



EPUAP 2015

18th Annual Meeting of the European Pressure Ulcer Advisory Panel

16 – 18 September 2015 · Ghent, Belgium · www.epuap2015.org



University Centre for
Nursing and Midwifery



PUTTING THE PRESSURE IN THE HEART OF EUROPE

PROGRAMME AND ABSTRACT BOOK

EduWond



Organised by the European Pressure Ulcer Advisory Board and the University Centre for Nursing & Midwifery (Ghent University) in cooperation with EduWond, CNC, WCS België and AfiScep.

Ground Floor

1. Refter Hall
2. Registration
3. Courtyard Exhibition
4. Kapittelzaal Exhibition
5. Poster area
6. Meeting room Sacristie
- S. Stairs



1st Floor

1. Priorzaal
2. Library/Speakers room (mezzanine)
3. Zaal Rector Gillis
- S. Stairs



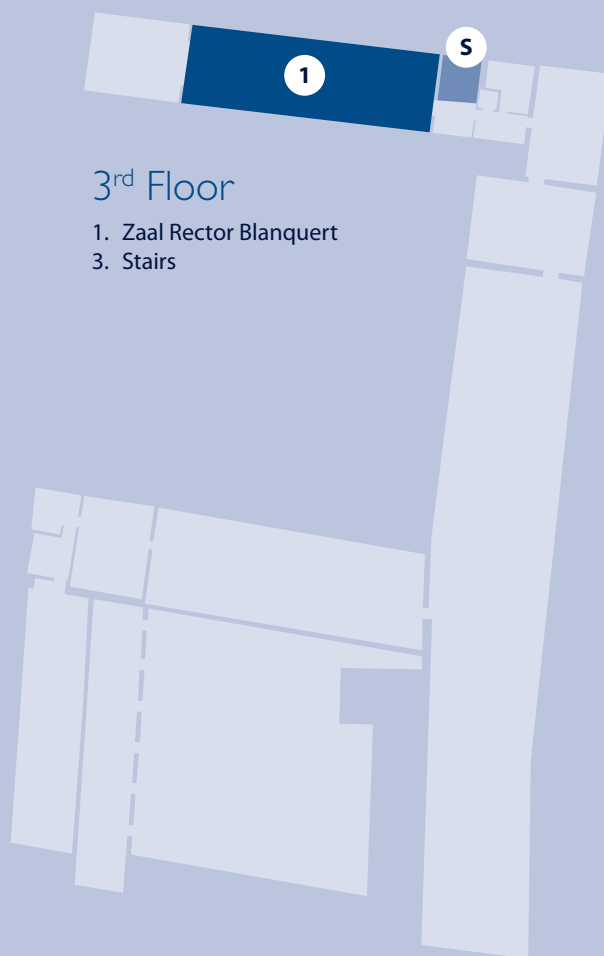
2nd Floor

1. Zaal Rector Vermeylen
2. Oude infirmerie
- S. Stairs



3rd Floor

1. Zaal Rector Blanquert
3. Stairs



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WELCOME



Dear colleague, Dear friend

Welkom in Gent! Bienvenue à Gand! Welcome to Ghent!

On behalf of all of us at the European Pressure Ulcer Advisory Panel (EPUAP) we wish you a warm welcome at our 18th Annual Meeting. The host of this year's conference is the University Centre for Nursing and Midwifery based at Ghent University. The conference is organized in collaboration with all Belgian woundcare organizations (EduWond, CNC, WCS België, and AfScep).

Ghent, a city of culture and science in the Flemish Region, is our hosting city. Ghent is without doubt one of the most beautiful historic cities in Europe and was given several pretty names: historic heart of Flanders, a city of all times, medieval Manhattan, Europe's best kept secret and received some international tourist nominations. In 2008 National Geographic Traveler Magazine ranked Ghent third in its list of 109 most authentic destinations. In the 2011 edition of the Lonely Planet's 'Best in Travel' guide, Ghent took the 7th place on the list of must-see cities.

More than 500 experts from 35 countries in Europe, The United States, Asia, Australia and Middle East are attending the conference. More than 120 abstracts were submitted and more than 30 companies will be exhibiting the next 3 days. The quality of the scientific programme has been acknowledged by the European Accreditation Council for Continuing Medical Education (EACCME) by assigning 14 European CME Credits (ECMEC). A real success!

Like every year, the aim of the conference is 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. The overall theme of this year's conference is "Putting the Pressure in the Heart of Europe" and the main topics of the scientific programme are:

- the societal impact of pressure ulcers
- health economics
- how to put pressure ulcers 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
- EPUAP - International Society for Pediatric Wound Care (ISPeW) Session
- Preview of the EPUAP Book: Science and Practice of Pressure Ulcer Management

With this scientific program, which blends top-tier science, the latest clinical research, and also region-specific activities covered in a Flemish and a French speaking session, we hope you will enjoy the conference and your time in Ghent!

Welcome!

