalence. An adjusted version of The European Pressure Ulcer Advisory Panel’s (EPUAP) methodology [3] was used. HAPU in this study was defined as PUs not documented at hospital admission based on health personnel’s admission notes in patient records. PU was assessed as no ulcer or category I-IV [4]. Study 2 was a part of a national patient safety campaign [5]. The study investigated patient safety culture using three items from the Safety Attitudes Questionnaire (SAQ): safety climate, teamwork, and perception of management.

The study includes 84 somatic hospital wards from a sample of hospitals in one region in Norway and a total of 1056 patients (68 years). Ward mean scores for the three items were used to predict HAPU odds. The intraclass correlation (ICC) (variance component + variance partitioned by ward) was estimated to investigate the distribution of variance of HAPU across levels. A two-level logistic regression model was applied.

Results
The ICC of the empty two-level logistic regression model was .90. This could indicate that organizational factors may affect HAPU prevalence. However, none of the patient safety culture items were significant predictors of HAPU (Table 1). But ICC at ward level was still almost 17.9%.

Discussion
None of the patient safety culture items were significant for development of HAPUs in our adjusted model. Our results confirm those of Auswaelder et al. for patient safety climate [6]. Still, the ICC at ward level was high and significant in the adjusted model. This could indicate that organizational factors not investigated in this study may have an impact, e.g., other items of SAQ questionnaire, the ward type, preventive measures, patient-to-nurse ratio, seniority of staff, staff attitude and knowledge towards PUs, or patient characteristics. Further research is needed.

Conclusion
The patient safety culture items had no effect on HAPU development in our study.

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 Sofi’s Minde Ordinat AS.

Conflict of Interest
None

References
[5] http://www.pasientsikkerhetsprogrammet.no/ho/i/tr/1/13/1b/14/12/1/1d/1/1

Table 1: The logistic multivariable regression model with HAPU and patient safety culture items

<table>
<thead>
<tr>
<th>Model</th>
<th>OR 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety climate</td>
<td>0.97 (0.93-1.02)</td>
</tr>
<tr>
<td>Teamwork</td>
<td>0.95 (0.96-1.04)</td>
</tr>
<tr>
<td>Perception of management</td>
<td>1.04 (0.98-1.11)</td>
</tr>
</tbody>
</table>

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RN’s knowledge of PU risk factors and prevention

in internal medicine of Landspitali University Hospital

Anna Bördardóttir 1, Iris Gisladóttir, ArnaThoroddsen 1

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Introduction
Pressure ulcers in hospitals are common and can be difficult to treat. They can lead to decreases in patient’s quality of life and increase healthcare system expenses. Studies indicate that the best treatment for PUs is a powerful prevention strategy and healthcare worker vigilance. To ensure that these indications can be followed, healthcare workers must be knowledgeable about PU risk factors and how to prevent them on a daily basis. The objective of this study was to answer the following:

1. What is the status of RNs knowledge in the internal medicine department of Landspitali when it comes to PU risk factors and prevention?
2. Is there a relationship between type of ward and knowledge?
3. Is there a relationship between clinical experience, age and status of knowledge?

Methods
This was a descriptive study. The population of the study was all nurses currently employed in the internal medicine department of Landspitali University hospital with valid employee e-mail addresses (N=293). Questionnaires were developed by the authors using a modified version of the PUQ-2003 questionnaire and current EPUAP/NPUAP guidelines and the authors’ own clinical experience. The validity of the questionnaire was determined by face validity. The cut-off point for sufficient status of knowledge was set at 70%. Reliability was determined via Cronbach’s alpha (p=0.701). Three questions were removed from the list for statistical analysis due to suspicion of translation error or wording. 293 RNs in 16 wards of the hospital received the questionnaire and were given three weeks to respond.

Results
32.7% of the 293 RNs responded (n=96)

Table 1: RNs Status of knowledge

<table>
<thead>
<tr>
<th>Status of knowledge</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 and over</td>
<td>56 (60.8)</td>
</tr>
<tr>
<td>Less than 50</td>
<td>38 (40.6)</td>
</tr>
</tbody>
</table>

Table 2: Scoring 50% and over by type of ward

<table>
<thead>
<tr>
<th>Ward</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute internal medicine</td>
<td>52 (53.2)</td>
</tr>
</tbody>
</table>

Discussion
Despite the low cut-off point determining sufficient status of knowledge only a third of the participants received the needed number of correct answers to score 70% or higher on the questionnaire. This is cause for some concern and indicates that further research may be warranted into the cause of this lack of knowledge. Among the participants, those aged 51 and older had higher scores than younger nurses. The study also showed that 16 years or longer clinical experience reflected higher scores. Type of ward appeared to have an impact on questionnaire outcome, but was statistically insignificant (p=0.176). Years of clinical experience (p=0.049) and biological age (p=0.01) seemed to affect status of knowledge. These findings suggest that clinical experience and biological age are determining factors for RNs knowledge of PU risk factors and prevention.

Clinical relevance
RN’s are at the front line of PU prevention because of their proximity to patients. Therefore it is important for them to maintain a certain level of knowledge.

Acknowledgements
We appreciate the help of the staff of Landspitali.

Conflict of Interest
No conflict of interest.

References
Evidence-based skin care at the university hospital Charité

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Introduction

At the university hospital Charité hundreds of patients receive daily routine skin care including washing, showering, bathing with or without the use of skin cleansers. Additionally various leave-on products are used including lotions, oils or creams. These personal hygiene and skin care activities are integral parts of nursing, but there is little-known about the benefits, costs and clinical efficacy of skin care in the hospital setting. The promotion of skin health is important especially in bedridden and immobile persons. The aims of our project are to assess and to evaluate skin care interventions and products at the Charité hospital and to develop an evidence-based clinical algorithm to improve the quality of skin care. The project is divided into three subprojects. All over the country re-use and leave-on products were considered. Here we report the results of the first subproject.

Methods

Skin care products available at the Charité were identified via the pharmacy and the purchasing department. Consumption and costs per ward were calculated and quantitatively described. A smaller qualitative research part semi-structured interviews on 13 wards were conducted.

Results

At the Charité 84 skin care products were identified. The three most frequently used products in the year 2012 were Odensan® hand wash gels, Bepanthen® Wound- and Healing Ointment and Bübchen® children care bath on 102 included wards. Product consumption was highest on intensive care units (Fig. 2). Overall there was a large heterogeneity in product consumption.

Discussion

Results indicate large variations in product use and skin care strategies. The choice of skin care products seems to be strongly related to the preferences, experiences and competencies of the individuals. At the same time there is limited evidence about the effects and efficacy of preventive skin care and product performance in the hospital setting [1, 2].

Clinical relevance

Evidence based skin care ensures skin integrity and health. However the broad variations in skin care practice reveal the uncertainties of best care practice and may indicate quality issues.

Acknowledgements

This project is supported by the Charité Foundation, the Clinical Research Center for Hair and Skin Science and the Clinical Quality- and Riskmanagement of the Charité.

Conflict of Interest

None

References


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Introduction
Stroke, one of the most common diseases in Sweden, affects around 26,000 residents annually [1]. When stroke leads to neurological dysphagia it is recommended to provide the patient with enteral nutrition (EN) to improve nutritional status. Due to European guidelines [2] Percutaneous Endoscopic Gastrostomy (PEG) is preferable to nasogastric tube feeding when the patient needs nutritional support for a longer period of time. Complications after inserting PEG vary; early complications are reported in between 3-35% of the patients and late complications between 20-28% [3,4,5]. Studies show that elderly patients suffer from malnutrition when admitted to hospital with an increase during the stay [6,7]. Studies also illustrate the relationship between malnutrition and increased mortality [8]. The aim of the study was to retrospectively examine indications, complications and survival of patients receiving a PEG and to study if there was any correlation to their initial nutritional status were reported.

Methods
Data was collected from patient records for patients admitted to hospital from January 2006 to December 2008. A total of 161 records were audited for patients that received a PEG during a four-year period at one university hospital and at one local hospital in an urban area in Sweden. Collected data included; age, gender, length of stay, eating difficulties, indication for inserting PEG, body length, body weight, BMI, unintentional weight loss, complications during hospital stay e.g. pressure ulcer.

Results
Of the 161 patients, 92 were women and 69 were men with mean age of 82 years (range 65-98) and 85% of the patients were either younger or equal 75 years. Mean length of stay was 34 days (range 8-216 days). Table 1 presents the characteristics of these patients, n=161(9).

<table>
<thead>
<tr>
<th>Age</th>
<th>Women</th>
<th>Man</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>65-74</td>
<td>71(4)</td>
<td>18(3)</td>
<td>22(1,7)</td>
</tr>
<tr>
<td>75-84</td>
<td>39(2,3)</td>
<td>21(1,9)</td>
<td>60(4.7)</td>
</tr>
<tr>
<td>≥ 85</td>
<td>47(28,2)</td>
<td>24(14,3)</td>
<td>71(4,5)</td>
</tr>
</tbody>
</table>

Preliminary results show that complications due to PEG insertion were reported in 45% of the cases, 31% of these had one complication reported and 14% had more than one complication (range 2-4) reported.

A total number of 116 pressure ulcers (PU) occurred in 81 patients, 38 women and 43 men. Thirty patients had more than one PU, one patient had PU within all four categories: IV. In age group ≥ 85 years, 37 patients developed PU, in age group 75-84 years, 31 patients developed PU and in age group 65-74 years, 13 patients developed PU.

Clinical relevance
This study shows that complications must be identified early after PEG insertion thus giving a chance of being treated.

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

References
Heel Ulcers: Simulations of Injurious Tissue Loads and Remedial Local Drug Delivery

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2Assaf Haroeh University Medical Center, Israel and the Hospital of University of Pennsylvania, USA

Introduction
The heel is one of the two most common sites for pressure ulcers [1]. Heel ulcers (HU) are formed when soft tissues are deformed for extended periods between the calcaneus and a support, causing structural damage and possibly pain [2]. Using a patient-specific three-dimensional (3D) finite element (FE) heel model with a pre-existing ulcer, we evaluated the internal tissue stress conditions that led to the formation of the HU in this case. We then modeled local drug delivery from over the wound bed area and to the tissues by means of a drug eluting dressing. The drugs considered for this patient-specific simulation were bupradine (IB; analgesic and swelling-reducing) and gentamicin (GM; a wide-range antibiotic) [3,4].

Methods
A 3D FE model of the right heel of a 72-year-old male (bodyweight, BW=89.8kg) who demonstrated a deep HU in an MRI scan was developed (Fig 1a). The tissues included in the model were the calcaneal bone, subcutaneous fat, insertion of the Achilles tendon, and skin. Tissue mechanical properties were all adopted from literature. To simulate the pre-injury anatomy, the HU was virtually removed and replaced with uncolored tissues. The heel was then loaded by downward deflection of the superior surface of the calcaneus to simulate foot weight (in the range of 131%BW; Fig. 1b) which was verified by calculating resultant posterior heel interface pressures. The simulations were developed and meshed using Simpleware ScanIP (ver. 6) and solved using FEBlO (University of Utah). Outcome measures at this stage were the magnitudes and distributions of effective (von Mises) stresses in the soft tissues. Next, the injury was considered again, a debridement was simulated, and drug dispersion in the wound bed was modeled in an off-labeled position (Fig. 3a). For this purpose, a tightly-overlying dressing was placed on the wound cavity and surrounding area. Drug concentrations in the tissues over time were governed by Fick's 2nd law of diffusion in 3D. COMSOL Multiphysics (ver. 4.4) was used to model the discharge of IB and GM (separately) from the dressing, based on empirically determined release profiles (Fig. 3b), using the Mackie-Meares theory [5]. Diffusion coefficients (D) were calculated for IB (2.04×10^-6 m^2/s) and GM (2.03×10^-6 m^2/s).

Results
Our modeling predicted HU injury thresholds of 15-23 kPa in skin, and 11-35 kPa in fat, upon a support with elastic modulus of 0.6MPa. Drug diffusion lines and concentration gradients are depicted in Fig. 3.
ABSTRACTS OF ORAL PRESENTATIONS

Stockholm, Sweden

Development of biomarkers for the Wound Fluid RT-PCR method to detect critically colonised and infected wounds

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Introduction
Bacterial identification is insufficient for diagnosing chronic wound infection because at least wound samples contain bacteria. Moreover, a relatively new concept of bacteria-related wound status “critical colonisation” manifests as delayed healing without overt clinical signs and symptoms, therefore invalidating diagnosis by clinical observations. Thus, it is imperative to develop a rapid, accurate and objective method to detect only problematic statuses caused by the presence of bacteria (critical colonisation and infection) that are in need of immediate clinical interventions. We previously developed the Wound Fluid RT-PCR method to discriminate wound statuses using gene expression analysis of cells in rat wound fluids [1]. The purpose of this study was to develop biomarkers of critically colonised and infected wounds in human by applying this method.

Methods
To identify marker genes for distinguishing critically colonised infected wounds from those with other statuses, we narrowed down candidate marker genes using rat wound models. The models were designed to manifest four distinct wound statuses according to the infection continuum: control, colonisation, critical colonisation and infection (Fig. 1). Briefly, we created thickness wounds on the flank region of male Sprague-Dawley rats and inoculated different concentrations of Pseudomonas aeruginosa. Wounds were covered with polyurethane film dressing and wound fluids were collected. RNA was extracted from cells obtained from post-wounding day 6 wound fluids and subjected to gene expression profiling by DNA microarray to generate lists of promising genes. Eleven patients with pressure ulcers were entered into this study. Wound statuses were judged retrospectively with sequential observations and divided into the non-infected, the critical colonisation and infection groups. We collected uae from these patients containing wound fluid and extracted RNA. The expression levels of the listed genes were evaluated in each group by real-time RT-PCR.

Results
A total of 550 candidate marker genes were identified that expressed a less than 1.5-fold change in the colonisation group compared with the control, a more than 2.0-fold change in the critical colonisation group and a more than 10-fold change in the infection group by the DNA microarray data. Of the 20 most candidate marker genes from the top of the list, expression of NPPB, ITGB6, CENP4, EMIL and ITSN1 were detected in the all critically colonised and infected wounds (7/7 samples) but not detected in the normal healing wounds (0/4 samples) in human wound fluid samples. CPEB1 expression was detected in 6/7 critically colonised and infected samples and 0/4 normal healing samples (Table 1). The genes NPPB, ITGB6, CENP4, EMIL and ITSN1 had 100% sensitivity and 100% specificity for detection of critical colonisation or infection.

Discussion
We have identified a number of marker genes that can distinguish normal healing and critical colonisation in clinical settings by the presence or absence of their expression using the Wound Fluid RT-PCR method.

- This method enables us to investigate gene expression status of the wound site without going excised and to assess wound status effectively.
- This study showed the possibility of using these markers clinically even for wounds with polymicrobial infections.
- Further mechanistic research for these marker genes in the context of wound infection may lead us to an understanding of pathophysiology of critical colonisation.

Clinical relevance
We anticipate these biomarkers will be applied to future clinical settings in the form of a handy diagnostic kit that can diagnose critical colonisation on the spot. It is supposed to be non-invasive, prompt and more accurate than conventional biomarkers for infection.

Acknowledgements
We appreciate the help of Ms. Aya Sata, Ms. Yumiko Fujimoto and Professor Mayumi Okumura in obtaining the clinical data and samples. This study was funded by the Grant-In-Aid for JSPS Fellows from Japan Society for the Promotion of Science (40062).

Conflict of Interest
The author declares no conflicts of interest.

References

Fig. 1. The tissue layers and clotting model

Fig. 2. Calculated distributions of shear strains and thermal energy (right frame) in the layers of the skin

Table 1: Diagnostic accuracy of the marker genes

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Biomechanical simulation of the Charcot neuroarthropathic foot with plantar ulcer.

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Introduction
Diabetic patients with long-term diabetes are mostly affected by peripheral neuropathy. This lack of sensitivity induces a destructive process affecting joints and bony structures which can lead to the Charcot neuropathic osteoarthropathy (CNO). The CNO results in dramatic deformities and dysfunctional foot and ankle complex. For 10 to 43% of the patients, joints are damaged in the tarsal-metatarsal zone leading to a mid-foot breakdown. This situation is described as type 2 CNO in Sanderson classification [1].

The destruction and osteo-synthesis create deformities and cause luxations. The gait and stance are modified and overloads occur because of overpressures before the bony prominences. As the neuropathy makes the region insensitive to pain foot ulcers can appear. The principal suspected causes are excessive compression intensity (leading to internal strains above 50% for about 10 minutes) and duration (leading to internal strains above 20% for about two hours) [2]. Currently, there is no way to prevent foot ulcer resulting from the foot anatomy reconfiguration induced by CNO.

Methods
To explore this issue, a Type 2 CNO foot was reconstructed using the CT-scan modality and the corresponding biomechanical finite element (FE) model was created. This model includes bones as rigid bodies and represents the soft tissues of the foot as two different sub-domains each modeled using a Neo-Hookean material with Young moduli and Poisson ratios of 200 kPa and 0.495 for the skin, 40 kPa and 0.49 for the fat-muscle tissue. The sole of the foot model is put in contact with a virtual horizontal pedobarographic platform.

The Charcot patient was asked to perform a static standing acquisition of plantar pressures using a Zungsheet platform. The collected pressures were applied on the FE foot sole in order to compute internal strains. Then, the foot model including gravity and contact with the virtual pedobarographic platform was used to simulate a standing position. The corresponding sole pressure (SSPP: standing simulated plantar pressure) and internal strains thus computed can therefore be respectively compared with the measured standing plantar pressures (MSPP) and with the internal strains simulated from the MSPP boundary conditions.

Results
The volumes and location of the largest clusters with continuous nodules with Von Mises (VM) strains over 20% or 50% are similar (error 5%) between measured pressure applied and static simulations. The simulated peak pressure value is also close to the one measured with the patient in weight bearing position.

Discussion

The FE model of the type 2 CNO is able to predict, in weight bearing position, the location and the proportion of the Von Mises Strains in the soft tissue of the diabetic foot. The location is similar to the real plantar ulcer for this patient and the plantar pressure values are in accordance with the measurements. Indeed, a peak pressure value of 19.6 kPa is simulated in regard of the cuboid bone, which happens to be the actual location of the ulcer.

Conflict of Interest

Some authors are involved with the TextSense Company (http://www.textsense.com/home_en).

References

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The effect of a simple three-step pressure relieving strategy for preventing pressure ulcers: an exploratory longitudinal study from 2002-2011

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Objective:
Pressure ulcers (PUs) still form an important and distressing problem in Dutch nursing homes. Pressure ulcer prevention protocols are generally based on current guidelines. We developed an alternative three-step protocol to help prevent pressure ulcers. We calculated in this study the effects of this new three-step protocol on the prevalence of pressure ulcers in patients at risk of developing PUs in the Avavo nursing homes in Eten-Leur/Zundert (Netherlands). In addition, the protocol’s general cost effects were explored.

Method:
Data on the prevalence of pressure ulcers and the use of preventive measures were derived from the annual independent National Prevalence Measurement of Care Problems of Maastricht University (LPZ). This annual measurement was implemented in 1999 and measures care problems such as the prevalence of PUs and related preventive measures. Data on patients at risk of developing PUs at the Avavo nursing homes in Eten-Leur/Zundert (Netherlands) were analyzed and compared with national data between 2002 and 2011.

Results:
The introduction of the three-step protocol resulted in a significant reduction of the nosocomial prevalence of category 2 to 4 pressure ulcers. The prevalence was reduced from 8.7% to 0.5% during the first year and remained stable at about 2% throughout the rest of the study period. The prevalence at national level also decreased during this period, but not as much and was still significantly higher in 2011.

The use of alternating systems decreased to almost 1%. Use of static air mattresses showed an almost linear rise in the Avavo nursing homes from the start of the implementation of the protocol, while the trend for both types of mattresses remained stable on a national level.

Introducing the static air mattress instead of the more expensive alternating mattresses helped to reduce the mean daily costs of mattresses at the Avavo nursing homes by over 70% compared to national figures. The workload of the nursing staff decreased as well thanks to the reduction of repositioning.

Conclusion:
The introduction of the three-step protocol showed to be effective. The prevalence of PUs and the mean daily costs were reduced to and have been sustained at a significantly low level.

References:
Cost analysis and effects of one of the outpatient wound care clinics in the Netherlands

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Introduction
The burden of treating chronic wounds is growing rapidly due to an ageing population and a sharp rise in the incidence of diabetes and obesity worldwide [1-4]. At any time almost 1% of the world’s population suffers from chronic wounds, with associated costs accounting for more than 2-4% of health care expenses [5]. The economic and effectiveness evidence of wound care community clinics in the UK encouraged us to perform a cost-analysis of one of the first outpatient community wound care clinic in the Netherlands.

Methods
This study involves a cost analysis based on an observational cohort study with a 1-year pre- and a 1-year post-admission comparison of costs. Patients were included when they first consulted the outpatient wound care clinic. They were all health insured by one health care insurance company Cooperation VZG. A standard six-step procedure for performing cost studies was used to calculate the costs [6-9]. Given the skewed cost data non-parametric bootstrapping was used to test for statistical differences.

Results
172 patients were included in this study. The difference in wound care related costs between the year before and after admission to the wound clinic resulted in a reduction of €2,621 per patient in the base case analysis. The categories ‘general practitioner’, ‘hospital care’, ‘mental health care’ and ‘patient transport’ scored lower after admission to the wound clinic.

Discussion
In this study only the reimbursement data of patients of one health insurance company and specifically only those made under the Dutch Health Insurance Act were available. Because of its observational design it is not possible to conclude on the plausible causality of the introduction of an outpatient wound clinic versus noticeable changes in reimbursement costs in the year post admission. Nevertheless this study is a first attempt of a cost analysis of an equipped (outpatient) wound clinic as an innovative way of responding to the increasing number of chronic wounds in the Netherlands. The calculations show that savings in wound care are possible.

Clinical relevance
The emergence of outpatient wound centres reflects the increasing incidence and prevalence of chronic wounds as well as the costs to the health care systems those patients represent. For the attainment paid at the wound care quality it is essential to establish a financially viable enterprise [9-12].

Conflict of interest
First author AALM Rondas, PhD student at the Maastricht University is working at the outpatient clinic as physiotherapist. The research data were though provided externally by Cooperation VZG and checked by the academic co-authors.

References
NURSES’ ATTITUDES AND PERCEIVED BARRIERS TO PRESSURE ULCER PREVENTION IN JORDAN

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Introduction
Pressure ulcers are common problem in different clinical settings. The sum of prevention modalities organized in the form of protocols is a key point for effective prevention. A number of these pressure ulcer prevention protocols have been reported in literature. The actual application of these protocols depends on the nurses’ desire to perform these interventions and on the existing barriers to practice. In Jordan, evidence regarding nurses’ attitudes and practice is lacking.

The purpose of this study is to explore Jordanian nurses’ attitudes toward the prevention of pressure ulcers, and to identify the barriers that exist to pressure ulcers prevention as perceived by the participant nurses.

Methods
A cross-sectional multi-centre study was undertaken in four hospitals in Jordan. The registered and practical nurses working at these sites were requested to complete a self-administered questionnaire.

Results
The participant nurses hold positive attitudes regarding pressure ulcer prevention. A positive attitude was expressed by an increased number of years of experience. Several barriers to prevention were reported by the participants, including: lack of staff (86.2%), time (83.6%), and patient conditions (68.6%).

Discussion
Findings of this study suggest that positive attitudes are not enough to change the practice. Several barriers need to be resolved first if effective prevention is to be provided. This should be addressed to nurses’ knowledge of risk assessment and preventive measures. A number of these pressure ulcer prevention protocols have been reported in literature.

Conflict of Interest
None to declare

Knowledge among ICU nurses about pressure ulcers prevention

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Introduction
Most pressure ulcers are avoidable. However, the prevalence of pressure ulcer in Intensive Care Unit (ICU) remains unacceptably high 16.8% [1]. 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 the knowledge among nurses about preventing pressure ulcer and compliance to guidelines.

Methods
In total, 100 nurses from one intensive care unit in the middle of Sweden participated. Data was collected September 2013 to October 2013 where the participants completed the Swedish version of the original Pressure Ulcer Knowledge Assessment Tool (PUKAT) [3]. The PUKAT has been translated into Swedish and recently been used in a study by Gunnberg et al, 2013 [2]. The mean knowledge score of ≥ 60% was satisfactory.

Results
The mean knowledge for the sample was 62.3%. One fourth (27.2%) of the nurses knew that lack of oxygen causes pressure ulcer. 18.4% knew that supine position – side 30° lateral position – reduces pressure risk the most. Likewise, 54.5% of the nurses completed a skin assessment on the patients’ skin in situ. Furthermore, 14.9% of the nurses used European Pressure Ulcer Advisory Panel (EPUAP) classification from category 1–4, when assessing pressure ulcers. Among the nurses 55% knew about the guideline.

Discussion
There is a knowledge deficit in pressure ulcer prevention among ICU nurses in Sweden. This study provides an insight into ICU nurses knowledge about pressure ulcers prevention and compliance to guidelines. A major educational campaign needs to be undertaken. Emphasis should be on understanding the etiology of ulcers and developing PU guidelines.

Clinical relevance
The findings underscore the importance of continuing PU prevention education for ICU nurses. Nursing leadership in the health care settings has a significant task to emphasize the core elements in patient care.

Acknowledgements
To all nurses who participated.

Conflict of Interest
None

References

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Patients with pressure ulcers – from prevention through treatment to healing – results from the national quality registries RUT (Registry of Ulcer Treatment) and Senior alert

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Introduction
To follow patients with pressure ulcers from prevention through treatment to healing or clinical negative event, by using the two Swedish national quality registries on pressure ulcers: Senior Alert for prevention and RUT (the Registry of Ulcer Treatment) for data on healing.

Methods
By using a common IT platform at UCR (Uppsala Clinical Research Centre) results from the two registries are used to follow patients with pressure ulcers to show the impact of prevention on healing time and the patients’ well-being and Health Related Quality of Life (HRQoL).

Results
In May 2014 there were 2283 patients registered in RUT, i.e. almost 10% of all patients with hard-to-heal ulcers in Sweden.

Medical treatment was carried out in 81 years compared with 70 years with pressure ulcers.

For all patients, women constituted 50% compared to 45% for patients with pressure ulcers.

The median ulcer size for all ulcers was 3.2 cm² compared with 10.7 cm² for pressure ulcers.

Median healing time was 146 days in 2009 compared with 71 days in 2013 for all ulcers and 92 days in 2014 for pressure ulcers.

Antibiotic treatment was reduced from 7% in 2009 to 2.4% in 2013.

In Senior Alert there were over 500 000 registrations concerning prevention for pressure ulcers but only 12% developed a pressure ulcer.

Discussion
The healthcare system requires information on the burden of care in order to inform decisions on the needs of the population and the allocation of resources. Cooperation between the two registries on prevention and treatment of patients with pressure ulcers whether the patient is older, in palliative care or a younger patient with neurologically diseases, can give a more complete picture of pressure ulcer care nationally.

The registries are used daily and nationwide in Sweden covering every level in the healthcare system such as primary care, community care, hospital care, wound healing centres and private care.

Focusing not only on healing but largely on the patients’ HRQoL, the registries can give supplementary information on the situation of these patients.

Together the registries demonstrate the potential for improved wound management while using national quality registries for structured ulcer care.

Clinical relevance
To use the resources of national quality registries which focus on prevention, LABs biodiversity and continuity of care, is a warranty for a more efficient and cost-effective wound management nationally while focusing on the patients’ well-being.

Acknowledgements
We appreciate the help of the steering groups of RUT and Senior Alert.

Conflicts of Interest
None

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Lactic acid bacterial symbionts in honeybees – an unknown key to honey’s antimicrobial and therapeutic activities

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Introduction
Today, due to the misuse of antibiotics and emerging antibiotic resistant pathogens, we are facing a new era of searching for alternative tools against infectious diseases. Chronic wounds are subjects for intensive research efforts due to the bacteria’s ability to sustain antibiotic treatment and maintain chronic infections by biofilm formation. Antibiotic resistant bacteria in wounds caused by frequent use of antibiotics are a threat to the Health Care Sector and now researchers are searching for new antimicrobial resistant bacteria in natural products and unexplored ecological niches for alternative tools against infections. Symbionts in an ecological niche that are already shaped to defend their host by producing bioactive compounds are a relatively unexploited option. Less than a decade ago we discovered a large un-explored bacterial microbiota of lactic acid Bacteria in symbiosis with honeybee’s, located in the honey stomach and key players in honey production (1). Our hypothesis that these novel LAB with their active bio-products could be the reason for why honey has been regarded as an antimicrobial agent through human history.

Methods
We conducted varying analyses in order to characterize LAB’s bioactivity and potential. To check the LAB’s antimicrobial activities we performed Dual Culture Overlay assays against wound pathogens.

Results
The Overlay assays (Table 1) display that all tested pathogens from clinical human wounds were inhibited by antimicrobial compounds diffusing from each of the 13 LAB originating from honeybees and when the 13 LAB were grown together. The results show that the different LAB strains produce different bioactive metabolites of varying inhibitory effects against the pathogens. These include; lactic, acetic and formic-acids, benzene, 3-OH Fatty acids (aR-yield), hydrogen peroxide, etc. (2).

Table 1. Dual culture overlay assays with LAB strains of low origin against clinical isolates of pathogens wound bacteria and yeast. The diameters of the inhibition zones are displayed in millimeters. Antibiotics commonly used against the same pathogens are depicted as controls.

Discussion and perspectives
The fact of finding new treatments in wound management is already one of the most important tasks in today’s clinical and biochemical research. Although clinical reports have shown positive results when using honey in wound management, the application of honey dressings still gives a low confidence for its use in therapeutic treatment in wound management. However, we have discovered a unique LAB microbiota in the honey producing tract of the honeybees given for the first time, an explanation to the before unknown factors contributing to honey’s antimicrobial properties (1). In the study we could confirmed that LAB symbionts are responsible for many of the antibacterial and therapeutic properties of honey. This is one of the most important steps forward in the understanding of the clinical effects of honey in wound management. The explanation model will take honey in combination with its viable and standardized amount of LAB into a much wider clinical use.

Conflict of Interest
The LAB strains used in these studies have been submitted to patent applications by T.C. Olofsson and A. Vásquez.

References
[2] Olofsson et al., submitted to Int. Wound J.
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(Bold = presenting author)

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P2 Material science for pressure redistributing seat cushions & mattresses
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P3 Therapeutic management of extensive pressure ulcer affecting occipital and parietal bone
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P5 Treatment of pressure ulcers in children with impaired central neuroregulation
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Agathangelou Charalampos

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Donnelly Jeannie, Semple Lorna, Dunlop Simon, Stina Kevin, Robinson David

SKIN Champions for Kids

Lundy Claire, Black Bronagh, Hegarty Paula, Warwick Carol
Use of “Collost”(“Salvecoll”) Preparation in Complex Treatment of Decubitus Ulcer, Degree IV.

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Introduction
Radical surgical treatment of decubitus ulcer, degree IV remains a very difficult problem as only 50-75 % of decubitus ulcers is healed by the primary intention, percentage of postoperation complications is high [12]. Search for preparations that are implanted intrasurgically and are totally biodegradable, hypoallergenic and have a considerable effect of stimulation of regeneration and repair is actively being carried out in the world. “Collost”(“Salvecoll”) preparation almost perfectly fulfills all these tasks, that is why it is been used in the complex surgical treatment of patients with decubitus ulcer, degree IV.

Methods
13 patients with decubitus ulcer, degree IV were treated with “Collost” preparation: 7 patients with decubitus ulcer in the area of the sacral bone, 3 patients had in the area of the ischial tuberosity, and 3 patients— in greater trochanters. These patients were included into the main group (MG). 15 patients with the same pathology were included into the comparison group (CG). Patients of both groups had almost the same age, mass and comorbidities, duration term of decubitus ulcer, local and general treatment, almost the same number of males and females. MG is it was a three-staged surgery, in CG— a two-staged one. The first operation in both groups was a maximum radical stoma correctomy (including oncosectomy). In the second stage of operation (proliferation stage) “Collost” was used for temporal closure of tissue defect (by a 50x60 mm membrane, having 5.5 mm thickness, 7 % or 15 % gel, powder) in MG. Preparation amount was determined individually and depended on the tissue defect size. Microperforations of gel into the margins and bottom of the wound were done, then the wound surface was irrigated by the powder. The final stage was the complete closure of wound defect by membranes, having the sizes of the wound. Membranes were fixed to the cut margins of the wound by single stitches along the perimeter, and in case of need they were stitched to each other. In postoperation period bandaging was performed on average once within 5 days, applied napkins were moistened by means of fluid solution of antiseptic. Stitches were removed in 3-5 weeks after maximum or complete biodegeneration of the membranes. After the first operation management of patients in CG was conservative and usual [2].

Results
In MG the results of complex hospital surgical treatment were good in all 13 patients (100 %) wound defects were totally healed without forming rough scars. In CG wound defects were totally closed only in 9 out of 15 patients, in 4 patients wound defect sizes became 1.6 times less, in 2 patients—1.2 times less. There were cases of wound redetection and superinfectioning after necrosectomy, i.e. 60 % of good results and 40 % of satisfactory results. The process of granulation tissue formation and marginal epithelisation on the background of “Collost” biodegeneration was activated in patients of MG, and it made possible to the wound get ready for AG or SS outfit. Time duration of getting ready for SS in MG was 35.0–48.4 days, in CG 61.2–81.8 days.

Discussion
Obtained good results in all 13 patients of MG and in 9 out of 15 patients in CG (60 %) made it possible to predict the perspective of “Collost” use in treatment of patients with decubitus ulcer, degree IV. Nevertheless, the little number of treated patients, absence of data about relapse in a year after treatment do not allow us to carry out a serious comparative analysis, using data from other clinics, also having not a great experience of “Collost” use in treatment of mentioned above category of patients. There is a necessity to carry out further multicentre investigation with “Collost” use for this pathology.

Clinical relevant.
“Collost” use in complex surgical treatment of patients with decubitus ulcer, degree IV considerably (1.75 times faster) reduced time duration of wound getting ready for AG or SS due to activated process of granulation tissue formation and marginal epithelisation. It made possible achieving of good results in all the patients of MG a total 60% of their tissue defects were healed and relapse absence within the first year of a first treatment.

Acknowledgments
Authors are grateful to all the stuff of the clinic that have taken part in treatment of this group of patients.

There is no conflict of interests among the authors of the abstract.

References

Material science for pressure redistributing seat cushions & mattresses

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Introduction
Pressure Ulcers (PU’s) are painful, problematic, yet largely preventable wounds. Indeed, research undertaken at several trusts in the UK shows that use of a few simple measures almost reduces the incidence of PU’s to zero. One of these measures is to be acutely aware of what support surface the patient is sitting or lying on, as such awareness facilitates the choice of the most appropriate surface.

Aims
The goal of pressure ulcer prevention is to reduce tissue deformation, to let the deformation occur in the material, not in the human body. In the newer versions of PUs etiology time is considered to be a major factor. There are diverse materials employed in the numerous versions of support surfaces currently available. This presentation will endeavour to combine the newest understanding of the causes of pressure ulcers with how materials in the support surfaces react to these factors. Fundamentally, the aim is to enhance understanding of how these support surfaces can contribute to pressure ulcer prevention.

Concept under consideration
When soft tissues are squeezed between a bony prominence and a support surface, the soft tissue will inevitably be compromised. Understanding how material the support surfaces are made of and how these materials react to a load (pressure and shear) is to enhance knowledge. In addition to hardness, hardness makes the choice of the most appropriate support materials. A material with hydrostatic properties, where the fluid is being dispersed, has better enveloping qualities and thus better pressure ulcer preventative qualities when compared to materials with a high resilience. Furthermore, materials which reduce a buildup of heat and humidity have better protective qualities than those without this ability. However, regardless of the material in the support surface one choses, a frequent turning regimen and steps outlined in the skin bundle are also important preventative measures against the development of pressure ulcers.

Clinical relevance
The key considerations in selecting the correct mattress or cushion are how well the material envelopes the body, the response of the material to being loaded and the effect that these factors have on the skin microclimate. Furthermore, use of all the appropriate interventions, as outlined in the skin bundle, should also be considered in order to ensure success in prevention strategies.

Acknowledgements
Prof Stephan Spingle and Dr Evan Cali for their kind and useful advices and lectures since 2005, Prof Zena Moore, for her guidance and advice in the world of pressure ulcers.

Conflict of Interest
The author is employed as a wheelchair seating and mobility consultant at ETAC.

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P3

The therapeutic management of extensive pressure ulcer affecting occipital and parietal bone
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Introduction
A female patient of 81 years, in good health condition, living on her own in a house suffered a stroke in 2011, and in 2010 she was diagnosed with an inoperable brain tumour (meningioma).

Methods
Apart from occasional memory loss and short term nuanas she had no difficulties and could take care of herself. Following a visit she paid to her relatives in December 2013 she suddenly lost consciousness, fell, and was left lying on a stone floor until her relatives found her after two days. She developed an extensive pressure ulcer in the location between her shoulder blades and the occipital and parietal bone in the skull, accompanied by loss of hair, skin, and subcutaneous tissue up to the bone in the area of 10x12 cm.

After two months of hospitalisation at the Department of Neurology her general condition has been stabilized, she communicates, but her mobility is limited.

Results
The pressure ulcer between her shoulder blades heals quite effectively, the manifestations on the cranium are stagnant, the pressure ulcer shows callous margins, and the bone is coloured dark brown to black. Since March 2014 the therapy included gel preparations, and we also have commenced stem cell therapy with a very good effect.

Discussion
The application of stem cells harvested from adipose tissue with growth factors processed using bioengineering technologies can deliver the most progressive effects without any undesired effects. Adipose cells (ASCs) are multipotent, thus an ideal source material in the field of regenerative medicine. The final effect of application includes the formation of new skin cells, improved appearance of existing wrinkles, improved skin elasticity due to the synthesis of collagen, elastin, and other ECM components (extracellular matrix – proteins and seasharks).

Clinical relevance
The method is quite costly and technically challenging, and requires perfect cooperation and coordination between the expert, the laboratory, and the patient, but it brings excellent final results. The method is very comfortable for the patients. The paper documents the topological therapeutic approach applied as well as the final effects achieved in the patients treated.

Conflict of Interest
There is no conflict of interest in connection with this presentation.

References

P4

Pressure ulcer prevention – A toolkit for healthcare professionals to ensure success
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Introduction
In 2009, the hospital pressure ulcer (PU) prevalence of category 1 to 4 was 19.2%. The prevention interventions were not always done by healthcare givers and not in adequacy with the latest best practices. An institutional program called "Objective Zero Escarre" (OZE) has been developed and implemented in the hospital. Primaries goals of the program were updating professionals’ knowledge regarding pressure ulcers prevention, enabling best practice guidelines and reducing the annual PU prevalence. In 2012, the prevalence is lower (12.2%) but shows that the prevention interventions are not well documented and the guidelines are not always adopted in practice. To guarantee long term effect on PU prevalence and to ensure continued awareness of PU prevention by all healthcare professionals, which clinical and management tools are needed to confirm that all at risk patients benefit from adequate interventions?

Methods
A literature review was made using PUBMED and Google Scholar. The keywords nursing supervision, guidelines adherence, pressure ulcer and incentive plan were selected separately and in combination. Six articles out of 32 were analyzed. They were chosen for their strength of evidence. The data collected was used to establish a list of the most reliable interventions in reducing pressure ulcer prevalence. Minimum required actions have been gathered in a toolkit in order to ensure the application of hospital’s PU prevention guidelines for all at-risk patients.

Results
Minimal required interventions toolkit (1-2-3-4-5)
1. Professional’s responsibilities clarification
2. Organisational management
   a. Risk assessment
   b. Risk support surfaces
   c. EBP-Posters and handouts
   d. Clinical documentation
   e. Patient/family empowerment
3. Professional knowledge and training
4. PU Champions
5. Performance of nursing care indicators and communication

Discussion
The professionals’ non-adherence to PU guidelines may affect the quality of care provided to the patient and lead to pressure ulcer development. The Lausanne’s University Hospital administration has made the program OZE a priority in its institutional action plan. Since 2009, the annual prevalence has been reduced. This reduction is probably due to the great effort done by the managers and healthcare professionals.

Clinical relevance
A prevention program needs continuous attention, monitoring and adjustment to ensure long-term awareness and good practice.

Acknowledgements
We appreciate the help of the Hospital Nursing Administration and healthcare professionals.

References
**P5**

**Treatment of pressure ulcers in children with impaired central neuroregulation**

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**Introduction**

One of the hardest and most frequent complications after spinal cord injury is pressure ulcers of soft tissues. The proportion of children patients with pressure ulcers is 15.5-27.4% of the total number of children with spinal cord pathology of various origins. Septic condition in this group of patients develops in 4% of cases. Decubitus lesions make difficult rehabilitation activities, and they can be the cause of postponing surgery operations.

**Methods**

In our clinical center we applied novel method for treatment of local trophic complications in children with spinal cord injury using sterile collagen material “Collost” (Russia), it also known as “Salveost” in EU. We applied two forms of the preparation – membrand and gel.

Before “Collost” application we conducted necrotherapy, excision of callous edges of the wound and marginal excision of the bone. Decubitus completely purified from fibrotic and nonviable tissue for translating the local process from necro-inflammatory condition to inflammatory-regenerator. It should be noted that we did not set out to completely debridement of the wound. We had to be sure that there was no contamination of Pseudomonas aeruginosa. The persistence of other kinds of microflora was not a contraindication to “Collost” application.

Dressings were conducted depending on the wound repair potential but not more than one time in 5-7 days. Effective application of “Collost” need of regular maintaining a moist environment, so we regularly irrigated the dressing.

**Results**

During the treatment with “Collost” (“Salveost”), the period of wound healing was ranged from 21 to 48 days. In all clinical cases there was formed full soft tissue without scar in the zone of biomaterial application. We did not observe any complications associated with “Collost”.

**Discussion**

Analysis of the results showed high efficacy of “Collost” (“Salveost”) in terms of the rate of wound healing and forming of new full soft tissue. So this fact indicated the perspective of this collagen biomaterial application in surgical practice.

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**P6**

**The Effect of a Silicone Border Foam Dressing For Prevention of Pressure Ulcers and Incontinence Associated Dermatitis in Intensive Care Unit Patients**

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**Introduction**

Clinical practice guidelines from the EPUAP and NPUAP summarize current evidence that strongly suggests increased risk of sacral pressure ulcer (PU) formation from shear force and sustained pressure when the HOB is elevated [1] Unfortunately, there is a clinical conflict of interest for ventilated ICU patients who is recommended to prevent pneumonia. Meanwhile, the etiology of incontinence associated dermatitis (IAD) differs from PU, but IAD and PU often coexists [2]. The skin affected by incontinence is less tolerant to pressure, friction, and shear [3]. The purpose of this study was to evaluate if application of a silicone border foam dressing to the sacral and coccygeal areas, would help to decrease PU occurrence and IAD score among patients at risk in the ICU, as compared to standard PU preventative care.

**Methods**

Data were collected using a non-randomized comparison cohort study. Subjects and Settings: 102 patients (>40 years of age) with a Braden scale score of 16 or less who were admitted to two ICUs at the Samsung Medical Center in Seoul participated in the study. Instruments: PU development was determined based on the guidelines of EPUAP and NPUAP. IAD was measured using the Incontinence Associated Dermatitis and its severity instrument (IADS) [4]. Subjects were assigned to the experimental group (standard PU preventive care routine plus application of the silicone border foam dressing), and 50 subjects were assigned to the control group (standard PU preventive care alone). The number of patients that developed PU in the experimental group was compared with that from the control group using the z-test (Table 1). The IADS score of the experimental group was measured and compared with those of the control group using an independent t-test (Table 2). Logistic regression was carried out to analyze the relationship between the IADS score and PU ulcer development (Table 3).

**Results**

Both the incidence of PU development and IADS scores were significantly lower (z2=1.722, p<0.01 and t=2.166, p<0.03, respectively) in patients assigned to the experimental group as compared to those in the control group. The incidence of pressure ulceration significantly increased as the IADS score increased (OR=1.900, CI=1.237–2.917). A logistic regression analysis revealed that pressure ulcer development was related to IADS score (p<0.003) and that the risk of developing a pressure increased 1.9 fold for every one-point increase in IADS score.

**Discussion**

We hypothesize that this difference is at least partly attributable to protection afforded by the dressing to the sacrum and the gluteal fold along the coccyx. Additional research is needed to confirm this hypothesis. Results of this study revealed an association between PU occurrence and IADS score. Although the etiology of IAD clearly differs from that of pressure ulceration, the conditions often coexist. Additional research is needed to further clarify the nature of this relationship.

**Clinical relevance**

Use of a silicone border foam dressing application was found to reduce the occurrence of PU and IADS scores in a group of critically ill patients.

**Acknowledgements**

The author thank JM Hwang, RN for the statistical analysis.

**Conflict of Interest:** None

**References**


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Telmedicine: a pressure sore project-Patient communication all the way home

The use of new technology as a communication channel to replace long travelling, travel expenses and time, is common in many workplaces. Video conferencing has long been used in both companies, but also private. Today, the opportunities to communicate are almost endless, regardless of the distances.

Norway is a country with scattered settlements. That leads to travelling over long distances, which at times can make it difficult to provide good healthcare support.

For many years, Sunnaas Rehabilitation Hospital has focused on implementation of telmedicine as a way to communicate with patients, colleagues and partners. This to facilitate necessary healthcare to all in need of it. This eventually ended up in what today is called "The Sunnaas model". We will give a presentation of this Model.

Sunnaas Rehabilitation Hospital has a nation-wide responsibility for patients with spinal cord injuries, among others.

In 2012 two pilot projects started, using telmedicine in the form of video conferencing, as an offering in the outpatient treatment of patients with spinal cord injury and pressure ulcers, and in the monitoring of aphasia patients. We will give a presentation where we focus on the results from the group with pressure ulcers. We used recommendations from the Norwegian Center for Integrated Care and Telemedicine, and we cooperated with the University of Oslo in the preparations for the pilot project.

We wanted to offer equal treatment to all patients, regardless of residence and geographical obstacles. We wanted to clarify if possible for patients with spinal cord injury and pressure ulcers to be followed up at home in a safe, predictable and responsible manner rather than to put them in hospital.

In addition, we wanted to improve interaction with homecare nursing in the way that we offered organized training in the care of pressure ulcers, and also invited the caretakers to call or send messages when they need assistance.

We also established close cooperation with the Plastic Surgery department at Oslo University hospital, for the possibility to quickly implement “the right treatment to the right patient at the right time”, aiming the patients to go back to habitual activity and participation in home, work and society.

During 2012, seven patients were followed up in the project. Patients and their local caregivers were interviewed about the experience of participating in the project. The feedback gave us the opportunity to facilitate the treatment. Wound healing were registered, we made socioeconomic calculations, and we revealed staffing needs to offer such an outpatient healthcare, both in specialist- and in primary healthcare. We will give a presentation with some of the results from this pilot project.

We also created a design for an e-learning course for use in primary healthcare. Parts of this course will be presented.

The results from the pilot project are good, both in terms of healing of pressure ulcers, cooperation with primary health care, and what comes to socioeconomic health savings. We will present some of this savings. The programme is now implemented in ordinary outpatient activity at Sunnaas rehabilitation hospital, but a problem, however, is the earnings to the hospital.

Surveillance and prevention: a contact-free monitoring solution

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Introduction

Caring for patients with low mobility, at risk of pressure sores, generally elders with high comorbidity, it means increase prevention activities, but if patients have already developed bedsores, then we need to survey carefully, to avoid new lesions and to manage the situation at our best. This is often not possible due to lack of human resources and too heavy workloads. In this context, it becomes very useful to have a technological support that can really help caregivers to improve patients management, allowing a deeper focus on mobilization and vital signs[1].

Methods

We started a study of a technological device that would allow easier management of the patient with bedsores (or at risk of developing). It’s a computerized device that can guarantees prevention of adverse events with contact-free continuous monitoring of Heart Rate, Respiratory Rate and Motion, without ever touching the patient, in the event of a change in a patient’s status, the system alerts caregivers at the Central Display Station (CDS), on large screens in prominent locations and on handheld devices. The system has been developed specifically for inpatients who need to be monitored frequently.

Results

The study is still ongoing, but the preliminary results are really impressive. We can confirm a lower level of stress among caregivers because if something happens there’s a system that help us to prevent and to intervene quickly, if necessary. We noted an higher level of assistance, a very low incidence of bedsores, an improvement in wound management and a better quality of life for patients, caregivers and relatives.

Discussion

The ability to use technological devices for the prevention and surveillance of patients with pressure ulcers (or at risk of developing) opens new scenarios of care: reducing workload to caregivers means a better quality of care, a reduction of the risk of "burnout syndrome"[3] and, therefore, improve the patients’ quality of life. It’s also very significant that patients at home can be managed better by relatives that show to be less anxious: they “feel safe and helped” and can be "transformed" into real caregivers.

There’s another feature to be highlighted: an important cost saving due to less ICU days, lower incidence of bedsores and “burnout syndrome”, better home management that reduces forced hospitalization[4].

Clinical relevance

Easy management, improvement of quality of life for patients and caregivers, prevention and surveillance, cost saving: we think that the clinical relevance of our work is that we are demonstrating it’s possible to achieve all these targets.

Acknowlegements

We appreciate the help of EarlySense (Israel) and Moss (Italy) that provided the devices.

Conflict of Interest

None

References

**Introduction**

One third of all hospital acquired pressure ulcers (APUs) are medical device related pressure ulcers (MDRPs). It is estimated that 40% of hospital-acquired pressure ulcers (APUs) are caused by the use of gastric feeding tubes (G-tube). A comprehensive review of the literature reveals a significant opportunity to improve care of patients who use G-tubes. A standardized care protocol (G-tube Care Protocol) aimed at reducing the risk of APU in patients who use G-tubes was developed at the University of Pennsylvania. Following the recommendations of the protocol, the G-tube bumper was placed in the anterior axillary line. A new protocol was developed that specified the G-tube protocol for use in acute care units.

**Methods**

On average, participants were participants in the protocol that included the anterior axillary line. The protocol was compared to the control group (N=54). The protocol was designed to be expanded to all patients in the control group. The protocol was expanded to all patients in the control group. The protocol was expanded to all patients in the control group. The protocol was expanded to all patients in the control group. The protocol was expanded to all patients in the control group. The protocol was expanded to all patients in the control group.

**Results**

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**Conclusion**

The G-tube protocol was used to reduce the risk of APU in patients who use G-tubes. The protocol was designed to be expanded to all patients in the control group. The protocol was expanded to all patients in the control group. The protocol was expanded to all patients in the control group. The protocol was expanded to all patients in the control group. The protocol was expanded to all patients in the control group. The protocol was expanded to all patients in the control group.
Predictive validity of four risk assessment scales for prediction of pressure ulcer development in a hospital setting

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Introduction

The prevention of pressure ulcer formation is an important aspect of nursing care, and the identification of patients who require preventive measures is a key issue. Various risk assessment scales have been developed since the early 1960s and all of the scales have claimed to have acceptable ability to identify patients at risk of pressure ulcer development. However, changes in health care delivery such as an older patient population and shorter hospital stay motivate continuous and repeated examination of the predictive validity of these instruments. The aim of this study was therefore to determine the predictive validity of four risk assessment scales. Two of the scales are commonly used in Sweden (modified Norton and RAPS) [1, 2] and two are used worldwide (Norton and Braden scales) [3, 4].

Methods

This cross-sectional descriptive study was conducted in a hospital in southern Sweden. Out of 415 patients (218 years) admitted to medical, surgical, orthopaedic, oncology and rehabilitation wards, a total of 346 patients participated in the study. Data were collected using the Swedish version of the European Pressure Ulcer Advisory Panel minimum data set [5], the Braden-, Modified Braden-, and the RAPS scales. The sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of the four risk assessment scales were calculated at various cut-off points, including the recommended cut-off for each scale. To define the prognostic validity of the scales, the area under curve (AUC) was calculated.

Results

Fifty-six of the 346 patients were found to have at least one pressure ulcer, yielding a prevalence rate of 16.2%. The RAPS scale reached best balance between sensitivity and specificity at recommended cut-off level (2.29), followed by the Braden scale and the Norton scale at recommended cut-off levels of 16 versus ≤16 points respectively (Tables 1). The modified Norton scale also reached an acceptable balance between sensitivity and specificity, but at the cut-off level of 13 points, which is a higher cut-off level than recommended. At these cut-off levels, which show the best balance between sensitivity and specificity, the PPV ranged from 32.5% to 35.1% among the scales and NPV ranged from 93.6% and 94.4%. Acceptable AUC was reached for all scales.

Table 1: Summary of the most important data

<table>
<thead>
<tr>
<th>Group</th>
<th>Cut-off</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified Norton scale [1]</td>
<td>39</td>
<td>77.6%</td>
<td>89.8%</td>
</tr>
<tr>
<td>RAPS scale [2]</td>
<td>29</td>
<td>77.6%</td>
<td>89.8%</td>
</tr>
<tr>
<td>Norton scale [3]</td>
<td>16</td>
<td>74.5%</td>
<td>76.0%</td>
</tr>
<tr>
<td>Braden scale [4]</td>
<td>16</td>
<td>74.5%</td>
<td>73.7%</td>
</tr>
</tbody>
</table>

Discussion

The results both supports and contradicts previously recommended cutoff levels. Regarding the modified Norton scale a cut of level of 20 is recommended in the Swedish Handbook for Healthcare. Based upon the reasoning that higher sensitivity is preferable to higher specificity, this study indicates that the cut-off level should be as high as 23 for the modified Norton scale. The effect of preventive measures could be the reason why the PPV of the scales was not very high.

Clinical relevance

These study results could be used as a basis for discussion concerning the current recommended cut-off level of the modified Norton scale and if it should be reconsidered.

Acknowledgements

We would like to express our thanks to the participating patients and nursing staff. Thanks to Södra Älvsborgs Hospital, Borås, Sweden and Linköping University, Linköping, Sweden.

Conflicts of interest

No conflict of interest has been declared by the authors.

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Peroperative pressure ulcers—A unknown phenomenon?

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Introduction

Pressure ulcers are an unwanted complication, that may lead to painful after-treatments. Pressure ulcers are a highly prioritized area in hospital settings in Denmark. There are a number of different policies in the area, frequent prevalence studies and the National “Patient Safety” Hospital. Peroperative patients have among other things very limited possibilities for repositioning, and lack of sensorial perception. Anesthetics can cause significant changes in patient hemodynamic status and skin perfusion, which makes these patients in sever risk of developing pressure ulcers during operation.

Methods

39 patients participated in this prevalence study. (N=39). A special record was made for data collection in this study and a creation of a database was made. We collected among other things data on Body Mass Index, age, position during surgery, positioning equipment during surgery, and time on the operation field. For statistical analysis was used SPSS version 19.

Results

The prevalence study showed that non of the 39 per- operative patients developed pressure ulcers during surgery. Our study revealed, that anesthetics- or operation nurses in the Neuroanaesthetic operation field often uses more than two different types of positioning equipment. Fig 1 surgery to prevent Fig 2 injuries.

The mean age was 54.53 (16-82) (fig 1) and the mean time on the operation table was 136.52 minutes (50-329) (fig 2).

Discussion

Which educational knowledge exist among nurses at this neurosurgical operations field? We intend to do further research on the prevention pressure ulcers. In addition we intend make case studies on some the patients, in search for answers.

Clinical relevance

The Nurses in the Neurosurgical operations field often hold significant knowledge in preventing pressure ulcers. A knowledge that maybe can be used in other hospital settings also, in the prevention of pressure ulcers.

Acknowledgements

We appreciate the help of Neuroanaesthesiologic and Neurosurgical Department at the Danish National Hospital.

Conflict of interest: None

References

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Incidence of Pressure Ulcers in Patients with Acute Spinal Cord Injury

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Introduction
Starting from 1996 all patients with spinal cord injuries (SCI) in the County of Stockholm have been included in a dedicated spinal rehabilitation program at the Dept. of Neurology, Karolinska University Hospital. Spinal cord injury patients are especially vulnerable to develop pressure ulcers due to loss of sensory functions and inability to change position, which may lead to suffering for patients and delayed rehabilitation. [2] In addition pressure ulcers are the most common "preventable" cause of hospitalization among SCI patients.[1] The aim of this study was to evaluate incidence and risk factors to develop pressure ulcers, such as delays in admission to the spinal unit and number of units the patient passes before admission.

Methods
Descriptive retrospective study with clinical journal review for all patients included in rehab chain for SCI 2010-2013. Information included age, gender, level and of completeness of injury, localization and grade of pressure ulcer at admission, comorbidity, body mass index, time to admission to the spinal unit and number of units passed before admission.

Results
Out of a total of 198 SCI patients, 26 patients had pressure ulcer at admission, of which 11 came directly from ICU.

Discussion
In this single center study of pressure ulcers at admission to the spinal unit we find an incidence of 11-22%. It was unexpected that such a high proportion of patients with pressure ulcer was admitted directly from the ICU, where staffing is much higher than for ordinary wards.

Clinical relevance
Pressure ulcer can be considered a failure of health care, since it can be prevented. Our findings underscore the need of instructing hospital units, including ICUs, caring for SCI patients. Preventive measures are likely to be cost effective and also result in reduced suffering among SCI patients.

Acknowledgements

Conflict of Interest

References

Table 1. Spinal cord injured patients admitted to R 18 for rehabilitation/year (blue).
We had no worsening (necrotic evolution), no infection signs, no pain increasing; in all patients we had the complete disappearance of pain.

Discussion
The results and the statistically significant numbers obtained demonstrate that this type of treatment is particularly effective, and thus indicated in the treatment of Incontinence Associated Dermatitis. This product can control optimally both the bacterial balance and, especially, the moisture balance; the synergistic actions of absorption and antisepsis allow to obtain successful treatments.

"Take home messages":
- complete healing in all patients
- no necrotic evolution
- no infections
- no allergies
- improvement of patients’ quality of life

Clinical relevance
The clinical relevance of this work is the demonstration that a very "easy to use" treatment can prevent the onset of skin complications due to incontinence.

Acknowledgements
We appreciate the help of Pharmeasy that provided the product for all patients.

Conflict of Interest
None

References

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P18

Decision making in mattress choice: a new tool suggestion

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2 National Health Service, Lombardy Region (Frezzo d'Adda, Milan), Italy

Introduction

Attending patients with very serious problems, often terminally, unfortunately means come into contact with the reality of pressure sores; for this reason, it becomes essential to be prepared to deal with the event, not only from a purely medical point of view, and therefore therapeutic / pharmacological, but also from the care that begins with prevention.

Our ambitious target is to be able to combine an effective preventive program to a valid therapeutic one, if the lesions are already present, optimizing and rationalizing the use of technological surfaces, improving the quality of life of the patients, reducing the workload of caregivers and developing a decision-making process.

Methods

The choice of an antibacterial surface should be based on accurate assessments and take into account the patient-specific characteristics in terms of evolutive comfort, ease of management for the caregiver, cost-effectiveness and, of course, in terms of preventive and curative efficacy.

We therefore analyzed the state of the skin at risk (or the pressure ulcer, if present) and the score of the Braden[1] scale to have a basic indication; we mostly evaluated the ability of spontaneous mobility of the patient which has a so preponderant influence in the choice of the surface[2]: a fully immobilized patient can’t have any benefit from a self-compensating surface that depends from the position variations. We then considered the nutritional status, the skin humidity and consistency, giving scores: the target was to obtain a numerical data that could guide us in choosing the most effective surface.

Results

In table 1 we show a schema for a basic choice. The results we had using this decision-making system are quite interesting because no patients developed new lesions and most of them improved their bedsore. In many cases we achieved complete healing.

Discussion

We agree that the most important data we had is that all three patients that couldn’t use the right surface (based on the suggestion of our schema) developed a new bedsore. According to the results we achieved, we implemented this tool with the items we already talked about; so, it’s possible to have a numerical value that can indicate the right choice.

Clinical relevance

We think that this work may be useful in our daily job; if we have the possibility to choose the right surface, we can manage patients in the best way. And that’s all we hope.

Conflicts of Interest

None

References


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Modeling the Economic Impact of Pressure Ulcer Prevention with the SEM Scanner

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Introduction
Bruin Biometrics has developed a budget impact model (BIM) to estimate the cost savings attributable to an intervention incorporating the SEM Scanner into a PU prevention protocol. In the United Kingdom, pressure ulcer (PU) care costs the healthcare system £2.1 billion per year [1]; cost estimates are similar in Germany (€1.4 billion) [2] and the Netherlands (up to €2.8 billion) [3]. Many countries reimburse only a fraction of the costs of treating pressure ulcers. As a result, there is a significant burden on healthcare systems to minimize PU incidence or experience financial losses due to unreimbursed expenses. Studies of PU prevention programs have demonstrated a 40-50% reduction in PU prevalence rates with intervention [4], but the realized savings of such programs vary dependent upon the cost of implementing the intervention and the care settings.

Model Variables
Based on published literature, the budget impact model assumes the following by country:
- Annual PU incidence and prevalence
- % of patients in hospital acquired
- Average patient length of stay (LOS)
- Average cost of one hospital day
- Reduction in PU incidence with intervention

These values are a weighted-average across PU Stage IV and can be modified from country-specific to hospital-specific or setting-specific if values are known.

Unrealistic/standard values (default values):
- Number of wards included in the model (3)
- Number of admissions per ward per year (25)
- Number of SEM Scanners deployed per ward (2)
- Time to perform visual skin assessment (4 min.)
- Time to collect SEM Scanner readings (8 min.)
- Number of assessments per day (2)

A net increase in nursing time and a capital expense associated with SEM Scanner deployment were included in the model.

Results
Table 1 presents the model assumptions, specifically the assumed 40% reduction in number of PUs, and the results, specifically the pre- and post-intervention losses (defined as cost of treatment minus reimbursement for treatment), the number of beds made available by decreasing LOS, and the total savings after accounting for the cost of deploying the SEM Scanner as an adjunct within a PU prevention protocol.

<table>
<thead>
<tr>
<th>Treatment (beds made available)</th>
<th>Total Savings (cost of treatment minus reimbursement for treatment)</th>
<th>LOS reduction (as compared with no intervention)</th>
</tr>
</thead>
</table>
| SEM Scanner as an adjunct       | £370,000 per ward per year                                    | 1.6
| SEM Scanner alone               | £185,000 per ward per year                                    | 1.5

Table 1: With 40% PU Reduction, Impact on Costs

Discussion
The most desirable healthcare interventions are those that increase quality of care and lower costs. In all cases of SEM Scanner deployment modeled, the care setting experienced cost savings, even with a default 40% reduction in the weighted average number of pressure ulcers and hospital-acquired cost increases of SEM Scanner deployment. To date, two separate studies using the SEM Scanner have, anecdotally, observed a reduction in PU incidence during the period of study due to increased awareness of PU prevention. The German model showed a modest excess reimbursement as a result of the deployment.

Clinical relevance
Decreasing pressure ulcer incidence is achievable and will result in significant cost savings. The SEM Scanner is well positioned to aid in this achievement.

Acknowledgements
We appreciate the assistance of K. Boodts, J. Höhne, O. Reitzl, and O. Reitzl of Delkor Consulting in developing this model.

Conflict of Interest
None.

References
ABSTRACTS OF POSTER PRESENTATIONS
Proceedings of the 17th Annual European Pressure Ulcer Meeting
Stockholm, Sweden

P21

Usability and Reliability of the SEM Scanner

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Introduction
The Bruin Biometrics (BB) SEM Scanner Model 200 (Fig. 1) is a battery operated, portable, handheld device that provides biomechanical information to a physician or health care professional that can be utilized as an adjunct to the current standard of care for the detection of pressure induced tissue damage. Current standard of care for pressure ulcer (PU) prevention includes risk assessment tools (Waterlow, Norton, Braden scales) and visual inspection. Both forms of assessment are subjective, dependent on the skill of the assessor, and may have tissue with one or more measures of predictive validity such as sensitivity, specificity, and reliability [1-3]. During device development, BB conducted usability and reliability studies in clinical and human subjects.

Methods
Usability Study of the SEM Scanner: Participants included 22 nurses, nursing students, and nursing faculty. Each participant was given 10 minutes to read the device Instructions for Use (IFU) and then was asked to perform readings at 3 different anatomic sites on a patient mannequin. A trained, unbiased observer noted correct and incorrect usage of the device. Upon completion of the procedure, each participant completed a survey assessing 9 domains of usability on a 5-point scale and was invited to give feedback in an open-ended interview.

Reliability Study of the SEM Scanner: Operators included 3 persons trained in using the SEM Scanner. Participants included 31 ambulatory volunteers. Each participant remained in a supine position for 15 minutes prior to collection of SEM Scanner readings. Each operator collected 3 readings using 3 separate devices at 4 anatomical locations on each participant for a total of 108 readings per participant. Intraclass correlation coefficient (ICC), an estimate of how similar measurements collected by different operators or devices are to each other, was calculated for operators and devices in SAS 9.3 (SAS Institute Cary, NC).

Results
Usability Study: 20 of 22 (91%) participants successfully used the device within 10 minutes of reading the IFU.

Table 1: Findings from Usability Survey

<table>
<thead>
<tr>
<th>Domain</th>
<th>Avg Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Familiarity</td>
<td>4.91</td>
</tr>
<tr>
<td>IFU Completeness</td>
<td>4.40</td>
</tr>
<tr>
<td>Device comfort</td>
<td>4.20</td>
</tr>
<tr>
<td>Screen layout and visibility</td>
<td>4.75</td>
</tr>
<tr>
<td>Pressure indicator</td>
<td>4.60</td>
</tr>
<tr>
<td>Ease of cleaning</td>
<td>4.75</td>
</tr>
</tbody>
</table>

Reliability Study: The SEM Scanner was reliable and measurements were repeatable across devices and operators.

Table 2: Findings from Reliability Study

<table>
<thead>
<tr>
<th>Anatomical Site</th>
<th>ICC By Operator</th>
<th>ICC By Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicep</td>
<td>0.96</td>
<td>0.96</td>
</tr>
<tr>
<td>Left hand</td>
<td>0.91</td>
<td>0.91</td>
</tr>
<tr>
<td>Right hand</td>
<td>0.92</td>
<td>0.92</td>
</tr>
</tbody>
</table>

Discussion
The SEM Scanner rates highly for ease of use and has demonstrated above 80% reliability. Upon learning about the SEM Scanner, health care practitioners immediately understood the potential for significant clinical impact of the device on PU detection. A clinical impact model has been developed and suggests potential reduction in PU incidence with SEM Scanner readings (1) on admission, (2) discharge, and (3) throughout length of stay.

Clinical relevance
The SEM Scanner can be utilized in diverse clinical settings with minimal investment in training to existing staff and will provide reliable assessment of pressure induced tissue damage irrespective of the clinician performing the assessment.

Acknowledgements
We wish to acknowledge the UCLA School of Nursing for use of their Simulation Lab. The SEM Scanner is a non-significant risk device under clinical investigational use in the United States.

Conflict of Interest
Both studies presented here were sponsor-investigator funded studies by Bruin Biometrics, LLC.

References

P22

SEM Scanner Readings to Assess Pressure Induced Tissue Damage

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2 Skilled Facility Healthcare Solutions, United States, 1 Bruin Biometrics, LLC, United States

Introduction
Bruin Biometrics (BB) has developed an easy to use device for use as an adjunct to standard of care for the assessment of pressure ulcers (PUs). Under clinical investigational device use in the United States, we have used the SEM Scanner in two clinical studies to assess sacral and heel regions in persons affected and unafflicted by PUs. New, portable tools used for early detection of pressure ulcers are essential if prevention is to be possible.

Methods
Affected Subjects Study: Participants were recruited from nursing homes or assisted living facilities in Virginia Beach, VA, USA and Los Angeles, CA, USA. Enrolled subjects were ≥18 years of age, had a Stage I PU or suspected deep tissue injury (DTI), and were free of physical limitations or contraindications preventing assessments and readings. Each identified PU or DTI was assessed visually and with the investigational device. SEM Scanner readings were collected at the center of the wound and at 16 points around the wound (Fig. 1). Demographics, medical history, Braden and Waterlow scores were collected. Analyses presented for the Affected Subjects Study are based on interim data, enrollment is ongoing.

Unaffected Subjects Study: Participants were recruited from a pain specialty clinic in Virginia Beach, VA, USA. Enrolled subjects were ≥55 years of age, were free of physical limitations or contraindications preventing readings, not currently using corticosteroids, and free of rheumatoid arthritis, gout, or autoimmune disease. SEM Scanner readings were collected at the center of the sacrum and left and right heel and at a subset of the 16 points of Fig. 1 (7 for sacrum and 4 for heels). Demographics and medical history were collected.

Results

Table 1: Findings from Study Subjects

<table>
<thead>
<tr>
<th>Study</th>
<th>Affected Subjects</th>
<th>Unaffected Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td># Subjects</td>
<td>22</td>
<td>16</td>
</tr>
<tr>
<td>% Male</td>
<td>42.9%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Age (Y)</td>
<td>82 (13.4)</td>
<td>67 (9.3)</td>
</tr>
<tr>
<td>% Caucasian</td>
<td>75.3%</td>
<td>76.0%</td>
</tr>
<tr>
<td>% Stage I PU/DTI</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td># Sacrum PU/DTI</td>
<td>13</td>
<td>13</td>
</tr>
</tbody>
</table>

Figure 1. SEM Scanner Wound Mapping Technique

Figure 2. SEM Scanner Readings for Affected and Unaffected Sacrum

Similar patterns are seen for PU/DTI wounds on heels albeit SEM Scanner values are lower for heels than for sacrum in affected and unaffected subjects.

Discussion
The SEM Scanner provides a tool for assessment of tissue viability and wound status. Consistent with a model of information followed by tissue damage, SEM Scanner values are lowest at the center of the PU wound and are highest at and beyond the edge of erythema.

Clinical relevance
SEM Scanner readings performed (1) on admission, (2) discharge, and (3) during length of stay can provide an objective means of supporting pressure ulcer assessment in the clinical setting.

Acknowledgements
We wish to acknowledge F. Turner, MD; A. Touch, MD; and P. Crawford, MSN, NP for assistance with these studies.

Conflict of Interest
These studies were funded and sponsored by Bruin Biometrics.
Effectiveness of the implementation of evidence-based recommendations for pressure ulcer prevention in hospitals - a systematic review

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Introduction

For more than ten years, evidence-based guidelines have been available for pressure ulcer (PU) prevention. But epidemiological data show a significant number of patients at risk who do not receive adequate preventive measures, indicating poor implementation of guideline recommendations [1,2]. Therefore, this review aimed to investigate the effectiveness of strategies for implementation of evidence-based recommendations for PU prevention in hospitals.

Methods

DESIGN: Systematic review with structured narrative synthesis of the data. SELECTION CRITERIA: We included randomised controlled trials (RCTs) and prospective, non-randomised controlled studies, reporting the effect of implementation of evidence-based prevention recommendations on the PU incidence in acute hospitals (published in German or English). DATA SOURCES: Electronic search in three databases (Medline, Cochrane Library, CINAHL) covering the period from January 2000 to May 2013, and bibliographies of retrieved studies. STUDY QUALITY: Study quality was assessed regarding bias, statistical imprecision and the reproducibility of reported implementation strategies. Selection of eligible studies, data extraction, and critical appraisal were conducted by two independent reviewers. SYNTHESIS: The characteristics of the implementation strategies were summarised using the framework of process evaluation by May [3] and cross-mapped with the studies' results, stratified for the trial quality.

Results

We included five studies (1 cluster-RCT, 4 non-randomised studies). In all studies, the implementation strategies comprised several components, with combining guideline recommendations in prevention bundles, staff education, monitoring and feedback activities, and local PU prevention champions most frequently applied. In general, strategies varied greatly, e.g. with respect to content, intensity, and duration of activities or target groups. In terms of risk of bias and statistical uncertainty, the study quality of all non-randomised trials was assessed as very low, while the cluster-RCT showed moderate quality. The reproducibility of reported interventions appeared as either moderate (2 studies) or very low (3 studies). All non-randomised trials reported a reduction of PU incidence. The cluster-RCT revealed no between-group differences in the PU incidence post-implementation.

Discussion

Despite the majority of studies showing a benefit, results must be interpreted with caution. Given the existing limitations in quantity and quality of available trials, we were not able to reliably assess the impact of implementation of evidence-based recommendations for PU prevention on the PU incidence in hospital patients and to identify likely reasons for success or failure. In future trials, implementation strategies should be chosen based on the most appropriate theoretical and empirical evidence. Components like reward systems for staff empowerment or supply of devices were rarely included in the evaluated strategies, but may be potentially important.

Clinical relevance

Based on our systematic review, the clinical impact of implementation of evidence-based recommendations for PU prevention in acute hospital patients remains unclear. In clinical practice, activities striving for better preventive care should be complemented with robust process and outcome evaluation.

Conflict of interest

There are no conflicts of interest.

References


Successful management of a non-healing pressure ulcer for an immuno-compromised child with a bacteria binding gel dressing

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Introduction

A 2-year-old girl with Acute Lymphoblastic Leukemia (ALL) developed a grade 4 pressure ulcer in the right gluteal sulcus after six months of chemotherapy treatment. The wound was managed with wound gel and adhesive secondary dressings according to local clinical practice. Surgical debridement of necrotic tissue was performed on two occasions with minimal improvement noted. After 30 days of management the wound was still about 2.5 cm in diameter (Fig 1). Meanwhile, the patient suffered from two episodes of febrile neutropenia requiring IV antibiotics. Also advanced antimicrobial dressings including silver based preparations were used with little improvement.

Methods

The management with a bacteria binding gel dressing began just over a month after the first visit to the wound clinic. The dressing was covered with moisture preserving polyurethane dressing. The dressing was changed twice weekly by the patient’s mother, who photo-documented the healing process.

Results

At the dressing change after 7 days a notable improvement had occurred (Fig 2). After 13 days of treatment, the wound was further improved and healing of the wound occurred over time while chemotherapy treatment was ongoing.

Discussion

The patient in this case report was an immuno-compromised toddler thus making the choice of dressing paramount. The purpose of the dressing was to protect the wound from infection without interfering with healing while maintaining a good moisture balance. Location of the wound within the diaper boundary and in combination with a compromised immune system increased the likelihood of wound contamination. This was a reason alone to protect the wound from infection.

In this case a bacterial binding gel dressing was used to protect the wound against microorganisms. The mode of action of the dressing is based on hydrophobic interaction and is not dependent on the release of chemicals into the wound bed [1].

An important factor for good wound healing is that the moisture balance is maintained [2]. After debridement of the necrotic tissue a wound cavity was formed which was filled with the gel dressing. As the gel is combined with a dressing the gel is kept in place.

The patient was managed at home with regular visits to the hospital to verify the state of the wound status. The dressing was easy to apply and removed both at the hospital and in the home environment. The gel did not cause pain and the dressing did not stick to the wound bed which may cause pain at dressing change.

Clinical relevance

This case report indicates that a bacteria binding gel dressing can add value in the treatment of a non-healing pressure ulcer in an immunocompromised child.

Acknowledgements

We appreciate the help of the mother of the child with continuous report on progress and pictures.

Conflict of Interest

There is no conflict of interest regarding the material discussed in the case report.

References

Therapeutic hypothermia and pressure ulcer risk
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2 Eira Hospital, Finland

Introduction
Recent NPUAP-EPUAP [1] guideline on pressure ulcers (PU) highlights oxygen consumption and temperature among the risk factors of pressure ulcer development. Both hypothermia [2] and fever [3] have indicated as risk factors, which is somewhat conflicting since the oxygen consumption increases or decreases about 13%, when the body temperature changes with one degree Celsius [3]. We examined whether therapeutic hypothermia predisposes for pressure ulcer development.

Methods
During 2010-2012 totally 4869 adult patients were treated in a large, mixed intensive care unit (ICU) and 364 patients (incidence 7.6%) of them developed a pressure ulcer. Patients with pressure ulcer exclusively in the nose caused by a non-invasive ventilation mask were excluded from the analysis.

To investigate the relationship of hypothermia and PU risk we examined retrospectively the development of PUs among adult patients with induced therapeutic hypothermia (n=65) with a target temperature of 33°C [3] over three years in this mixed ICU population.

Results
74.6% (44) of the patients were transferred to wards as recovering. 12 (incidence 20.3%) out of the 59 therapeutic hypothermia patients developed a pressure ulcer during their intensive care period. The location of pressure ulcer was not recorded in 8 patients, two had a pressure ulcer in sacrum and 2 in the heels.

Discussion
Hypothermia reduces the oxygen requirements of the tissues considerably which together with the use of dynamic mattresses aimed at maximum protection against PUs should decrease the risk of pressure ulcer development [1]. When assessing the PU risk issues in the past medical history and the prior cardiopulmonary resuscitation needs to be considered as predisposing factors for PU development. Furthermore, the total immobility with deep sedation and prolonged intensive care together with stiffening (reduced elastic modulus) of the tissues due to hypothermia will increase the pressure ulcer risk [1, 2, 5]. In this ICU population, the extremely high risk group of intensive care patients for PU development i.e. Jackson/Cubbin score ≥29 (2.5%), where the therapeutic hypothermia patients also belong to, the incidence of pressure ulcers is about 12% [5]. Furthermore, within these intensive care patients we can identify subpopulations of patients whose PU risk is more than 40%. Thus based on the incidence of the pressure ulcers in the therapeutic hypothermia group, it is questionable, whether hypothermia forms a major risk factor for pressure ulcer development.

Clinical relevance
Patients treated with therapeutic hypothermia belong to the high risk group developing a PU for several reasons and has to be treated accordingly. Still hypothermia itself is not necessarily independent risk factor for PU development.

Acknowledgements
The study has been supported by grants from the author’s Department, the Finnish Wound Care Society and the Finnish Society of Intensive Care Medicine.

Conflict of Interest
Esa Soppi is the chairman of board of Carital group manufacturing and marketing globally mattresses for pressure ulcer prevention and treatment.

References

Sequential Organ Failure Assessment as a Predictor of Pressure Ulcer Risk in Intensive Care Patients
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2 Eira Hospital, Finland

Introduction
More than 450 different risk factors for pressure ulcer development were recently identified [1]. Many of these risk factors are derived from common bases but dealt or interpreted differently in various risk scales. The Sequential Organ Failure Assessment (SOFA) score takes into account in addition to respiratory and hemodynamic variables also renal hepatic and hematological disorders as well as the Glasgow Coma score (GCS) [2]. Martino et al [2010] identified first-day respiratory SOFA and fourth-day cardiovascular SOFA subcategories as possible risk factors for PU development. Furthermore, Glasgow Coma score have been indicated as a possible risk factor [1]. This abstract reports the significance of the SOFA scale on pressure ulcer development in a cohort of more than 4700 ICU patients.

Methods
The data were retrospectively collected from the clinical database of a large mixed intensive care unit (ICU) consisting the whole adult patient cohorts (about 16300) from years 2010-2012 [4]. The first day SOFA scores were used to predict the PU risk. The patients with PU at admission (N=115) as well as those from whom all data point were not available were excluded from analysis.

Results
357 out of 4782 patients during their ICU stay developed a pressure ulcer, or a PU incidence 7.5%. The higher the SOFA score the more patients developed a PU (P<0.0001, logistic regression). A SOFA score ≥212 group consisted of 71% of all patients but that group included 18.5% of all patients. Only the thrombocyte count and bilirubin concentration were not significantly associated with PU development (P=0.217 and P=0.7077, respectively).

Discussion
Previously only limited evidence have been available of the association of SOFA score or its subcategories to the development of pressure ulcer in intensive care [1, 3]. The Jackson/Cubbin (JC) risk scale which has been shown to perform best among risk scales for intensive care patients [4, 5] contains respiratory and hemodynamic variables. Even though they are presented in JC scale differently from that of SOFA the results are concordant. It seems that large patient materials are needed to show, excluded or confirm previously suggested associations of SOFA and PU development [1-3]. The results confirm and indicate that the first day respiratory and cardiovascular SOFA subcategories have a predictive value for the pressure ulcer development in the ICU setting.

Clinical relevance
Respiratory and cardiovascular SOFA subcategories together with other variables may improve the prediction of pressure ulcer development in ICU patients.

Acknowledgements
This study has been supported by grants from the author’s Department, the Finnish Wound Care Society and the Finnish Society of Intensive Care Medicine.

Conflict of Interest
Esa Soppi is the chairman of board of Carital group manufacturing and marketing globally mattresses for pressure ulcer prevention and treatment.

References
Vital Skin Predictor – a measurement tool to quantify temperature and humidity at the interface between wheelchair cushion and buttocks

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2 Adelaide Centre of Expertise in Rehabilitation and Audiology, The Netherlands, rgsaer@adelaide-zorggroep.nl

Introduction

Pressure distribution, sitting balance, temperature and humidity are important factors in the prevention of pressure ulcers. Temperature and humidity determine the microclimate between cushion surface and buttocks. Ferguson-Pell states that too little attention is paid to microclimate [1], one reason being that it is very difficult to quantify objectively. More knowledge about this microclimate may aid in the choice of cushion type and may aid in raising patients’ awareness regarding the importance of the aforementioned parameters. The aim of this study was 1. to develop a system to measure temperature and relative humidity at the cushion / buttocks interface (CB), and 2. to assess potential differences in microclimate changes over time, in healthy volunteers who sat on three types of cushions.

Methods

The Vital Skin Predictor (VSP) measurement mat, developed by Adelastik, consisted of 7 calibrated sensors (STHTS, Sensation). 6 placed in a permeable fabric (sabatologisk.com) and 1 measuring room climate. Ten healthy subjects participated in the study (table 1). They sat on the VSP quietly for 45 minutes behind a PC. All were biometrically identical. The difference was calculated between the relative humidity measured in the room and the mean value of relative humidity measured by the 6 sensors in the VSP averaged over the last five minutes of the 45 minutes measurement.

The three cushion types used were:
- Basic wheelchair cushion (Hardicare) (basic)
- Ultrasound Medical Seat with permeable cover (Cusiana) (CMS)
- Ultrasound Medical Seat with PU cover (Cusiana) (PU)

Statistical analyses included Wilcoxon signed rank tests.

Results

Figure 1 shows an example of time series of the measurements from one participant. Figure 2 shows boxplots of the difference in relative humidity for all 3 cushion types. Temperature at the CB did not differ significantly between the three cushion types.

Discussion

The VSP proved to be mechanically robust (wear-and-tear) and electronically stable. The VSP is able to differentiate between cushion types regarding microclimate aspects, i.e. regarding relative humidity. Of the three cushion types compared, CMS proved to be the best in regulating the microclimate at the CB.

Clinical relevance

Results indicate that the VSP may provide valuable information as to prescription and evaluation of cushions, thereby optimising pressure sore prevention regimes.

Acknowledgements

We appreciate the help of R. Doon, Cusiana BV, and J. Stolkerman, Sabatologisk, the Netherlands.

Conflict of interest

None.

References


Methods and results of the James Lind Alliance Pressure Ulcer Priority Setting Partnership

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Introduction

The role of people with chronic, complex wounds in wounds research is usually limited to “being objects of study and beneficiaries of research results” [1]. The James Lind Alliance Pressure Ulcer Priority Setting Partnership (JLAPUP) was initiated by the National Institute for Health Research (NIHR) Wounds Research for Patient Benefit (WRPB) programme grant for applied research [2]. The primary objective was to bring service users/patients, carers and health professionals together to identify and prioritise the top ten uncertainties, or ‘unanswered questions’, about the effects of pressure ulcer interventions that they agree are the most important. A second objective was to investigate methodology for patient and public involvement in research priority setting in wound care. Pressure ulceration was chosen because pressure ulcers were the most common complex wound type found in the WRPB prevalence study and because pressure ulcers are a high priority for the UK National Health Service (NHS). The prevention of pressure ulcers is included in domain 5 of the NHS outcomes framework 2014/15 [3].

Methods

We adopted a mixed methods, participatory research framework to this priority setting work. There is no standard method for health research topic identification and prioritisation and reporting in this area is predominantly descriptive rather than evaluative. JLAPUP was conducted in close collaboration with the James Lind Alliance (JLA) which was established in 2004 to bring together patients, carers and clinicians together in Priority Setting Partnerships (PSPs) to identify and prioritise uncertainties about the effects of treatment. While our methods were informed by the emergent JLA approach, we were also influenced by other approaches and in particular the Dialogue Model, another framework for research agenda setting, which includes both consultative and deliberative methods and allows for emergent and flexible design. A protocol was developed which outlined a six phase process comprising expression, initiation, consultation, collation, prioritisation, integration, reporting and evaluation. This was followed under the guidance of the JLAPUP steering group.

Results

An existing, reliable answer in the research literature was found for only one of the 690 uncertainties submitted in the process. 61% of research questions generated focused on prevention as an investigative outcome and 32% focused on healing. Genuine uncertainties are published on NHS Evidence in the UK Database of Uncertainties about the Effects of Treatments (DUETs). The top ten uncertainties chosen in the deliberative process are at http://www.jlapup.org.uk.

Discussion

The JLAPUP process revealed the extent of research uncertainty about pressure ulcer treatment and prevention in addition to the effectiveness of treatment and prevention interventions, stakeholders also placed high priority on research concerned with aetiology, diagnosis, prognosis and other aspects of care. In keeping with previous PIPLs JLAPUP prioritised questions about the effectiveness and harmonization of NHS service models and the best means of supporting patient and family self-care within those models. JLAPUP faced the particular challenges posed in developing patient and public involvement work with those affected by chronic wounds who are often elderly, immobile, unrepresented and uncared for, many of whom are living with concurrent long term conditions. Participants in the process were generally younger and more able to be living at home than the pressure ulcer population as a whole. People in more formal care settings (including people in nursing homes and hospital in-patients) were under-represented compared to the pressure ulcer population as a whole. These omissions may be offset to some extent by the inclusion of uncertainties from health professionals and carers for these groups.

Clinical relevance

The JLAPUP process revealed that some strongly held beliefs about pressure ulcer care are actually big research uncertainties.

Acknowledgements

We appreciate the help of all the partners and all those who submitted their experiences and uncertainties to the process.

Conflict of Interest

None.

References

Introduction

Deep tissue injury (DTI) is a type of pressure ulcer developing due to loading of soft tissue e.g. near bony prominences. Often injury remains internal and undetectable until severe and external wounds develop. Highlighting the need for improved early detection of and insight into the onset of DTI. To this end animal experiments and dedicated finite element analyses (FEA) can be performed [1]. In this study new magnetic resonance imaging (MRI) compatible experimental set-up is used, enabling mechanical loading of the tibialis anterior muscle (TA) of a rat during 3D MRI [2]. The MRI methods combined with custom 3D FEA allow for evaluation of in-vivo damage and loading metrics during DTI development.

Methods

7-week-old Sprague-Dawley rats (♂, 152-220g, n=10) were secured in the MRI compatible set-up and subjected to indentation of the TA. A 7.0T Bruker small animal scanner was used to perform MRI measurements pre-, during- and post-indentation. Anatomical and geometry was recorded using T1-weighted MRI while indentation induced physiological changes, potentially including damage, where assessed with T2-mapping. Animal specific 3D FE models were created based on segmentation of the T1-data (using the GIBBON MATLAB Toolbox [3]). The models were further validated with respect to prespective indentation and motion. Soft tissue was modelled as uncoupled Ogden hyperelastic. Local strain energy density (SED) served as a summary metric of deformation. Quantitative T2-maps were created by voxel wise MRI signal fitting. Preliminary analysis was performed on two subjects comparing SED and T2-maps.

Results

In Fig.1 A-B-C T2-maps of the TA muscle are shown pre-, during- and post-indentation, respectively. Significantly increased T2-values (ROI-based analysis, paired t-test, p<0.001) were observed post-indentation as compared to pre- and during-indentation. The T2-enhancement was highly structured and edema was present between muscle and skin. Fig.1 D shows a schematic representation and boundary conditions of the 3D FEA. Fig.1 E shows that the SED was maximal at the indentation site. Fig.1 F shows an axial SED slice corresponding to those in Fig.1 A-B-C. A comparison of C and F shows that regions of high SED values and raised T2 values visually correlate.

Discussion

The development of DTI is indicated by local tissue T2-enhancement. T2-enhancement is caused by an increase in intra- and extracellular free water. Possible causes for this increase are pathologic features associated with DTI such as inflammation and oedema. Visual comparison between the MRI results and the FEA results show that high SED values colocated with elevated T2 values, and thus damaged tissue. Future work focuses on the analysis of the 3D MRI and FEA derived damage metrics.

Clinical relevance

The combination of MRI and FEA provides insight into the effects of mechanical loading on the development of deep tissue injury. This insight can be used to optimize treatment strategies.

Acknowledgements

This research was supported by the Dutch Technology Foundation STW, the Applied Science Division of NWO, and the Technology Program of the Ministry of Economic Affairs.

Conflict of Interest

No conflicts of interest reported.

References


Methods

The onset of a pressure ulcer, superficial or deep, is multifactorial although it seems clear that sustained mechanical loading is the primary cause [1,2]. The influence of shearfriction on the development of pressure ulcers has been acknowledged for a long time. Dredelle (1976) found that the combination of pressure and shear could reduce the threshold value for the development of pressure ulcers by a factor of 10 [3]. The images in figure 1 underline the importance of taking shear into account. The figure illustrates the calculated stress distribution inside a spherically shaped deforming body sliding over a flat surface. This results in a shear force parallel to the surface that depends on the friction coefficient. The shear force increases significantly in the almost friction-free situation (figure 1 a) and is due to contact of the tissue with the flat surface of the indentor.

Discussion

The combination of MRI and FINA provides insight into the effects of mechanical loading on the development of deep tissue injury. This insight can be used to optimize treatment strategies.

Acknowledgements

This research was supported by the Dutch Technology Foundation STW, which is part of the Netherlands Organisation for Scientific Research (NWO), and which is partly funded by the Ministry of Economic Affairs.

Conflict of Interest

There are no conflicts of interest reported.

References

P31

Preventing Heel Blisters in Orthopaedic Patients who have spinal anaesthesia

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Introduction
This is a multiple Orthopaedic patient innovation that positively impacts on change in a particular care group. This study is to determine if the application of a five layer silicone dressing when used prophylactically would reduce the incidence of the development of a grade 2 heel blister, where shear and friction are causative factors post-operatively in acute trauma patients who undergo spinal anaesthesia.

Methods
All patients who present on the unit over a 3 month period with fractured neck of femur and are selected for spinal anaesthesia repair will be included in the study. Subject to consent they will have a five layer silicone heel dressing applied immediately post-operatively. The heel skin will be monitored for signs of non blanching erythema daily and the dressing will be removed after 72 hours post operation or when the patient is mobilizing out of bed.

Patients with known vascular disease or with existing tissue damage related to pressure, shear or friction will be excluded from participating in the study. Usual preventative care delivery will be continued within the study with the addition of the silicon dressing application.

Previous data has been collected on incidence of post operative heel blister damage following spinal anaesthesia and this will be utilized as a baseline in order to determine decrease in incidences.

Data will be collected on age, sex, surgery performed, Waterlow Risk Assessment score, any skin damage identified on admission, type of trauma, period of time prior to hospital admission.

Discussion
The prevention of hospital acquired pressure ulcers in all patients remains a critical challenge. Once all known preventative strategies have been utilized. Whilst generic strategies such as pressure reducing foam mattresses and dynamic pressure relief mattresses, the incorporation of rounding’s, positional movement, nutritional correction, etc all play a significant part in preventing such events. It is argued that there is a requirement to also recognize that deeper analysis into the specific causative factors of pressure area damage which are specialist to the patient and/or the patients presenting condition should also be addressed. The incorporation of the five layer silicon dressing into the context whereby the patient has an unforced deficit of sensory perception could then be widened to incorporate those patients who have a disease related deficit such as new stroke patients, elderly patients and diabetic patients, who have degrees of peripheral neuropathy and are often unaware of the sensory deficit, may also benefit from such preventative measures.

Data collection will demonstrate if a fall in incidence occurs when analyzed against previous comparable period data. Recommendations for a wider study to be undertaken will include patients who have sensory deficit and this will be made once the initial data collection is completed and preliminary conclusions can be derived.

Clinical Relevance
The hypothesis for testing is that the application of a five layer silicone dressing within the principles discussed by the Santa Maria study can be applied in a setting where moisture is not a key factor but where sensory deficit results in shear and friction being a principle causative factor, will result in a decrease from previous acknowledged data statistics.

References

P32

SYSTEMATIC IMPROVEMENT OF PRESSURE ULCER PREVENTION

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Introduction
When the Kalmar County Council first conducted a prevalence study of pressure ulcers, the prevalence of 19 percent of patients affected was reported, i.e. every fifth patient had pressure ulcers! To implement a change soon became imperative. An interdisciplinary group was set up, with focus on systematic improvement. The objective was thus to achieve an annual reduction of pressure ulcers by 20%, beginning in 2012, and to eventually achieve Vision Zero.

Methods
Methods:
• Mapping of pressure ulcer prevalence in each ward (2008-)
• Consensus regarding common materials and procedures:
  - Preventive measures (repositioning schedules, pressure-relieving equipment, nighttime mattresses, etc.)
  - Education programs
  - Prevention plans
  - Follow-ups after each prevalence study and annually
  - Follow-ups on risk and skin assessments
  - Establishment of skin-care teams

Clinical relevance
Pressure ulcers increases the number of days spent in hospital, depleting budgets by 70 000 SEK/patient, but above all – pressure ulcers results in increased suffering for each patient.

Conflict of Interest
None.

Results
In 2014 the Kalmar County Council reached a prevalence of 5.4 percent, the lowest reported prevalence in all the County Councils of Sweden.

Table 1: Prevalence statistics 2008 vs 2014

Note: The results include all reported pressure ulcers, even ulcers that were known when the patient was admitted to hospital.

Table 2: Categories/stages of pressure ulcers 2008 vs 2014

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Mepilex Border Sacrum dressing use for pressure ulcers prevention in period of open heart surgery and in ICU
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Introduction
Pressure ulcers prevention is more than ten times cheaper than treatment. By using modern technologies and diagnostic methods during open heart surgery, nowadays it is possible to make surgeries for high risk patients. According to that, there is a possibility to get pressure ulcers during the surgery. It is important to assess the risk of obtaining a pressure ulcer for each patient, and to prevent to pressure ulcers before surgery as most of them can be prevented. One of the actions in pressure ulcers prevention is using suitable dressing which maintains skin entirety. To prevent pressure ulcers effectively, Mepilex Border Sacrum dressing was used for patients before open heart surgery arterial blood condition.

Methode
Clinical observation in which took part 16 patients. Main patient selection criteria: Mechanical lung ventilation (16), repetitive surgery (4), long surgery (13), unattainable hemodynamic (13), obesity (4). Each of all selected patients were evaluated. Estimation included evaluation of skin entirety and risk of pressure ulcers from Braden scale before putting on dressing in surgery room, in ICU and before patients were moved to the clinical heart surgery department. Duration of surgery was 2 to 11 hours. Average age of patients 65 years. For one patient the dressing was used after surgery ICU with an intention to prevent PU. During surgery one patient got 2 stage PU in sacrum area outside of the borders of dressing.

Results
From all selected 16 patients, everyone maintained skin entirety by using Mepilex Border sacrum dressing 1st stage pressure ulcers healed in 17 hours and 2nd stage pressure ulcers healed fully in 19 days. Period of using one dressing was 3-7 days. Total usage of dressing: 19, average usage time of one dressing: 1, 5 days (7max).

Conclusions
Safetac technology Mepilex Border Sacrum dressings efficiency was convincingly proved in clinical practice, using for patients with prolonged immobility, it started using Mepilex Border Sacrum at the right time for prevention it is possible to fully maintain skin entirety during surgery and recovery period in intensive care unit.

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The prevention of sororigonic wounds in intensive care
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Introduction
Some wounds may be caused by the negative effects and activities of nurses and their care. Adverse effects include: prolonged pressure on the skin and tissue; pressure of the equipment, friction, moisture, devices for monitoring vital signs, inappropriate fixation, allergy to patch or disinfectants; restraints; frequent bed turning; bed plates; poor dressing application of a protective film on the predilection sites; inadequately selected therapeutic material for healing; inappropriate use of anti-infectious aids or prone position [1, 2]. The formation of wounds is caused by the focus on life-saving and so neglected skin care is common in intensive care units.

Methods
A questionnaire survey (22 items) was carried out among nurses working in the largest Faculty hospital in the South Moravian region (Czech Republic). Statistical analyses was made with the Kruskal-Wallis and Wilcoxon test (significance level 0.5).

Results
The survey was completed by 149 acute care nurses (working at anesthesiology – AN or ICU) with a response rate of 86.7%. The average age of respondents was 31 years. Average duration of working experience was 9 years. Most of respondents graduated from secondary school for nurses (40.94%). Only a few had an academic degree (8.29%) or MSc. (9.4%). Half of the respondents worked in AN (47.65%) and a half at ICU (52.35%). Almost all interviewees marked down pressure ulcers (84.56%), while nurses in the ICU were more likely to perform dressing changes with a doctor during morning hygiene care (p=0.00).

Clinical relevance
Acute care nurses from our sample have a sound knowledge of wound prevention, but it appears that many of them do not use the recommended clinical guidelines pertaining to wound care. Because it is important for nurses to be able to detect early symptoms of wound formation and possible complications, it is necessary to plan treatment precisely according to current clinical guidelines. Knowledge about the risk of possible interventions has to be improved. Therefore (acute) care nurses and physicians should accept better the knowledge and skills of their nurses.

Acknowledgements
We appreciate the help of nurses from The Brno Faculty Hospital.

Conflict of interest – no conflict of interests

References

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Pressure ulcer prevention – Why don’t we start from the beginning?

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Introduction

Extensive research tells us that pressure ulcer prevention does make a change and early actions are encouraged. International and national clinical guidelines have been developed. However, we also know that these guidelines are not always used in everyday practice [1]. Furthermore, clinical guidelines often exclude the care provided at more complex settings as for example the emergency department and ambulance contexts. Why don’t we start from the beginning of the acute care delivery chain?

A randomized controlled trial (RCT) has been undertaken to test the effect of heel pressure ulcer prevention boots. The purpose of this presentation is to describe methodology, strengths and barriers when conducting a RCT across the acute care delivery chain.

Methods

The RCT involved ambulance stations, emergency departments and wards at two county councils in Sweden (Fig. 1). A total of 18 3 patients participated in the study. Study-specific protocols were developed to cover the care processes in the entire acute care delivery chain, from inclusion in the acute care admission to discharge from a hospital ward.

Results

Information about incidence of pressure ulcer, risk assessment as well as patients’ perspective of comfort was gathered. Data collection is completed and data analysis in progress.

Discussion

Interventions focusing on the entire care process, from the pre-hospital care, admission via the emergency department and to discharge should be encouraged in respect to safety and quality requirements to improve the patient care.

Our study shows that it is possible and of importance to carry out RCTs across the acute care delivery chain. Although the intervention was easy to apply, the implementation to the contexts was more complicated. During the planning stage and the data collection several challenges were raised: such as organizational changes, logistic issues, number of health professionals involved and staff unfamiliar with research procedures. This study was resource- and time-consuming.

Clinical relevance

Patient care must be safe and based on the best possible evidence. This is a responsibility for all health care staff caring for patients across the acute care delivery chain. Thus, undertaking RCTs in clinical care is important to facilitate research based care and to support research utilization.

Acknowledgements

A grateful thank you to Etac for providing Healthit and to all study nurses for the help with data collection.

Conflict of Interest

None

References


Marjolin Ulcer: Arising in A Pressure Sore with Acute Malignant Transformation

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Introduction

Marjolin ulcer refers to a rare malignancy that arises from chronic non-healing wounds or cutaneous scars. This most commonly occurs in burn wounds, but has been reported in many other types of non-healing wounds [1]. The development of malignancy tends to be slow, usually takes time of 25 to 50 years [2]. Marjolin ulcer tends to be more aggressive than other types of skin cancer and metastatic rate has been documented much higher [1].

Methods

Thirty-four-year-old male with a history of paraplegia had undergone surgery with V-Y advancement flap 17-years ago. Two years prior to presentation, he noticed the onset of ulceration again. The purplish mass with central ulceration was located over previous surgical scar in midline of sacral area, measuring approximately 5 x 6 cm (Fig. 1). The scar presented itself with a relatively normal appearance.

Results

Punch biopsy was done which revealed well-differentiated SCC. Bilateral lymph nodes were palpated, and we checked pelvic CT and PET, which showed suspicious bilateral lymph node metastasis. The patient received wide excision and bilateral lymphadenectomy. The resultant defect was covered with superior gluteal artery perforator propeller flap. The final pathology report described a Marjolin ulcer, characterized by well-differentiated SCC. No evidence of recurrence of cancer or ulceration was found at the 6-month follow-up examination (Fig. 2).

Discussion

We present a case of Marjolin ulcer which quickly transformed to a malignancy within only 2 years. The previous scar presented itself with a relatively benign appearance, different from what could be seen in a typical Marjolin ulcer. Therefore, scar itself does not seem to be a direct cause of Marjolin ulcer in this case. However, the scar was located on midline of sacral area where suffer from repeated friction, shearing and pressure. We assumed that increased vascularity and weakened epithelium of scar combined with repeated trauma due to midline location quickened malignant transformation. We managed it with perforator propeller flap, and successfully covered the defect with normal skin which is distant from the surgical scar.

Clinical relevance

We report a case of Marjolin ulcer which degenerated within only 2 years, successfully treated with perforator propeller flap.

Acknowledgements

We certify that there is no conflict of interest.

References

FACIAL PRESSURE ULCER DUE TO THE SENSTAKEN-BLACKMORE TUBE SECURING HELMET
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Introduction
Pressure ulcers are serious complications and major cause of morbidity in critically ill patients. In most cases, pressure ulcers develop over bony prominences such as the sacrum and greater trochanter. However, in cases where a medical device itself produces the pressure, the pressure ulcers may develop in an unusual area where it may be difficult to detect. In the present report, we described a case of an atypical facial pressure ulcer associated with Sengstaken-Blakemore (SB) tube in use in order to raise awareness of this rare complication among clinicians.

Methods
Fifty-nine-year-old female with alcoholic liver cirrhosis visited emergency department due to massive hemorrhage. On physical examination, the initial blood pressure was 60/40 mmHg, pulse rate was 160 beats/minute, and respiratory rate was 34 breaths/minute. To prevent further bleeding, SB tube was inserted and it was secured to helmet. When the helmet and tube were removed after 3 days, about 14 x 3 cm sized full-thickness skin necrosis was noticed in her forehead (Fig. 1).

Discussion
The purpose of this presentation is to report a rare cause of MDR pressure ulcer to alarming the clinician the significant pressure. We certify that there is no conflict of interest. References

ABSTRACTS OF POSTER PRESENTATIONS

P38
Dual process theory and nurses’ pressure ulcer related decision making
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Introduction
Consistent delivery of safe high quality health care relies on nurses’ ability to make appropriate judgements and decisions about the treatment of patients. Nurses have to make a number of judgements and decisions in what is known as dual process theory (8, 9). When, where and in what balance system 1 and system 2 are used is an active sub-discipline of dual process models. Developmental Review. 2011;3(2):103-18.

Discussion
Studens (10, 11) which underpin the dual process theory indicate that experts have an enhanced intuitive process for decision making that is underpinned by pattern recognition, which allows them to decide the best course of action with the experiential information stored in their memory. Experts develop their expertise through practice and reflection on experience, which results in a higher level of expert heuristic or intuitive decision making in contrast to the more emotional intuitive decision making of novices (10, 12).

Clinical relevance
The dual process theory appears to account for some of the findings about the shortcomings of nurses’ pressure ulcer related decision making in different studies (1, 2). It may be prudent to put in place measures such as clinical decision support systems or decision making aids (13, 14) to enable nurses to consistently make more appropriate decisions about pressure ulcers.

No conflict of interest
References

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P37
FACTORIAL PRESSURE ULCER DUE TO THE SENSTAKEN-BLACKMORE TUBE SECURING HELMET
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Introduction
Pressure ulcers are serious complications and major cause of morbidity in critically ill patients. In most cases, pressure ulcers develop over bony prominences such as the sacrum and greater trochanter. However, in cases where a medical device itself produces the pressure, the pressure ulcers may develop in an unusual area where it may be difficult to detect. In the present report, we described a case of an atypical facial pressure ulcer associated with Sengstaken-Blakemore (SB) tube in use in order to raise awareness of this rare complication among clinicians.

Methods
Fifty-nine-year-old female with alcoholic liver cirrhosis visited emergency department due to massive hemorrhage. On physical examination, the initial blood pressure was 60/40 mmHg, pulse rate was 160 beats/minute, and respiratory rate was 34 breaths/minute. To prevent further bleeding, SB tube was inserted and it was secured to helmet. When the helmet and tube were removed after 3 days, about 14 x 3 cm sized full-thickness skin necrosis was noticed in her forehead (Fig. 1).

Discussion
The purpose of this presentation is to report a rare cause of MDR pressure ulcer to alarming the clinician the significant pressure. We certify that there is no conflict of interest. References

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Soft-tissue complication during early treatment of children with congenital clubfoot: prevention and management

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Introduction
Serial casting in children with congenital clubfoot is a standard protocol for management of this severe orthopaedic disorder. Casting starts usually immediately after birth of the child and clinicians are facing with numerous problems, depending on the specific skin and soft tissue condition of the newborn, inevitable pressure during casting and severity of the deformity.

Aim
To assess the risk of soft-tissue damage during early treatment of children with congenital clubfoot in order to avoid possible complication.

Material and method. In consequential series of 100 children with congenital clubfoot (135 feet) we assessed the number of soft-tissue complications. Three groups were determined depending on severity of the damage: 1) skin irritation; 2) pressure sore; 3) ulcer. The square of the damage and duration of healing process were assessed also. Correlations of the incidence of complication with age of the child, severity of initial deformity, and details of treatment protocol were estimated.

Results
The incidence and severity of soft-tissue damage during early treatment of children with congenital clubfoot has positive correlation with severity of the initial deformity. We could not found dependence of the incidence of soft-tissue damage with the sex of the child. Ulcers were more common for children younger 6 months. In children, treated by the method of Ignacio Ponseti provides less complications in terms of soft-tissue lesions.

Conclusions
Soft-tissue damage during early treatment of children with congenital clubfoot is rather common complication. Severity of the initial deformity is estimated as the most important prerequisite for the following soft-tissue lesion. Age before 3 months does not alleviate the risk of the lesion. Thorough casting in accordance with current principles (Ponseti) and the usage of contemporary materials help in prevention of severe complications.

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Cardiopulmonary resuscitation (CPR) - function of air mattresses is useless? - A manikin study

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Introduction
There is a huge variation between the properties of dynamic air mattresses, and which may behave differently in case of cardiopulmonary resuscitation (CPR) [1,2]. Air mattresses in acute care units are expected to be equipped with a CPR system to enable a rapid deflation of the air mattress to allow CPR to be carried out. A part of the continuously functioning air mattresses are so called open systems which are required to be deflated at the initiation of CPR according to manufacturers’ instructions, while others are closed systems not necessarily requiring deflation. However, it is not known whether the use of a CPR function of the air mattresses really has an effect on the stability and effectiveness of CPR. Therefore, we examined the functionality and performance of different type of mattresses during CPR [1,2].

Methods
In this study we examined the performance of a higher specification foam mattress and two dynamic air mattresses which modes of function are totally different (Carital Optima, thickness 13 cm, closed system, optimally adjusting to optimum irrespective of patient’s weight, body shape, and position by the intelligent control unit) and Nimbus, thickness 21.5 cm, alternating system, pump functioning 24/7; an open system) during the experimental CPR. A patient simulator manikin (SimMan 3G, weight about 40 kg) was used as a resuscitation target. Air mattresses were examined during their normal functional modes as well as when the CPR-valve was opened at the initiation of experimental CPR. The results were compared to situations where the manikin was placed on hard floor and on a higher specification foam. It is still possible that the use of the CPR-valve can increase the stability, effectiveness and efficiency of resuscitation if the thickness of the mattress increases above 20-25 cm and if the CPR is carried out in bed.

Clinical relevance
The results highlight potential differences between various type of mattresses in association with CPR. Current requirements on deflation of air mattresses are based on opinion and not on research.

Conflict of Interest
Esa Soppi is a chairman of the Board of the Carital Group.

References

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Introduction

Current guidelines state that a higher specification foam mattress is more effective in pressure ulcer (PU) prevention than a conventional foam mattress [1]. The guideline, however, does not specifically define what is a higher specification foam mattress. In different occasions the quality of foam mattresses are attributed to various criteria, such as the thickness of the foam, number of foam layers, density of the foam, its subjective softness or hardness, its viscoelasticity or results from interface pressure measurements, etc. Still, none of these properties as such have proved to be significant, since they are partly subjective or have little to do with the functionality of the mattress to prevent the PU development. The evidence defining what is a higher specification for mattress is scarce and conflicting results [2].

To our knowledge there are no single study involving foam mattresses that would highlight more than two specifications of polyurethane foams which make the interpretation and comparison of the study results extremely difficult. To improve the situation it would be beneficial to agree on how the specify different foams and foam mattresses. We want to share our combined close to 100 years of experience in polyurethane foam production, of working with foam manufacturers, research on mattress development, mattress manufacturing and pressure ulcer research.

Results

Table: The key properties for higher specification foam mattresses.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>4 cm</td>
<td></td>
</tr>
<tr>
<td>Density</td>
<td>35 kg/m³</td>
<td></td>
</tr>
<tr>
<td>Elasticity</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Viscoelasticity</td>
<td>30%</td>
<td></td>
</tr>
</tbody>
</table>

A higher specification foam mattress needs to have at least two layers; high resilience foam on the bottom and viscoelastic foam on the top. However, the specifications of different foam grades needs to be clearly defined. Table summarizes the main features for higher specification foam mattresses. At least the six main features listed in the table should be available from each grade of the foam used in any mattress. Furthermore, the production tolerance of the foam grades should be tight, ±5%, from batch to batch.

Discussion

A higher specification foam mattress needs to fulfill three central functional user specifications: 1) It needs to possess good pressure relieving properties and 2) the patient is able to change his or her position, 3) it is easy for the nursing staff to change the patient’s position or move the patient. Thus the mattress needs to have good pressure relief properties and prevent the development of high peak pressures. Simultaneously the mattress needs to support the body well and be comfortable. Currently all of these properties are impossible to achieve by using only one type of polyurethane foam. Combination of different foams e.g., a low resilience foam with a higher resilience foam on the top [3]. On the other hand a foam mattress with multiple layers is not automatically a higher specification foam mattress. Furthermore, the mattress cover has a major impact on the functionality of mattress including its micromotors. Thus, a higher specification foam mattress needs a cover which properties are also clearly defined.

Clinical relevance

Clear specifications for foams and mattresses help to judge their suitability for different use in clinical settings. No clinical trials should be published without clearly specifying the foam grades used in the mattresses.

References


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Discussion and Clinical relevance

We assume that Cartilat mattresses have contributed to these excellent results observed in the PICUs. The relative differences in interfaces pressure and contact area changes are almost equal from hard surface to foam and from foam to Cartilat Neo. The products offer great pressure relief, coupled with optimal immersion and envelopment control together with unique stability necessary for therapy of vulnerable patients, such as spinal or unstable fractures and ECMO.

References

Pressure ulcer: teaching the mechanical basics over 6 years

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Introduction
4 posters are proposed (1 for each main hard site: sacrum, heel, ischium, greater trochanter).

- Teaching the mechanical basics which should be taught to those whose vocation is the health care of pressure ulcer patients.
- Exacerbate the false notion of fate and stress the notion of pressure [1][2], shear [3][4], and friction [5] on the main hard bony sites [6].
- Point out that the concern about the dressing’s choice is not enough, for the best dressing in the world cannot heal a pressure ulcer if it continues to undergo pressure, shear, and friction forces.

Methods
- Quote and describe one by one the most common trigger situations for each main bony site, and propose the resulting preventive and curative measures.
- Summarise 24 years of practice in the pressure ulcer field.
- Highlight the practical side of the issues with diagrams and drawings.

Results
Targeted persons, from January 2003 to March 2013 (break from February 2009 to December 2012):
- Students → nurses: 780
- nurses: 540
- nurses + nurse aids trainees with institutionalized disabled persons: 96
- Certified hospital nurses + nurse aids: 55
- nurses school in Switzerland: 28
- doctors (general practitioners): 15
- physical therapists: 9

TOTAL: 1523

Discussion
- The students received this teaching with enthusiasm, since everything is new for them.
- Most of qualified nurses are unaware of this basic practical teaching about the mechanics of those trigger situations, although they have the overall theoretical knowledge of pressure ulcers; they often confuse sacrum with ischium.
- Physicians are taught very little about pressure ulcers predict in their training, and yet they don’t attend teaching sessions in a hospital setting (ask of interest or time?).
- Information on pressure ulcers is so abundant that many professionals don’t know how to differentiate between priorities, details, useless actions, and harmful actions.
- The qualified nurses know very well how to select the dressing and how to manage promoting conditions such as maceration and maceration. But many trigger situations are unknown or neglected.

Clinical relevance
A maximum number of patients will be impacted if an accurate, simple, logical, and mechanical teaching of the basics is widely spread among the care providers.

The patient participation as well as that of his family is of the utmost importance in the healing process.

Conflict of Interest
None.

References

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To prevent and treat pressure ulcers through a holistic approach and team work

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Introduction

Rehab Station Stockholm conducts medical rehabilitation for people with spinal cord injuries, orthopedic injuries, stroke, MS, and general neurology outpatient and inpatient form. Our patients have a major risk of developing pressure ulcers due to paralysis, muscle atrophy, bone decalcification and sensory loss.

Our goal is to help our patients;
- Prevent and avoid pressure ulcers (PU)
- Healing - as soon as possible
- Prevent complications and recurrences after a pressure ulcer flap surgery.

Methods

Through a team effort with a holistic point of view, we can prevent, heal and stop pressure ulcers. You need to engage and educate the patient in the wound healing process in order to understand the cause-effect for a faster and long-lasting result.

To heal deep pressure ulcers on the sitting area, it’s necessary to offload lying in bed and this may last for several years. There is a major risk to become apathetic and lose the spark of life because of the isolation and lack of activity due to pressure ulcers. A flap surgery may then be the only way out, but complications after surgery and recurrence, and new pressure ulcers are reported to be as high as 30-40%.

In cooperation with the plastic surgeons at the Karolinska University Hospital, we have designed a rehabilitation programme after flap surgery for pressure ulcers in paralyzed patients.

Results

A methodical 3-year follow-up of the plastic surgery patients shows that our program has improved the situation tremendously when only 4% received postoperative complications and these were in addition lighter than before and it showed a low incidence of new or recurrent ulcers (11%). None (0%) have had infection.

We can see that patients and assistants react faster than before and can then stop the progression of the wound before it goes too far. Team work around the pressure ulcer patients is of great importance, not only to change the dressing!

Discussion

Early treatment of pressure ulcers with specific knowledge of the patient group is considered too expensive but it would avoid several operations and prevent years of suffering. If the patient is admitted in hospital in the early stages, the pressure ulcer often heal faster because it is easier to structure pressure relief routines in healthcare than in their home.

Procurement, lack of knowledge and money can prevent the patient from receiving the right dressings and technical aids. Preventing pressure ulcers cost significantly less than pressure ulcers, both in healing terms of money and personal suffering. Despite the fact that as much as 50-95% of these pressure ulcers could be prevented, people still dying because of pressure ulcers.

To prevent and treat pressure ulcers through a holistic approach and teamwork is both economically and saves years of suffering for those affected.

Clinical relevance

Our Stockholm chain of care with guidelines for treatment after a flap surgery is so successful that centralization should be considered for persons with spinal cord injuries

Conflict of Interest

None

A course in the holistic approach to healing pressure ulcers in persons with SCI

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Introduction

Pressure ulcers are a major complication (95%) after a spinal cord injury (SCI).

At the Rehabilitation Station Stockholm (RSS) we educate patients how important it is to learn how to avoid and treat pressure ulcers (PU).

Many patients are admitted to RSS in our specific wound care programs where they are treated by the whole rehabilitation team. Many district nurses do not have sufficient knowledge of SCI. This makes it difficult to get a holistic view of the situation. An admission and/ or custom made review is necessary to get an overview and to plan treatment.

Methods

Rehab Station Academy has designed customized courses in the user’s home. It's important to get the user, their relatives and helpers to understand cause and effect of wound healing to achieve a positive result that endures.

At the RSS we give courses in wound care programs, advice and support is given continuously during healing process by phone / email. Patients living in Stockholm are also followed up in the Spinalis outpatient clinic.

Results

Wound healing is normally rapid with our hospitalized patients as our holistic approach includes not only dressing changes but also pressure relief, correct tools and suitable nutrition.

Discussion

Our specialized experience and knowledge of pressure ulcers, rehabilitation of SCI and technical aids makes it possible to help the persons even in their home. The review and education in cooperation with user, family and staff is a successful combination for wound healing.

Clinical relevance

With this holistic method, we can faster wound healing which can prevent years of suffering, this is also socioeconomically very positive.

Conflict of Interest

None
Results of the WMW project: PU Quiz in accordance with the 2nd world wide Stop Pressure Ulcer Day

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Introduction
The association Wound-Management-Vienna decided to take part in the 2nd Stop Pressure Ulcer Day on November 21st 2013. A multi-center event was planned. Due to this reason 2 standardized questionnaires for healthcare professionals and non-healthcare professionals were developed. The interview was conducted by executive committee members and regular members of the association. To receive representative information cooperation was initiated with the hospital Göttlicher Heiland, the Geriatriceum Baumgart and the office of the GP Dr. Michael Mraz. The aim of the event was to get information about the basic knowledge in pressure ulcer in both groups.

Methods
For each group 10 multiple choice questions, based on the EPUAP factsheet and the EPUAP patient guide were designed. Each question had 3 answer possibilities, but only one was correct. Demographic characteristics like sex, age and profession of the participant were collected. The aim of the project was to get at least 100 forms of each group to reach an average sample. The analysis was carried out numerically.

Results
219 healthcare professionals and 131 non-healthcare professionals completed the questionnaires. The evaluation showed that 17.35% (38) healthcare professionals and 36.64% (48) non-healthcare professionals answered all 10 questions correctly. Although there were two different questionnaires, we discovered that the healthcare professional, not differs in the level of knowledge but they stick to old doctrines.

The other interesting point was that they did not use their intuition in contrast to the non-healthcare professionals.

Due to these results we will show for each group which questions had the most frequently wrong answers.

Discussion
Summarizing the results it could be necessary for the healthcare professionals to develop and revise information about instruments of diagnosis and the different possibilities which trigger a pressure ulcer. In relation to the non-healthcare professionals it would be useful to point out more the risk-factors for developing a pressure ulcer.

Clinical relevance
For our association with its characteristic feature of patient empowerment and education for persons dealing with a non-healing wound the results showed us the possible way for our future activities concerning knowledge transfer and understanding. Finally we would like to repeat the interviews in Austria to get the information if there is a difference in the various parts of Austria.

References

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Template for the EPUAP Annual Conference 2014 Stockholm, Sweden

Gunilla Didriksson, Päivi Oswald, Malin Samuelsson, Helene Strand
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Titel: No pressure in C-ICU

Introduction
The central Intensive Care Unit 96 at Sahlgrenska University Hospital in Gothenburg is the largest intensive care unit in Sweden treating about 2000 patients a year. C-ICU is a mixed medical and surgical intensive care unit that treats mainly adults but also children from the age of 4 months. The unit has competency in medicine, surgery, nursing and medical technology which involves specialist areas like trauma, transplantation, neurosurgery, vascular/plastic/tumour surgery, sepsis, organ failure, infections, cardiac arrests and sepsis related shock in children.

Background
In 2011, C-ICU participated in a national study that measured and identified pressure ulcers. The result showed that several of our patients had signs of pressure damage and therefore had an increased risk of developing a pressure ulcer.

Aim
Earlier detection of pressure damage and preventing pressure ulcers with improved routines and guidelines.

Methods
We monitored pressure sensitive areas in all patients every month during 2012. We used the pressure ulcer classification tool used by European Pressure Ulcer Advisory Panel (EPUAP) which divides the pressure ulcers into 4 different grades.

Pressur ulcer grading
Stage grade pressure description ulcer damage
1. Non-blanching erythema or intact skin
2. Full-thickness wound, which involves the epidermis, dermis or both
3. Full-thickness wound, which involves the epidermis, dermis, subcutaneous tissue and the superficial fascia
4. Full-thickness wound, which involves the epidermis, dermis, subcutaneous tissue and the deep fascia

The results of the study were presented to the rest of the staff through verbal presentation and were posted on the noticeboard. We also provide teaching to the staff in C-ICU and have developed new clinical practice guidelines for preventing pressure ulcers. Registered nurses and enrolled nurses shall inspect and record the status of the patient’s skin to increase awareness in changes in the condition of the skin and observe early signs of pressure damage. The status should be recorded by a registered or enrolled nurse in the patient’s medical records.

Results and continued work
Regular monitoring shows that we follow the new guidelines and that the incidence of pressure ulcers has dropped to zero since we commenced the monitoring. The awareness of how to prevent pressure damage has increased. We continue to monitor the incidence of pressure damage in our unit twice a year for quality assurance.

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**P52**

**Dressings & Topical Agents for Preventing Pressure Ulcers – A Cochrane Review**

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3 NHMRC Centre for Research Excellence in Nursing, Centre for Health Practice Innovation, Griffith Health Institute, Griffith University, Australia
4 School of Nursing and Midwifery, University of Queensland, Australia

**Introduction**

Pressure ulcers, which are localised injury to the skin, or underlying tissue or both, occur when people are unable to reposition themselves, to relieve pressure on bony prominences. Pressure ulcers are often difficult to heal, painful and impact negatively on the individual's quality of life. The cost implications of pressure ulcer treatment are considerable, compounding the challenges in providing cost effective, efficient health services. Efforts to prevent the development of pressure ulcers have focused on nutritional support, pressure redistributing devices, turning regimes and the application of various topical agents and dressings designed to maintain healthy skin, relieve pressure and prevent shearing forces. Although products aimed at preventing pressure ulcers are widely used, it remains unclear which, if any, of these approaches are effective in preventing the development of pressure ulcers.

**Methods**

A Cochrane Systematic review was to evaluate the effects of dressings and topical agents on the prevention of pressure ulcers, in people of any age without existing pressure ulcers, but considered to be at risk of developing a pressure ulcer, in any healthcare setting. In February 2013 we searched the relevant electronic databases to identify reports of relevant randomised clinical trials. We included RCTs evaluating the use of dressings, topical agents, or topical agents with dressings, compared with a different dressing, topical agent, or combined topical agent and dressing, or no intervention or standard care, with the aim of preventing the development of a pressure ulcer. We assessed trials for their appropriateness for inclusion and for their risk of bias. This was done by two review authors working independently, using pre-determined inclusion and quality criteria.

**Results**

Five trials (940 participants) of unclear or high risk of bias compared a topical agent with a placebo. Four trials randomised by individual and one trial randomised by cluster. When results from the five trials were combined, the risk ratio (RR) was 0.78 (95% CI 0.47 to 1.31; P = 0.35) indicating no overall beneficial effect of the topical agents. When the cluster randomised trial was omitted from the analysis, use of topical agents reduced the pressure ulcer incidence by 36%; RR 0.64 (95% CI 0.40 to 0.83; P = 0.0009). Four trials (561 participants) all of which were of high or unclear risk of bias showed that dressings applied over bony prominences reduced pressure ulcer incidence RR 0.21 (95% CI 0.10 to 0.41; P = 0.0006).

**Discussion**

There is insufficient evidence from RCTs to support or refute the use of topical agents applied over bony prominences to prevent pressure ulcers. Although the incidence of pressure ulcers was reduced when dressings were used to protect the skin, results were compromised by the low quality of the included trials. These trials contained substantial risk of bias and clinical heterogeneity (variations in populations and interventions); consequently, results should be interpreted as inconclusive. Further well designed trials addressing important clinical, quality of life and economic outcomes are justified, based on the incidence of the problem and the high costs associated with pressure ulcer management.

**Conflict of Interest**

The authors have no conflicts of interest to declare.

**References**


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**P53**

**Tissue Oximeter Measures Increased Perfusion to Areas of Vacuum-Assisted Wound Closure**

Katelin O'Brien 1*, Michael Singer 1*, Kristen Allano MD 1, Thomas Davenport MD 1

1 Long Island Plastic Surgery Group, United States, katelan@lipsp.com

**Introduction**

The tissues of many acute and chronic wounds are deficient in oxygen. It has been theorized that closure of these wounds is enhanced by increased perfusion to the tissue surrounding the wound. Vacuum Assisted Closure devices induce negative pressure suction, allowing edematous fluid to be sufficiently removed, thus, inducing vasoconstriction and greater cell proliferation. The ViOptix™ Tissue Oximeter is a technological device that assesses blood flow to a particular part of the body by measuring the hemoglobin saturation via infrared light. This device can help to assess perfusion to a particular part of the body. The objective of our work was to determine whether or not the Wound VAC does, in fact, increase blood flow by measuring changes in perfusion with the Tissue Oximeter.

**Methods**

The Tissue Oximeter sensor was placed on the same area of 5 individuals' arms and the baseline hemoglobin saturation was measured. A vacuum-assisted closure device sponge was then placed, turned on, and 125mmHg of pressure was applied. Changes in perfusion, as indicated by the Tissue Oximeter, were recorded.

**Results**

All five individuals demonstrated an increase in their hemoglobin saturation with the use of the Wound VAC, as indicated by the ViOptix Tissue Oximeter.

**Discussion**

This study demonstrates that the Wound VAC does increase perfusion to the area of the body to which it is applied. Moreover, it further demonstrates the use of the hemoglobin oxygenation ratio in the assessment of blood flow. Further studies can be done to examine changes in perfusion in smokers versus non-smokers and in individuals who are actually undergoing Wound VAC therapy.

**Conflict of Interest**

None

**References**


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A pressure ulcer (PU) is localized injury to the skin and underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear (1).

In the studies conducted for the determination, the prevalence and incidence of PUs in Turkey, operation-related PU was determined to be 54.6%, it was determined to be 14.3% and 20.56% in intensive care units, and 8% and 8.3% in post-prevalence studies (2,3,4,5,6). Even though PU can be mostly prevented, it constitutes a problem for the individual, healthcare system, and economy of the country (7,8).

The scope of the Stop Pressure Ulcer Day on November 21st 2013, with the contributions of the European Pressure Ulcer Advisory Panel, some events were organized by the Turkish Wound, Ostomy and Incontinence Nurses Society with the participation of 49 hospitals in 7 provinces in Turkey. Within this scope, "STOP Pressure Ulcer Day" posters were hung in hospitals, patients and their families were distributed EPUAP Patient Guide "How can you help to stop pressure ulcers, and a meeting was held by nurses at the hospital." The information poster titled EPUAP Fact sheet "Pressure ulcers just the facts" was presented to the hospital administration and distributed to all the clinical areas for the nurses.

As a result, this activity had meant to us very enjoyable and productive experience.

Acknowledgements
We appreciate the help of Wound Ostomy and Incontinence Nurses in Turkey.

References
A congenital neural tube closure defects and pressure ulcer

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Summary
A congenital neural tube closure defects’ children, who live in the special institute (Wheelchair Repair Primary School, Secondary School, Uniform Methodology Institute of Special Education and Student Home), I examine, how many pressure ulcers occur at 1997-to 2012 of the spina bifida’s children. (1. Table)

<table>
<thead>
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<th>Year</th>
<th>Boy</th>
<th>Girl</th>
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<td>8</td>
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<td>2014</td>
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Introduction
This numbers are very low-down, because they use the Clean Intermittent Self-Catheterization (CISC). This method is simply and quick to learn, six times a day do that. This children’s quality of life, mobility, independence and improvement. The special institution, where live the students, derived from all over the country.

This is important for us, how may to help provides for physically disabled people. The main role is the prevention, and early detection. An other essential project, the education for parents and children:

A wound biopsy was executed, to evaluate the biopsy was executed, to evaluate the pathological examination of approved moist, hydro-active wound treatment combined with controlled, low frequency LMPC impulses.

The aim is to judge the introduction of the treatment protocol of pressure ulcers and the use of an electric stimulation.

METHODS

The pulses then cause the following cell and tissue reactions in the wound and the surrounding skin (depending on the selected polarity):

- Acceleration of the migration of cells that are important for wound healing, such as macrophages, leucocytes, fibroblasts, keratinocytes, etc.
- Increase and acceleration in the proliferation of tissue cells important for wound healing, such as: granulation tissue, epithelial tissue, capillary blood vessels, peripheral cutaneous nerves, etc.
- Increase in cellular ATP, DNA, and protein synthesis
- Reduction in the number of bacteria in the wound due to the bacteriostatic effect of the pH value changes which the current causes.
- Reduction of accompanying wound edema
- Reduction of accompanying wound pain

The device’s polarity is set according to the condition of the wound. DC Pulses flow from the woundEL electro stimulation device onto the wound through the dressing electrode, and are then transferred back to the device through the dispersing electrode.

The therapy has been carried out for 3 weeks, following the protocol. The wound evolution was documented with qualitative controls.

In this context we have considered the device application over 50 patients affected by pressure ulcers.

The therapy has been carried out for 3 weeks, following the protocol. The wound evolution was documented with qualitative controls.

The indicators of quality under exam were the wound bed and healing process.

Electrostimulation Wound Healing and Tissue Regeneration
M. Cilibrì1
1 C.A.R.T. (Wound Care Centre ASL NAPOLI 3 SUD) District 56

Introduction
Wound treatment with woundEL is a highly effective, synergic combination of approved moist, hydro-active wound treatment combined with controlled, low frequency LMPC impulses. EStim is already listed inside the EPUAP/NPUAP treatment guidelines for pressure ulcers. In fact, it is the only therapy ranked with the highest possible level of recommendation with regards to the evidence available.

In this context we can state that contemporary clinical studies are missing which describe how to implement the guidelines and how to compare a cellular level with NPWT and c/how to measure therapeutic outcome in daily practice and c/to find a modality of treatment that fits an ambulatory care.

This is important for us, how may to help provides for physically disabled people. The main role is the prevention, and early detection. An other essential project, the education for parents and children:

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In this context we have considered the device application over 50 patients affected by pressure ulcers.

The therapy has been carried out for 3 weeks, following the protocol. The wound evolution was documented with qualitative controls.

The indicators of quality under exam were the wound bed and healing process.

In some cases it was possible to compare histologically the wound treated with negative pressure wound therapy and the one treated with electro stimulation.

Results
The results, obtained by considering the evaluation forms, are:

- the improvement of wound aspect was made on 44 patients over 50;
- the wound healing process advanced over 90% cases;
- the histological comparisons between pressure ulcers treated with negative pressure and the ones with electro stimulation demonstrate that the healing process was halted after 4 weeks of treatment of NPWT, while it continues if treated with electro stimulation.

Conflict of Interest
There were no external sources of funding for this study. The authors have no conflicts of interest to declare.

References
Evaluating the effectiveness of a new Lateral Turning System to aid Patient Repositioning using Dynamic Interface Pressure Mapping

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Introduction
Repositioning of patients who are at risk of pressure ulcers is paramount in any preventative or treatment plan, in conjunction with pressure redistribution/reducing surfaces, skin care and nutritional support. The quality of offloading areas subjected to high pressure will undoubtedly vary among health care professionals dependent on their experience and skill. Difficulties may arise when patients are not clinically stable enough to be physically moved, non-concordant with a repose planning plan and/or distressed when moved due to pain or dementia. This evaluation demonstrated the effectiveness of using a new lateral turning system in comparison to physical repose positioning by using dynamic interface pressure mapping.

Methods
An alternating dynamic pressure therapy full mattress replacement system was placed on the lateral turning system with the continuous bedside pressure mapping system placed on top of the mattress underneath the back sheet. The evaluation was carried out with the consent of a patient who had been assessed as very high risk of developing a pressure ulcer (Waterlow score of 27/27) who was already being nursed on the alternating mattress replacement system.

Continuous pressure mapping was performed for 12 hours, broken into 2 segments of 6 hours: the first segment was mapped with nursing staff repose positioning the patient on a 2 hour basis with the lateral turning system not in use. The second segment was with the lateral turning system set to repose the patient to a 30degree left every hour without nursing staff having to physically repose the patient.

Device under study
The lateral turning system under evaluation was the TopTo® (GeneCare) and the mattress replacement system was Tito II (Siddhi Doherty)

Results
Peak pressures were noted on the patient’s spine, sacrum and shoulder intermittently during the period of being repose positioned by nursing staff with peak pressures of 97mmHg in the hip and shoulder after 2 hours.

Whilst using the lateral turning system lower pressures were noted in the spine, sacrum and shoulder areas, the lowest being 53mmHg with a peak pressure of 490mmHg.

The volunteer patient reported that she found her position in bed more comfortable with the lateral turning system than when staff were repose positioning her.

Discussion
Effective patient repose positioning undoubtedly plays an important role in minimizing pressure in bedbound patients, however, in practice some nurses are more skilled at this than others.

Dependent upon an individual patient it may take between 2 – 4 nurses to reposition them to reduce the risk of pressure damage, and then it will depend on the skills of the nurses as to how effectively the offloading of pressure would be.

With the lateral repose positioning the patient was effectively placed into a 30degree left position which they found comfortable and reduced the workload of the nursing staff without compromising patient care. However the author does advocate that if this system is used nursing staff should still perform regular skin assessments to identify early signs of skin damage.

Clinical relevance
The TopTo® is an effective alternative to physical positioning of patients who are immobile and/or bedbound.

Acknowledgements
I appreciate the help of Siddhi Doherty who kindly provided the pressure mapping system.

Conflict of Interest
No conflict of Interest

References

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Pressure mapping on OR Table and post op

Maria Annell, Etsac AB, Sweden
Elia Sterner Karolinska Sjukhuset, Sweden, Bart Van der Heyden, Belgium

Introduction
During spring 2011, we performed pressure mapping in surgery resembling conditions on ORT and directly thereafter on hospital bed with standard hospital mattresses and hospital beds with ROHO Dry Floatation overlay.

During surgery, orthopedic patients are positioned and can remain in the same position for hours. By performing pressure mapping, document redness and interviewing the test persons we obtained information that we have analyzed.

Methods
2 test persons
A: Woman 59 years, 52 kg, 167 cm
B: Woman 55 years, 70 kg, 168 cm

Both were feeling since 24.00 the night before and dressed in hospital shirts. We used two different ORT, one with regular foam and one viscoelastic foam.

Positions ORT, Supine for 2 hours, lateral with fixations for arm and for 1 hour. Test person A used Warm dough.

“Postop” Transfer to hospital bed. Supine position for 1 hour. Hospital standard mattress and ROHO Dry Floatation overlay.

Continuous pressure mapping was performed on all surfaces:
- Recording of pressure distribution and intensity on exposed skin areas. Focus on how rapidly the pressure is increasing and distribution developed.
- Documentation of persistent redness.
- Documentation of the test person’s own pain experience.

Results
On ORT:
Max pressure over the exposed area developed rapidly.

Positional alterations in hip and knee angles had no effect on the exposed areas in the lateral position.

We saw high pressure that didn’t result in redness and vice versa.

Redness due to the same pressure intensity but on different body parts had different appearance.

On the ORT the max pressure and pressure distribution developed within a few minutes.

On the standard mattress the pressure raised slower than on ORT.

The ORT showed high pressure on the hospital bed.

The ROHO DPO gave standing pressure distribution and largest contact area.

The pressure was extremely exposed on ORT and standard mattress.

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No conflict of interest

Acknowledgements
Elia Bamber R.N, MD, doctor, Karolinska Sjukhuset, Bart Van der Heyden, independent PT, clinical consultant, Belgium

Besides our two brave test persons; A: and B, Elia, Bart and myself would like to thank you Kai and Eva who assisted us during the whole procedure.

Clinical relevance
When these results were presented for the orthopedic surgery unit, it became very obvious how exposed the heels are. This has resulted in a ongoing study for heel pressure protection before, during and after surgery which will start during 2014.

Acknowledgements
Elia Bamber R.N, MD, doctor, Karolinska Sjukhuset, Bart Van der Heyden, independent PT, clinical consultant, Belgium

Besides our two brave test persons; A: and B, Elia, Bart and myself would like to thank you Kai and Eva who assisted us during the whole procedure.
Can Pressure Mapping Facilitate Patients and Carers in Their Decision Making with Regards to Repositioning and Pressure Ulcer Prevention in the Community Setting

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Introduction
XSENSOR® ForeSite™ PT Patient Turn System (ForeSite PT System) is intended for monitoring in-bed activity and care delivery for patients susceptible to pressure ulcers in all care settings.

The ForeSite PT System consists of a fitted mattress cover embedded with thousands of sensor cells that continuously measures the patient’s body surface pressures and a touch screen computer that displays a turn timer and pressure information. It helps to identify areas of the body that have been under sustained pressure. The turn timer allows clinicians, carers and patients to better understand and manage a patient’s turn schedule and repositioning regime.

This project focuses attention onto the community dweller, and explores the use of pressure mapping in a setting where care provision is much less frequent than in the more studied hospital setting and where the ability to monitor patient activity is often reliant on unreliable care (1). The objectives of the study are whether the development of pressure ulcers can be reduced following use of the ForeSite PT System is product useful in facilitating patient decision-making in determining specific positions that should be avoided; to look at the ease of use and user acceptability and comfort of the product.

Methods
Patients were recruited for the study who were identified as being at high risk of developing pressure ulcers and who were referred to the tissue viability service. The patients comprised of those who either refused or were unable to participate due to limitations in their mobility.

Results
The early results indicate that patients are very responsive to the images on the pressure monitor; requesting to be turned in line with the turn clock, becoming more confident with repositioning regimes and shifting position in line with the pressure indicators. Pressure ulcers are healing or improving as clinicians and carers also report this on the images on the monitor. Pressure that would not have been identified is being captured through the mapping; Figure 1 demonstrates a bedpan placed under a patient for a period of 55 mins with pressures of >20mHg in the contact area and the heels.

Discussion
The mapping images appear to facilitate individualised care. Although it is recognised that interface pressures do not provide the full picture with regards to the amount of pressure exerted on muscle tissue and deformation of cells which result in deep tissue injury(14), they do provide insight into areas that are at high pressure and thus require a change in position. It is not possible via MRI to determine a patient’s normal lifestyle only the effect of low tissue tolerance at a given time. Therefore through this technology, the monitoring of interface pressures in the patients home will allow a patient to adjust their positions according to their own interface pressures.

Clinical relevance
The use of the pressure mapping device provides valuable insight into patient activity in the community with the potential to enable vulnerable adults to be more empowered in terms of management of their conditions. By observing the colour changes produced by the pressure variances, patients can then make real time decisions around pressure relief and position change that make a difference to their pressure risk.

Aknowledgements
We appreciate the help of the patients, care givers, XSENSOR and SUMED for their continued support.

Conflict of Interest
Project supported by XSENSOR and SUMED

References

Comparison of Pressure Area Index (PAI) achieved on pressure reducing mattresses as part of the introduction of a new CLP mattress system

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Introduction
Patient support surfaces for over 25 years have been compared using interface pressure measurements; these studies have measured either;

1. For alternating pressure mattresses (ALT) the Pressure Relief Index (PRI) defined as the period over a set time (i.e. one complete mattress cycle) at a given reference point that pressures are below relevant thresholds (5.10, 20 & 30mmHg).

2. For constant low pressure mattresses (CLP) the Pressure Area Index (PAI) is calculated. This is defined as the number of sensors reading below relevant thresholds as a percentage of all the load bearing sensors.

This evaluation of the seven mattresses was performed in order to gather baseline PAI data of the mattresses to compare with two new CLP mattress systems develop for the Multicare Critical Care Bed.

Methods
The nine mattresses were placed on a Multicare Critical Care Bed and tested in two lying positions, position 1. Supine, and position 2. Profiled at 30 degrees with knees galleted. The profilled and kneel galleted position was achieved using the auto contour feature of the bed frame. The FSA (Force Sensor Array) bed mat from Vista Medical was placed directly onto the mattress. Both mattresses and sensor mat were set up as per manufacturer’s instructions.

An 83kg manikin was positioned on the mattresses for 15 minutes to allow for adjustments, then for a further 15 minutes whilst measurements of the contact pressures were recorded. The focus of the evaluation was to analyse and report on thePressure Area Index achieved.

Clinical relevance
Pressure Area Index is only one factor in the assessment of an individual mattress and does not provide any indication of clinical outcome, further testing and evaluation design need to be considered before being able to identify a superior product.

Conflict of Interest
Author received a consultancy fee from Linet UK.
Using the latest technology support surface and patient monitoring in an adult critical care to optimise outcomes in pressure ulcer prevention.

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2 University Hospitals Bristol, United Kingdom

Introduction

The reported incidence of pressure ulcers in the Critical Care settings is low, figures given range from 14.3% in one hospital [1] and 38% - 124% in a literature review in 2008 [2]. The cost of treating pressure ulcers, estimated at between £1000 for a Category One to £10,000 for a Category Four [3]. The impact these figures have on the financial burden to healthcare is significant and continues to be a focus for targeted prevention strategies. The University Hospital Bristol Adult Critical Care Unit with 20 ICU/HDU beds (13 level 3 and 7 level 2) introduced new technologies within the normal package of care for patients at high risk of pressure ulcer development.

1. Virtuoso Series 2 Mattress providing two modes of operation, alternating or constant low pressure support.
2. Used the Innova Clinical Information System as part of the ‘intentional rounding’ protocol to optimise appropriate care and interventions.

Methods

Over the 6-month period the Virtuoso Series 2 mattress was evaluated on a rolling programme throughout the unit. Critical Care Unit staff were provided with a product specific evaluation form made up of seven sections to complete during and following their use of the mattress with each patient. Trust pressure ulcer incidence reporting continued unchanged as per policy and guidelines. Data was analysed using the statistical analysis package SPSS Base.

Results

51 patients (31 male, 19 female) completed the evaluation, mean age 62.77 years (range 24 - 97yrs), length of stay 2 - 61 days (mean 8.12 days). Forty six (46) patients were immobile, 37/46 were recorded as being ventilated (32/67 sedated) needing maximum assistance for repositioning. 74.5% (n=38) patients were assessed as high/very high risk of pressure ulcer development.

17 patients had tissue damage, (n= 13 Cat.1, n=3 Cat.2, n=1 Cat.3) 15 of which had developed prior to admission to the unit. All patients were reported to be healing or healed whilst on the Virtusoo (n=5 healing, n=12 healed).

87.5% (n=42/48 responses) found the mattress to be acceptable.
95.9% (n=47/49 responses) found that the mattress met their expectations in the management of patients, and in the prevention and management of pressure ulcers.

Discussion

Prior to commencing the project the average monthly incidence of pressure ulcers was 7-9% with high numbers of category 2 and 3 pressure ulcers. In the six months the incidence reduced to <2% and has continued to remain at this level following the mattress data collection period.

Conflict of Interest

All abstract authors are employees of Systagenix. This study was funded by Systagenix

Table 1: Unit pressure ulcer incidence figures

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<tr>
<th>Month</th>
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Clinical relevance

The Virtuoso mattress system is safe and effective in optimising outcomes in the management of critically ill patients, coupled with effective nursing and care rounding packages optimised healing and prevented very high risk patients from developing pressure ulcers.

References


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Introduction
Pressure ulcer prevalence is estimated at 5-25% of adult Finnish patients. Pressure ulcers (PU) cause considerable financial burden to the societies not to mention the increased stress, pain, reduced quality of life and anxiety for all involved. Most pressure ulcers develop during the first week of treatment and the risk is greatly increased if patients are elderly, unable to move or suffers from malnutrition or has reduced sense of pain. Satakunta Central Hospital prioritized pressure ulcers as one of main development projects aiming at establishing a leg ulcer care policy to minimize their genesis. The aim of the study was to determine the present number and grades/staging of pressure ulcers and to perform risk assessment to consented adult patients on study day.

Methods
Consented adult in-hospital patients were assessed clinically by an authorized nurse specialist and the whole skin was examined. Pressure ulcers were graded using NPQUA/PUP guidelines for pressure ulcer staging and Braden risk assessment tool was used. Demographic data was collected from patient files.

Results
236 patients in 13 wards were treated in hospital on the study day and 229 patients (97 %) were consented. Overall pressure ulcer prevalence was 8.7 % (20 patients). Category/Stage I was most prominent, in 14 patients. Category/Stage II was detected on 4 patients, Category/Stage III on 1 patient and 1 patient had an unclassified PU. Ulcers were situated on heels in 8 patients, wascal in 7 patients, acupar in 2 and were on hip and 1 in pelvic area. Braden risk was extremely high in 1, 4 % (4 patients), high in 17 % (39 patients), medium in 25 % (60 patients) and low in 55 % of patients. Most pressure ulcers (56 %) were found on patients treated in surgical wards in our hospital. Hospital treatment length was less than 4 days in 44 % with 4 PUs and 4-7 days in 30 % with 5 PUs and over 7 days in 22 % with 11 PUs respectively.

Discussion
Preventing pressure ulcers should be considered as a major multi-disciplinary concern in health care. They can be regarded as adverse events in the co-operation and skills of the entire health care team. Although most, but not all, pressure ulcers can be prevented [1], effort should be put on intensive and sustained staff education and constant patient monitoring and full patient information recording [2] in Finland pressure ulcers prevention has not evolved in the past 10 years and prevalence ratios have remained relatively unchanged [3]. Real development and implementation procedures leading to pressure ulcer prevention and treatment excellence and, thus, higher quality of care are actively being implemented in Satakunta Central Hospital.

Clinical relevance
Only adequate acknowledgement of pressure ulcer problem in health care settings can lead to key preventive practices. This study is will further lead our focus on developing preventive methods and daily routines for all in-hospital patients to prevent pressure ulcers.

Acknowledgements
The study was funded by the Satakunta Hospital District and the Hospital District of Southwest Finland.

References
Biophotonics: a novel approach to the treatment of wounds

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Introduction
Chronic wounds particularly pressure ulcers are a challenge to treat and may substrat despite multiple wound treatment modalities. Phototherapy has traditionally been used to treat skin conditions and is also now being considered for tissue repair applications [1,2,3]. KLOX Technologies has devised a new biophotonic system based on light for wound healing.

Methods
The KLOX biophotonic system is comprised of a multi-LED light and a photoconverter gel (Fig 1) containing a fluorescent chromophore. The multi-LED light emits narrowband light at a peak wavelength well suited for activating the chromophore in the gel. Once activated, the chromosome fluoresces to illuminate the wound with a broader wavelength of light spanning blue, green, yellow and orange wavelengths.

Results
Key findings from the in vitro and vivo studies include:
- Bactericidal/bacteriostatic effect.
- No negative effect on fibroblast or keratinocyte viability.
- Angiogenic effect seen in cdils isolated from diabetic patients.
- Growth factor modulation (favorable to wound healing).
- No cytotoxicity and excellent safety profile.
- Modulation of protein secretion and gene expression involved in the early phase of wound healing in 3D skin model.
- Collagen synthesis.

In addition anecdotal observations and results from clinical trials in Canada have shown unresponsive chronic wounds to proceed to heal, some in an accelerated manner.

Discussion
The in vitro and in vivo studies together with the clinical data have indicated the potential of KLOX’s biophotonic therapy to make a significant positive impact on wounds. Further clinical trials are currently being planned.

Clinical relevance
An effective and easy to use, effective therapy aimed to treat both pressure ulcers and hard to heal wounds could be a very important addition to clinical practitioners’ armamentarium.

Acknowledgements
None

Conflict of Interest
Non

References

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Reliability and Predictive Validity of Braden Scale in Turkish Intensive Care Patients

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Introduction
It is important to determine healthy patients for developing of pressure ulcers at intensive care units by using a valid measurement tool. In Turkey, there have been no studies that have tested the Braden Scale, which is the mostly used measurement tool, for reliability, predictive validity and established cutoff points for assessing risk specific to intensive care units. The purpose of this study was to: (a) establish the reliability and predictive validity of the Braden Scale (BS) in intensive care units’ patients; and (b) determine the critical cutoff point for patient risk.

Methods
The sample was 422 patients with a mean age of 59 (SD=16) years at 50 intensive care units (ICUs) of 21 hospitals, located in Istanbul, Turkey. Reliability was based on internal consistency and item-total correlation. Internal consistency was assessed by Cronbach’s coefficient. Item-total correlation was assessed by Pearson correlation coefficients. Predictive validity was measured by using sensitivity, specificity, positive predictive value, and negative predictive value.

Results
The Cronbach’s alpha value was 0.82 for the overall score. Corrected item-total correlation coefficients ranged between 0.72 to 0.84 for the subscales (Table 1). BS scores were significantly lower in those who developed ulcers than in those who did not develop ulcers, in patients with and without pressure ulcers, the least difference was observed in moisture dimension scores. Overall, the critical cutoff score for predicting risk was 14 and the best sensitivity and specificity balance was obtained with this cutoff score (Table 2).

Discussion
The reliability analysis yielded highly satisfactory results. The Cronbach’s alpha coefficient for the total instrument was higher than 0.80 indicating that very acceptable internal consistency. Item-total correlations exceeded the accepted standard which was 0.20. BS scores were significantly lower in patients with pressure ulcers than in those without ulcers showing that its usefulness in predicting pressure ulcers. By means of moisture dimension, there was a least difference between patients with and without pressure ulcers. In ICUs, urinary catheterization may be necessary for preventing activity and maintaining absolute bed rest as well as for problems such as urinary incontinence. In such situations, problems occur in evaluating the moisture subscale and the discriminating function of the dimension becomes limited. On the other hand, in studies, it was reported that the activity and nutrition subscales did not provide sufficient evaluation in ICUs patients [1]. The BS demonstrated usefulness in predicting pressure ulcer development on ICUs when using a cutoff score of 14. Studies continue in order to determine the cut-off point of the BS in ICUs [2].

Clinical relevance
The satisfactory results we obtained prove that BS will be suitable instrument for use in determining healthy patients for pressure ulcers in ICUs. Additionally, the BS can be used in the evaluation of the effectiveness of nursing interventions to decrease pressure ulcers incidence.

References

Prevalence of Pressure Ulcers in Intensive Care Unit Patients in Turkey

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Introduction
Pressure ulcers, which have varying incidence rates from country to country and from institution to institution are one of the important health problems. Intensive care units (ICUs) are seen risk places for developing pressure ulcers. However there was no study that has investigated pressure ulcers prevalence among a representative sample in ICUs in Turkey. The purpose of this study was to evaluate the prevalence of pressure ulcers among adult intensive care patients.

Methods
The risk of pressure ulcer in 422 patients at 50 ICUs of 21 hospitals, located in Istanbul, was determined by using the Braden Scale. Subsequently, patients who had pressure ulcer were evaluated by means of ulcers’ localization and size, presence of exudate, situation of surrounded tissues and ulcers’ phase according to the classification system recommended by EPUAP. Before the study, permissions from the management of hospitals and ethical approval by Local Ethics Committee were obtained.

Results
The prevalence of pressure ulcers in intensive care patients was 39.8% (n=168) (Fig 1). Patients who were victimized by pressure ulcers were 63.0 mm (SD=26.4) and the prevalence of ulcer/s’ localization is the longest. It is expected result because risk of pressure ulcers increases as the duration of hospitalization increases.

Clinical relevance
The prevalence of pressure ulcers in ICUs are quite high. The more effective precautions should be taken.

References
**Proceedings of the 17th Annual European Pressure Ulcer Meeting**

**Stockholm, Sweden**

## P70

**Instrument measuring of the competence “risk assessment of pressure ulcer” applicable to simulation of clinical practice: process validation**

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### Introduction

The clinical decision involving the best available practice presupposes the exercise of the competence. The evidence contained of the guideline of National Pressure Ulcer Advisory Panel (NPUAP) and European Pressure Ulcer Advisory Panel (EPUAP) may result in structuring of competences to health professionals with safety and quality training. Competences involve the articulation of a set of knowledge, skills and attitudes (1). The competence development are pointed as process and outcome positive of clinical simulation strategy. The aim of this study was to construct and validate the contents of the measuring instrument of the components knowledge, skills and attitudes of the competence “Risk assessment for pressure ulcer” applicable to teaching strategy by simulation.

### Methods

This 1sts methodological study was developed in stages. The first: elaboration and validation of the construct (theoretical framework) on the knowledge, skills and attitudes of the competence “Risk assessment for pressure ulcer”. The second development of pilot instrument subjected to semantic analysis and content validation. The elaboration of the construct obtained from the analysis of the knowledge (knowledge), knowing-doing (skills) and wanting to do (attitudes) based on conceptions of Le Bozec (2003), considering the recommendations for risk assessment the NPUAP / EPUAP (2009) . For the attitudes used the concept of critical thinking established by Delphi report process (1990). Were identified 37 items of knowledge, 29 items to skills; 34 items to attitudes, totaling 100. The construct was subjected to content validation by a committee of five experts. The test was expressed by degrees of pertinence. The instrument for measuring competences was developed from the validated construct and subjected to semantic analysis (brainstorming with groups formed by 4 nursing undergraduate students and 4 newly qualified nurses). Finally, it was content validation by six expert committees. The instrument consisted of the 30 statements that allow the verification of level of agreement: knowledge 14, skills 8 and attitudes 10.

### Results

The construct and instrument for measuring competence exhibited reliability (0.0 % of pertinence). The instrument was validated with response scale of five points ranging from none (1) to extremely (5). The scores follow the variation interval of the Likert scale. To Knowledge (min / max = 14 / 70). Ability to (min / max = 84 / 0); For attitudes (min / max = 10 / 50). The higher the score in each component, the higher the level of the combination of knowledge, skills and attitudes to exercise of the competence.

### Discussion

Studies suggest that development of competences is the main result of the simulation strategy. However, there are few educational constructed and validated instruments capable of measuring the exercise of competences (2) [4]. Of the 37 operational items of knowledge constructed, 33 items were considered pertinent and two changed. After classification by type of knowledge, 15 items suffered textual revision and one was deleted, resulting in 38 items. Of the 29 items about Skills, 27 were considered pertinent. The classifications by type of knowing-doing resulted in the amendment of four items, a reclassification and other one discarded, leaving 28. Of the 34 items about Attitudes, 33 were considered very pertinent and one was discarded. The content validity of the construct considered 99 of 100 items appreciated. The validated construct gave support to development of the instrument of the competence which consisted of the combination of knowledge evidence-based. Psychometric procedures for the instrument will be test in future studies.

### Clinical relevance

The instrument is applicable to simulation strategy for the development of competence “risk assessment for pressure ulcer”.

### Acknowledgements

We appreciate the help of the Superior Coordination of Improvement of Higher Education Personnel (Capes). No conflicts of interest to declare

**References**

[1] Le Bozec G. Pato Agre; Armed; 2003

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**Proceedings of the 17th Annual European Pressure Ulcer Meeting**

**Stockholm, Sweden**

## P71

**Detecting Subclinical Pressure Induced Tissue Damage among Nursing Home Residents with Subependimal Moisture (SEM) Measures: Preliminary Findings**

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### Introduction

Pressure ulcers (PUs) are classified by the level of visible tissue damage, where stage I PUs exhibit non-blancheable redness on intact skin, deep tissue injuries (DTI) show maroon or purple skin discoloration, stage II PUs are partial thickness skin loss with drainage and stage III and IV and unstageable ulcers involve full thickness damage (1). Stage I PUs account for up to 47% of all PUs in the elderly, many of which progress to more severe ulcers (2, 3). Skin discoloration indicates underlying tissue damage has already occurred. Detection of subclinical pressure induced tissue damage can allow for visible tissue rescue preventing stage I PUs and DTI. In pilots studies, we showed that subependimal moisture (SEM) or water content in skin and tissues as measured using surface electrical capacitance, is related to skin damage among nursing home (NH) residents and SEM increased (e.g., more edema, inflammation) when no visible damage was observed but stage I or greater PU was visible one week later. The purpose of this descriptive cohort panel study is to describe SEM as a method of identifying pressure induced tissue damage among NH residents.

### Methods

The University of California, Los Angeles, Subject Protection Committee approved the protocol. Research staff obtained written consent to participate from NH residents or designated proxies for those unable to provide consent. 417 NH residents from 19 N H in California participated in the study. Visual skin assessments and SEM were obtained weekly for up to 16 weeks. SEM was measured with surface electrical capacitance as a level of early pressure induced tissue damage among NH residents.

### Results

NHS were reflective of U.S. NHs with a range across quality of care ratings. For example, late stage II, Average 33%. Similar across 16% Superior 22%. Participants had a mean age of 76.7 (SD=14.2), years; 55% female, 37% non-Hispanic white, 21% Hispanic, 29% African American, 12% Asian American, with mean Braden Scale score =156, SD 3.2: functionally independent (U.S Minimum Data Set (MDS)) mean bed mobility score = 2.7, SD 12; transfer score 3.1, SD 1.0; range 1-4). Mean length of stay was 16 years (25% of participants were newly admitted during study). Indicence all PUs stages & DTI over 16 weeks:66%; Stage I PU= 23%; DTI only=7%; and Stage I PU only=35%. Mean SEM for skin condition at admission: No damage 40.7, Erthyma 42; Stage I 4.1 (only 1 sacral observed). SEM was higher the week prior to observed erythema/PU compared to SEM taken concurrently and to normal readings: 42.51 (SD 7.65) versus 41.45 (SD 5.54) and 49.06 (SD 7.74), respectively.

Mean SEM for skin condition at Le Heel: No Damage 28.8, Erthyma 30.6, Stage 10, DTI 27.6. (findings similar for R Heel)

### Discussion

SEM is modally related to subsequent induced skin and tissue damage. This approach can allow researcher to focus on pre-stage I pressure damage or subclinical disease. More work is needed to understand inter- and intra-person variation in SEM.

### Clinical relevance

SEM may be useful as a method of detecting pressure induced damage across anatomic locations earlier than visual assessment. Use of biomechanical measures such as SEM could be used for earlier more aggressive interventions and provide more objective assessment data. SEM shows promise for improving the quality of PU care.

### Acknowledgements

NINR R03R010736-2 Conflict of Interest—none

**References**


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The use of DACC technology in two patients under Negative Wound Pressure Therapy - a new approach.
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Introduction
Negative Wound Pressure Therapy (NWPT) is a well documented and successful therapy in the management of recalcitrant, non healing pressure ulcers, cavity and surgical wounds.

Cutimed Sorbact is a unique range of antimicrobial wound dressings that promote the natural wound healing process in a unique manner of action that works without a chemically active agent in an unclean, colonised and infected wounds. It uses the physical principle of hydrophilic interaction. The dressings are coated with a matrix of a new generation of hydrophilic macromolecules, giving them their high hydropilic properties.

The author has had good results experience with NWPT and DACC technology. This trial has evolved from the mode of action of DACC and NWPT on healing rate and wound bed.

The Tissue Viability Team in City and Hackney community has evaluated the effectiveness of Cutimed Sorbact dressing under Negative Wound Pressure Therapy (NWPT). The Cutimed Sorbact has been trailed in the Trust to look at its versatility in terms of cost, quality and effectiveness as well as patient experience. A case study was undertaken involving two 74 year old females suffering from pressure ulcers for the past two months. They have been on a regime of various dressings to manage exudates for the past two months until they were referred to the Tissue Viability Service.

Methods
Two patients around the same age, suffering from pressure ulcers within City and Hackney were selected from the caseload of the Tissue Viability Service. Dressing selection and a holistic assessment2 was carried out. The wounds presented were 80 sqcm, sloughy, small, warm to touch, redness to surrounding area as well as an increase in pain and exudates level. The wound showed no signs and symptoms of infection. It was noted that the two ladies became withdrawn and psychologically disturbed. They were socially isolated due to high exudates and small when they go out of the house. It has been noted that they even restricted their grand children to visit them.

Nottingham Health related QOL scale3 and pain score completed at each visit.

Both patients were placed on NWPT but only one had Cutimed Sorbact under the therapy.

Results
The use of the NWPT had kick-started the healing phase in both wounds and the wound healed after 6 weeks in Patient with DACC technology and the other one in 8 weeks. Staff and patient comments and views have been documented. Nottingham HROD, and pain score show progression of score towards a better QOL and patient outcome and lesser pain from week to week.

N.B. The patient with the DACC and NWPT had longer wear time of the dressing, hence less nursing visit, hence less total dressing cost. This was possible due to the granulation not sticking to the DACC mesh while normally beyond 48 hours the granulation tissue attaches to the foam tissue.

Discussion
It is important to be able recognize the stage a wound is at in the healing phase and to know if a wound is not following the normal progression in healing. Identifying debits in the wound and knowing how best to deal with it are important aspects of wound management. The wound principles and structure within the wound bed will assist the healing process. Dressing selection and knowing the surface area and the dressings are crucial to optimized healing. Cutimed Sorbact dressing promotes faster healing and improves patients quality of life when used appropriately after a holistic assessment of the patient.

Clinical relevance
DACC technology dressing along with NWPT pumps is effective in terms of rate of healing and dressing change as well as exudates management. It is also a good cost effective therapy in its totality of reduction in nursing time and improving quality of life.

Acknowledgements
We appreciate the help of Nurses Arminda Costa e Anaebela Gomes.

Conflict of interest
None

References

Discussion

The prevalence rate is within the range found in literature. A disturbing fact is that most of the PU originates in the hospital, which may reflect the need of the institution to invest in prevention.

Clinical relevance
Institutional best practice policies for the prevention of PU associated with hospitalization should be encouraged. At a time when so much is said in preventing iatrogenic infection will not be also the pressure ulcer a iatrogenic disorder?

Acknowledgements
We appreciate the help of Nurses Arminda Costa e Anaebela Gomes.

Conflict of Interest
None

References

Discussion
Increasing quality decreasing Incidence of PU in a ICU

Introduction: Research in the area of the wounds has been growing, we have found that many professionals have investigated this issue that become increasingly prevalent [ALVES, P., D. 2012]. In a hospital setting, 70% of chronic wounds, occur during the first weeks of hospitalization, and its prevalence reaches 4.5% in chronically ill and about 9% in the remaining patients [DELARUZES, et al., 2011]. Studies in several countries, reported rates of incidence of 26.8% to 62.5% (SERPINA, et al., 2011) that are significantly higher than in Portugal with prevalence rates of pressure ulcers (PU) 16.6% at UCI.

Objectives: To determine the prevalence, incidence and risk of developing pressure ulcers, patients admitted to the PU at the period 31 October 2012 to 31 October 2013.

Specific objectives: Identify the prevalence and incidence of pressure ulcers in hospitalized patients in the P-ICU. Stratify the risk of PU development through the records of the Braden Scale.

Methods: Epidemiological study, retrospective focusing on the population of patients admitted to the ICU from 31 October 2012 to 31 October 2013. Data were obtained from the B-ICU program, which is in force for implementing patient records, getting all registered information concerning patients from admission to discharge. The data were further processed in SPSS program analysis performed and the relationship between variables.

Results: In the period from 31 October 2012 to 31 October 2013, were admitted 509 patients of whom 89 had a PU, a prevalence of 17.5%. The incidence of new NP was 38 patients (7.5%). The average risk index assigned by Braden was 11 points - high risk of developing pressure ulcers. The patients who developed PU, the average age was 68 years and mode of 76 years. The youngest patient was 20 and the oldest 87. Related to the classification of PU found that the largest percentage (25.5%) of the ulcers were category 4. Also found that the ulcers Category 1 (16%) were less frequent in the studied period. Were also identified, unusual representing 3% and unclassified lesions that represent 10% of PU. The average time for a patient develop a PU during the study period was 180 hours or 7.5 days, calculated by the introduction of diagnostic and/or of nursing treatment.

Conclusion: The values of incidence and prevalence are lower than in other European countries, however, it is a worrying problem in intensive care units, as well as the increase in costs of hospitalization, prolongs it, and causes more suffering for the patients and family. It is one indicator of the quality of nursing care provided, it is necessary to explore the predisposing factors and proposes for prevention interventions. Were some doubts about the consistency of ratings related to nutrition, where it proposed to introduce a range of nutritional screening. As for records with different ratings in semantic terms is essential to assign a category when assigning a diagnosis of pressure ulcers. It is important to standardize the terminology records and formalization on the categorization of most current pressure ulcers.

Clinical relevance: This study’s show the dimension of the problem and a way to justify the investment in prevention.

Acknowledgements: We appreciate the help of Nurses from “COU-Polina” - CHUV/P.ESP/0 and E.P.E.

Conflict of Interest None

References


Discussion and clinical relevance

From the staff point of view it is very important to have medical devices that help the staff with the nursing care. This “Multicare” bed is big, much bigger than a normal ward bed. It is very technical and at first glance the “Multicare” bed appears daunting to the staff. As the increase in costs of hospitalization is crucial factor for the prevention is pressure relief for patient who are bed ridden and immobile [12].

Methods

To investigate the effect of an active pressure ulcer red distribution mattress with a automatically lateral therapy bed for prevention and treatment of pressure ulcers. The frequency of the mattress cells movement cycle is 7.5 minutes. The cells “moving” from the foot to the head of the mattress. The bed has weight function and can be placed lateral position to relieve pressure from vulnerable areas.

Results

Case 1: Men age 73, healthy and very long. At admission to the hospital (11/11) he was septic and treated at ICU for over one month. During the ICU care period he got “candidiasis diabetic” and had severe AD problem. When arriving to the ward he had 15 at score of MNS and she was very ill and affected of the infection. He was replaced on a standard foam mattress. After a few days the nurses found superficial ulcer in the ear and he was put on the special mattress. He recovered after ~ 60 days. He used the “Multicare” bed to discharge (3 of March). The MNS score was 22 at discharge. He needed hospital care some times after this episode and he asked especially after the bed because he felt the bed very comfortable and safe.

Case 2: Woman age 73, she had a severe skin disease. Her skin condition was very painful. At admission to the hospital (11/11) she needed care at ICU and got pressure ulcer during this care period. The ICU nurses categorizes the pressure ulcer to category 3 and the size was 2.5 cm placed on the buttocks. She has also severe AD problem. Risk assessment score was 27 and she got the “Multicare” bed at the ward. She felt the bed comfortable, and the mobilization from the bed was smooth. At discharge the 17 of April she had MNS score of 22 and free from pressure ulcer and AD.

Discussion and clinical relevance

From the staff point of view it is very important to have medical devices that help the staff with the nursing care. This “Multicare” bed is big, much bigger than a normal ward bed. It is very technical and at first sight staff describe the bed “like a big spaceship”, with many buttons and many functions on the panel to keep in mind. After training and started using the “Multicare” bed they appreciated the bed functions, and it still looked like a “big spaceship”. From the staff point of view this is important:

1. Easy to weight the patient - and stores the weight scores in bed memory.
2. The bed’s lateral can facilitate moving and mobilization of a patient. This reduces the physical strain and increases safety for the patient and the staff.
3. It is easier to making the bed, do daily hygiene and other nursing care tasks - collaboration with several people is not necessary, time consuming.
4. It is also important that a lot of care is conducted in an ethical and dignified manner for the patient.
5. And the comfort and patient safety is important.

Acknowledgements

We appreciate and thank Linda Sweden, for the opportunity to continue testing this “Multicare” bed.

Interest of conflict - none

References


Kosial, A. Archiblad Physical Medicine and Rehabilitation 5:19-29.1961;
Problematic Stage IV Pressure Ulcers on Heels closed with Polymeric Membrane Dressings
Charalampos Agathangelou
ARITI Center of Assisted Living, Rehabilitation and Wound Care, p: x@ethangbe@cty@net.com cy
Nicoria, Cyprus

Introduction
Heel pressure ulcers on extremely disabled patients tend to have marginal circulation and often become infected. Even with good compliance, which is rare, many heel pressure ulcers never close. This study highlights three patients who would not appropriately offload their heels: a 50-year-old man with severe Parkinson’s, a combative 80-year-old man with Alzheimer’s and a severely contracted 60-year-old woman with Alzheimer’s, all with 3–6 month old stage IV heel pressure ulcers acquired during hospitalization.

Methods
It was important for us to use a dressing that could easily be changed by the relatives at home. We chose to evaluate polymeric membrane dressings in regards to ease of use, cleansing and healing.

One patient’s wound was sharp debrided. Polymeric membrane dressings modelled a small amount of saline softened the exschar on the other. One of the ulcers a silver version of the polymeric membrane dressing was used together with a charcoal dressing due to the odour. After initial debridement the polymeric membrane dressings were placed directly on each wound and replaced daily without rinsing or any other intervention. Later, dressing changes were performed every other day.

Results
The patient with Parkinson’s did not tolerate a low air-loss bed. He would not wear heel protectors, perhaps due to the heat (no air-conditioning). His previous dressings stuck painfully to his wound, but the polymeric membrane dressings were non-adherent and promoted steady wound healing. The 80-year-old man with Alzheimer’s was extremely aggressive when he became impatient, banging his heels on the bedrail. Dressing changes were quick, atraumatic and easy to perform, so his wife was able to do them without irritating him, allowing community nursing visits to decrease from daily to weekly. The 60-year-old lady with Alzheimer’s showed an improvement already after 2 days, after 2 weeks she no longer needed the silver version of the dressing. Her large cavity closed after 3.5 months. Both the other ulcers closed within nine months.

Clinical relevance
Choosing the correct dressing is extremely important in regards to healing and compliance.

Acknowledgements
We appreciate the help of Ruthie Winbald from Ferris Medical Corp who helped with the layout of the poster.

Conflict of Interest None

Discussion
The patient with Parkinson’s did not tolerate a low air-loss bed. He would not wear heel protectors, perhaps due to the heat (no air-conditioning). His previous dressings stuck painfully to his wound, but the polymeric membrane dressings were non-adherent and promoted steady wound healing. The 80-year-old man with Alzheimer’s was extremely aggressive when he became impatient, banging his heels on the bedrail. Dressing changes were quick, atraumatic and easy to perform, so his wife was able to do them without irritating him, allowing community nursing visits to decrease from daily to weekly. The 60-year-old lady with Alzheimer’s showed an improvement already after 2 days, after 2 weeks she no longer needed the silver version of the dressing. Her large cavity closed after 3.5 months. Both the other ulcers closed within nine months.

Introduction
Pressure ulcers are complex wounds which can affect the skin as well as muscles, tendons and bones. They are painful lesions which threaten life and limb and they are expensive to treat. Whilst it is estimated that 200,000 people develop pressure ulcer per annum [1], the size of the problem within the BHSTC was relatively unknown. In addition, we did not have a clear view of contributing factors.

Methods
The Tissue Viability Nurse (TVN) team worked with the Safety Improvement Team, Risk and Governance and front-line staff to develop additional fields within Datix (a healthcare risk management, incident and adverse event reporting software). This allowed us to validate, grade and theme reported pressure damage. The TVN team prospectively reviewed all pressure ulcer incidents that occurred from April 2012 until March 2013. This information provided base-line information on the number of pressure ulcers as well as an understanding of the cause. It allowed us to target education and resources in areas of need.

We encouraged teams to take an active part in a UK Safer Patient Network collaborative. This allowed front-line staff to learn from colleagues with expertise in Healthcare Improvement, with particular regard to introducing the SKIN™ Bundle [2]. Regionally, we worked closely with the Public Health Agency and other Healthcare Trusts, sharing experience and influencing local standards. We introduced the SKIN™ Bundle into all our acute adult inpatient wards and departments, utilising the concepts of local ownership of data (Safety Crosses, Datix, monthly audit information), SKIN™ champions and small cycles of change. All areas received additional education. (SKIN™ workshops, one-one sessions and resources, e.g. the SKIN™ Chart and the Think SKIN™ Poster). Frontline staff were asked to investigate every hospital acquired pressure ulcer (grade 2 and above) using a standardized root cause analysis form. Learning was shared to reduce the likelihood of similar problem arising.

Results
Within the BHSTC, the reduction of Hospital acquired Pressure Ulcers is a primary driver for safety and quality. Every Trust acquired pressure ulcer (grade 2 and above) is investigated and learning shared. The reporting of Grade 2 pressure ulcers (superficial) has increased (in keeping with better vigilance, and understanding), however, the incidence of severe pressure damage has decreased (Fig 1).

Fig 1: Reduction of deep pressure damage

Discussion
Patients are creating novel solutions to meet the needs of the patients and staff within their own departments. These include:
• An Avert Poster – This reminds staff that the patient is on the SKIN™ Bundle.
• Incorporation of the SKIN™ Bundle into the major theatre care pathway.
• Ward based Pressure Ulcer Groups, which have been pivotal in exploring issues through team supervision, newsletters, providing one-one feedback on problems noted and introducing novel solutions to device related ulcers.

Conflict of Interest None

References
INTRODUCTION
Cerebral palsy (CP) is the commonest cause of physical disability in childhood. Children with CP may have problems with mobility resulting in contractures, poor nutrition, incontinence and are frequently reliant on orthotic appliances and wheelchairs. These are all risk factors for pressure ulcer development yet there is under-recognition of risk in this population. There appears to be lack of awareness amongst carers of relevant risk factors or the preventative measures that should be taken. Over the past four years in the UK there has been widespread adoption of the SKIN™ bundle developed at St Vincent’s Medical Centre in Florida [1]. It has been fully implemented for adults in our organisation. The regional children’s neurodisability team recognised there was an opportunity to pilot a children’s version of the SKIN™ Bundle in a high risk group of children attending the tertiary service as outpatients.

The aim of the project was to ensure all at risk children had a SKIN™ assessment completed. The secondary aim was to provide appropriate education to carers.

METHODS
The core team comprised a clinical nurse specialist, lead consultant, occupational therapist and physiotherapist. The project was developed in conjunction with the BHSC Tissue Viability Nurse Specialists. The project commenced in January 2014 using improvement methodology including 3 PDSA cycles of the existing SKIN™ bundle templates. Implementation commenced in March 2014. A baseline carer questionnaire was undertaken to obtain information on current knowledge of risk factors for pressure damage in children.


All patients had the SKIN™ bundle assessment undertaken on admission. Carers were provided with verbal and written information on risk factors, prevention and treatment.

Process measures: all children with risk identified should be given information on prevention or referred on for treatment.

Balancing measures: increased recording of pressure ulcers on DATOS and nursing time taken to complete the bundle to be < 10 mins per patient.

RESULTS
Pre-Assessment. Carer questionnaire: 70% had never received any formal advice on caring for their child’s skin. 50% of this group’s children had experienced skin breakdown. Carers had poor knowledge of risk factors.

Completion of SKIN Bundle
Two PDSA cycles were undertaken to develop an appropriate form.
Completion of the form fell to below 60% owing to lack of awareness of the new process when a new staff member was working with the team.
A steady improvement occurred over the next two weeks.
A total of 14 children presented with active skin breakdown requiring outpatient treatment and advice from clinic staff. There was no reported increase in reporting to BHSC Tissue Safety form. All assessments were completed in less than ten minutes.

DISCUSSION
Carers are not well trained in the risk factors for skin breakdown in children with neurological disability. A simple information leaflet appears appropriate for raising awareness. The SKIN bundle was a quick and effective tool for use in the outpatient setting.

CLINICAL RELEVANCE
• A new process requires training and education of the team and updating if things change.
• A bundle should be easy to administer with clear actions.
• Skin breakdown in children with neurological disability is under recognised and under treated.
• Carers can be empowered to act as skin champions using verbal and written information explaining risk factors and prevention techniques.

Parental comments ‘I will be more vigilant… reminded me what to look out for’ and ‘I will be more aware of moisture build up… and watch out for friction… I would know what to do…’

ACKNOWLEDGMENTS

CONFLICT OF INTEREST: None

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GENERAL INFORMATION

Venue: Aula Magna
Aula Magna Stockholm University
Frescativägen 6
SE-106 91 Stockholm
Sweden

EPUAP 2014 Conference Secretariat
Tel: +420 731 555 750
office@epuap.org

CONFERENCE HOURS

Tuesday 26 August
16:00 – 18:00 Pre-registration at conference venue

It is possible to upload oral presentations. More information will be available at the registration desk.

Wednesday 27 August
07:30 – 17:30 Registration
09:30 – 10:15 Opening ceremony
09:30 – 17:00 Scientific sessions
09:00 – 17:30 Commercial exhibition
17:00 – 17:30 Official opening of the exhibition (in the exhibition area)
19:00 – 20:30 Welcome reception at the Stockholm City Hall, Nobel Prize Hall

Thursday 28 August
07:30 – 17:15 Registration
08:00 – 17:15 Scientific sessions
08:30 – 17:10 Commercial exhibition
19:30 – 23:00 Conference dinner at Solliden Restaurant, Skansen

Friday 29 August
08:00 – 12:00 Registration
09:00 – 14:15 Scientific sessions
09:00 – 13:00 Commercial exhibition

TAXI

Taxi fares in Sweden are not regulated, which means that prices can vary significantly between companies. We recommend to use the following taxi companies: Taxi Stockholm (+46 8 15 00 00), Taxi 020 (+46 8 15 00 00) and Taxi Kurir (+46 8 30 00 00)

CERTIFICATES OF ATTENDANCE

All participants will received their certificate of attendance by email after the conference.

CME - CONTINUED MEDICAL EDUCATION

The 17th EPUAP Annual Meeting has been accredited by the European Accreditation Council for Continuing Medical Education (EACCME). The 17th Annual Meeting of the European Pressure Ulcer Advisory Panel is designated for a maximum of, or up to 14 European CME credits (ECMEC).

In order to obtain the CME credits, your attendance must be verified for each of the days that you wish to obtain the credits. In order to verify the attendance please go to the registration desk every day after 15 pm Wednesday and Thursday and after 10 pm on Friday. A certificate with your CME credits will be issued after the conference and it will be sent to you by email.

ENTITLEMENTS

Full conference registration:
• Final programme and abstract book
• Admission to the full conference programme, coffee breaks & buffet lunch
• Welcome reception on 27 August at Stockholm City Hall, Nobel Prize Hall

I-day registration:
• Admission to all sessions and symposia of the day, coffee break & buffet lunch.

CLOAKROOM

The cloakroom is located on the ground floor, near the entrance to the venue cafeteria. Please follow the signs. The cloakroom is unattended.
LUNCH AND COFFEE BREAKS

Lunch and coffee breaks will be served in the exhibition area and catering stations are located both on the ground floor and the gallery floor.

INFORMATION FOR SPEAKERS

Please bring your presentation to the technician in the meeting room at least 2 hours before your presentation. The technician will transfer the presentation into the conference server and make sure your presentation runs smoothly. We do not allow the use of personal laptops for presentations. Please bring your presentation on a memory stick. At the end of the conference, all presentations will be deleted so no copyright issues will arise.

Presentations taking place on 27 August in the morning can also be submitted on 26 August between 16:00 – 18:00 at the Aula Magna. Please ask the personnel at the registration desk.

MEETING ROOMS

- **Main Auditorium Left Side** is located on the ground floor. The key lectures and free paper presentations will take place here.
- **Main Auditorium Right Side** is located on the ground floor. The industry symposia and workshops, as well as free paper presentations will be held here.

The entrance to the main auditorium left side and right side is possible from both ground floor and gallery floor.

- **Bergsmannen** is located above the Auditorium, on the 7th level. Free paper presentations and workshops will be held here.
- **Spelbomskan** is located above the Auditorium, on the 7th level. Free paper presentations and workshops will be held here.
- **Kungstenen – Speakers’ Room** is located above the Auditorium on the 7th level.

EXHIBITION

The most important companies in the field of pressure ulcer and wound management will present the latest products and developments in this field.

The exhibition is open during the conference programme. You can visit the exhibition during coffee and lunch breaks which will be served in the exhibition area. You can collect stamps from each exhibitor and win a free registration to the EPUAP 2015 Annual Meeting in Ghent, Belgium. Ask at the registration desk for the exhibition prize form.

The exhibition is located on the ground floor as well as on the gallery floor.

LANGUAGE

English

INTERNET AND WIFI

Free WiFi is available all through the venue. Access to WiFi will be possible based on it-access cards to be picked up at the registration desk.

POSTER AREA

The poster area is located on the Mezzanine Floor. Please follow the signage or ask the personnel at the registration desk for more information.

The posters should be set up on 27 August from 07:00 – 09:00. Equipment for setting up the posters will be provided at the registration desk upon request. Assistance will be available in the poster area during the time period mentioned above. There will be no formal presentations of paper posters. The conference secretariat takes no responsibility for damaged or left posters.

EPUAP INVESTIGATOR AWARDS 2014

The EPUAP Experienced and Novice Investigator Awards will be awarded by the President of EPUAP at the conference dinner held on 28 August at Solliden Restaurant.

**BEST POSTER AND BEST ORAL PRESENTATION** will be awarded by a panel of judges. The results will be announced after the conference and the award consists of a free hard copy of the updated guidelines for the prevention and treatment of pressure ulcer.
ABOUT STOCKHOLM

Stockholm, also known as the, Venice of the North’, is strategically located on 14 islands on the coast in the south-east of Sweden. The city’s oldest section is Gamla Stan (Old Town), located on the original small islands of the city’s earliest settlements and still featuring the medieval street layout. Metro station in the old city is Gamla Stan (red and green line).

Stockholm is a compact yet cosmopolitan city with excellent flight connections and an efficient public transportation system. There are many reasons why Stockholm is the natural Capital of Scandinavia. One is that Stockholm is positioned at the heart of the region, and enjoys the benefits of a world-class transport infrastructure. Another is that Stockholm is the largest city in the largest country in Scandinavia. It is also where you find the most multinational companies, the largest stock market and, not least, the most visitors. People come to Stockholm for the food, the design and the music. Stockholm also offers a unique range of galleries and museums, and every year the eyes of the world are on Stockholm when the Nobel Prizes are awarded. Welcome to Stockholm – The Capital of Scandinavia.
SOCIAL EVENTS

WELCOME RECEPTION

The welcome reception is hosted by Stockholm City Hall in the Nobel Prize Hall and it is included in the registration fee. Entrance is by invitation only. You will receive your invitation when you register to the conference. It is necessary to confirm participation in advance.

The City Hall was designed by architect Ragnar Östberg in 1923. The building is beautifully situated on the waterfront in central Stockholm. It is mostly famous for the Nobel Prize festivities every year on 10 December.

Conference Dinner
at Solliden Restaurant, Skansen

The Solliden Restaurant is located 10 minutes away from the city centre and offers a unique panoramic view of Stockholm. Skansen is known for its wild animals, culture and out-door exhibitions of Swedish cultural heritage.

Transportation to the conference dinner:
There will be free transportation to / from the conference dinner for all dinner guests. Meeting point: Mornington Hotel, Nybrogatan 53, Östermalm.
Pick up time: 19:00

Coaches will depart from the conference dinner between 22:30 and 23:30 and will take the guests to the city centre and to Mornington Hotel.

Date: 27 August 2014
Time: 19.00 - 20.30

Date: 28 August 2014
Time: 19.30 - 23.00
Place: Solliden, Skansen
Price: € 100, limited number of seats

Live music & dance – Blåslaget will perform the best songs of ABBA.
Please don’t forget to bring the dinner ticket.
# Sponsors and Exhibition

**EPUAP 2014**

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INDUSTRY SATELLITE SYMPOSIA AND WORKSHOPS

Wednesday
27 August 2014

13:15 - 14:15  |  Main Auditorium / right half
LINET WORKSHOP
Title: Pressure Ulcer Prevention - Changing Techniques
Speaker: Lorraine Demott - Clinical Specialist (Moving and Handling)

15.30 - 17.00  |  Main Auditorium / right half
NUTRICIA SATELLITE SYMPOSIUM
Title: Pressure ulcer care without attention to nutrition is incomplete pressure ulcer care
Chair: Prof Jos Schols  |  Speakers: Dr Emanuele Cereda, Dr Pearl Gumbs

Thursday
28 August 2014

08.30 - 09.30  |  Main Auditorium / right half
MÖLNLYCKE SATELLITE SYMPOSIUM
Title: The impact of evidence on clinical practice: Protecting your patients
Chair: Dr Joyce Black  |  Speakers: Prof. Nick Santamaria, Dr. Peggy Kalowes, Prof. Amit Gefen

09:30-10.30  |  Workshop room - Bergsmannen
LOHMANN & RAUSCHER WORKSHOP
Title: Debrisoft - Active debridment
Speaker: Prof. Christina Lindholm
10.00 -11.00  |  Main Auditorium - right half

**ARJOHUNTELIHG WORKSHOP**

**Title:**
ArjoHuntleigh Interactive Workshop on Active Microclimate Management

**Speakers:**
Angel Delgado; Global Clinical Development & Clinical Sciences, ArjoHuntleigh  
Greg Olk; Senior Manager, Global Product Marketing, ArjoHuntleigh

11:00 - 12:30  |  Workshop room - Spelbomskan

**SCA HYGIENE PRODUCTS AB**

**Title:**
Incontinence and elderly skin – Aspects of Pressure Ulcers and Incontinence Associated Dermatitis

**Speakers:**
Sari Torniainen; Commercial Training Manager, Dr Shabira Abbas; Senior Scientist, Dr Maria Sköld; Associate Scientist

14.15 - 15.45  |  Main Auditorium - right half

**3M SATELLITE SYMPOSIUM**

**Title:**
Pressure ulcers and Incontinence - Associated Dermatitis: the journey from the lab to the patient

**Chair:** Prof. Dimitri Beeckman  |  **Speakers:** Prof. Amit Gefen, Dr. Jan Kottner, Mrs. Knibbe H. Msc

16.00 - 17.00  |  Workshop room - Bergsmannen

**COMPLIANT CONCEPT WORKSHOP**

**Title:**
Mobility Monitor – a versatile assistant for pressure ulcer prevention that measures your patient’s mobility & supports your repositioning management

**Speaker:** Michael Sauter
Journal of Wound Care (JWC) is the leading source of tissue viability research and information. JWC is essential reading for all specialists who wish to enhance their practice and stay ahead of developments in wound management and tissue viability.

The journal is internationally renowned for its cutting edge and state-of-the-art research and clinical articles, as well as its coverage of management, education and novel therapies.

JWC has been associated with an Impact Factor (IF) of 1.906 for 2012, corresponding to a total number of citations of 1327.

The journal is indexed on Medline, Scopus, CINAHL and the Thomson Reuters’ Science Citation Index-Expanded and Current Contents/Clinical Medicine.

“The Journal of Wound Care is an extremely valuable resource that contains a wealth of peer-reviewed papers detailing the latest advances in wound care research. A must read for clinicians, academics and researchers who want to advance their own knowledge/practice and keep abreast of the wound care literature.”

Caroline McIntosh, Head of Podiatry, National University of Ireland.

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Hosting Societies
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Associazione Italiana Ugere Cutanee - Onesus
www.aiuc.it

A.I.S.I.E.C.
Associazione Italiana per lo Studio delle Lesioni Cutanee
www.aisiec.it

Co-Hosting Societies
E.P.U.A.P.
European Pressure Ulcer Advisory Panel
www.epuap.org

E.T.R.S.
European Tissue Repair Society
www.etrs.org

Stay tuned
# EXHIBITORS

## EPUAP 2014

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18th Annual Meeting of the European Pressure Ulcer Advisory Panel  
16-18th September 2015 · Ghent · Belgium

Dates and information

Conference dates
16 – 18 September 2015

Venue site
Culture and Conference Center
Het Pand

EPUAP Industry Session
January 2015 (Ghent)

Abstract submission deadline
30 April 2015

Early registration deadline
15 June 2015

Programme

The main topics of the conference programme will be:

- the societal impact of pressure ulcers;
- health economics;
- how to put pressure ulcers more on the international agenda for healthcare;
- pressure ulcers and quality indicators;
- developing and evaluating local and national quality improvement projects;
- international collaboration in practice, research and education.

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