Prof. Dimitri Beeckman

*Chair of EPUAP 2015
Chair of the EPUAP Scientific Committee*

Kind regards,

Prof. Amit Gefen

President of EPUAP

Prof. Lisette Schoonhoven

*President-Elect of EPUAP
Chair of the Guidelines Committee*

The Local Organising Committee:

Hilde Heyman
Evelien Touriany

Hilde Beele
Luc Gryson

Steven Smet
Christian Thyse

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.

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

EPUAP Executive Board Members

Amit Gefen, *President*
 Lisette Schoonhoven, *President Elect and Chair of the Guidelines Committee*
 Jane Nixon, *Treasurer*
 Jeannie Donnelly, *Co-Treasurer*
 Dimitri Beeckman, *Chair of the Scientific Committee*
 Jan Kottner, *Co-Chair of the Guidelines Committee*
 Zita Kis Dadara, *Public Relations*
 Christina Lindholm, *Public Relations*

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Ghent University - 'Dare to think': not just a slogan

Ghent University was founded in 1817 by King William I of Orange. The past 200 years, Ghent University employed many eminent scientists such as Nobel Prize winner Corneille Heymans, Leo Baekeland, Joseph Guislain, Walter Fiers, Marc Van Montagu, Peter Piot,... You'll also find many prominent persons among our alumni such as Robert Cailliau (co-inventor of the Internet), Dirk Frimout (astronaut), Peter Piot (United Nations) and Jacques Rogge (former President of the International Olympic Committee). Today, Ghent University is a top 100 university and one of the major Belgian universities counting over 41,000 students and 9,000 employees spread over 11 faculties and 117 faculty departments. These departments offer more than 230 high-quality courses in every scientific discipline, each inspired by innovative research. Ghent University distinguishes itself as a socially committed and pluralistic university in a broad international perspective.

The Faculty of Medicine was one of the four founding faculties of Ghent University. Today, with 200 professors instructing 6,200 students, it remains one of its largest. Now formally named the Faculty of Medicine and Health Sciences, the Faculty provides training in seven disciplines: medicine; dentistry; biomedical sciences; physical education; rehabilitation sciences and physiotherapy; medical and social sciences (nursing and midwifery, healthcare management and policy, and health education and promotion); and speech therapy/audiology. It has a close relationship with Ghent University Hospital, the largest such institution in Belgium. The Faculty, also renowned for its postgraduate and continuing education programs, seeks to build a highly dynamic learning atmosphere linked to not only strict healthcare but also to what is currently happening in the broader society. More information: <http://www.UGent.be>



University Centre for
Nursing and Midwifery

University Centre for Nursing and Midwifery (UCVW)

The University Centre for Nursing and Midwifery (UCVW) is part of the Department of Public Health, Faculty of Medicine and Health Sciences, Ghent University. The team consists of 20 members of staff being active in academic education, research, societal/academic services and administrative support. The UCVW is led by Prof. dr. Sofie Verhaeghe, Prof. dr. Ann Van Hecke, and Prof. dr. Dimitri Beeckman. The UCVW is a dynamic research center that focuses on the development, validation and valorization of scientific knowledge that leads to safe, evidence-based and efficient care and organization of care. This includes a focus on the translation and implementation of complex interventions in practice. Through partnerships and

collaborations with external partners, the UCVW aims to support research skills of professionals in clinical practice. The research work is divided into six domains: skin care (pressure ulcers and incontinence-associated dermatitis), oncological care, midwifery, education and training, mental health care, and nutritional care. The UCVW uses innovative research methods (quantitative, qualitative, mixed methods) and works with national and international governments, universities, healthcare organizations and the industry in order to accomplish its mission. The UCVW is responsible for the organization of the Master in Science in Nursing and Midwifery. More information: <http://www.UCVWgent.be>

3rd EPUAP FOCUS MEETING



The Role of Skin and Tissue Maturation
and Aging in Pressure Ulcer Research and Practice

4 – 6 April 2016 | Berlin, Germany

www.focusmeeting2016.org



The EPUAP Focus Meeting is a relatively new initiative aimed at exchanging knowledge among scientists, clinicians, R&D and industry in regard to the latest developments in special areas of pressure ulcer research and practice. The focus meeting is intended to give room for in-depths discussion about special topics, to identify knowledge and technological gaps, as well as clinical needs in the pressure ulcer field and establish a platform of discussion for academia and industry.

Why attend the Focus Meeting?

- Receive an overview of current research and development trends in academia in regard to a spectrum of knowledge and technologies in the pressure ulcer field.
- Receive an overview of current trends in commercialized technology in the pressure ulcer field as well as of needs and technological gaps identified by the industry.
- Opportunities for commercialization of inventions and technologies which are still at the research lab phase.
- Obtain an overview of the state-of-the-art in pressure ulcer prevention and treatment technology which is currently being developed at research labs internationally in the academia.
- Scientists and companies have opportunities for to work together towards commercialization of technologies – starting at an early stage of development of the technology – and in particular, to jointly shape the course of R&D so that it meets true clinical needs and bridges actual gaps which have been identified by the industry.
- It is an appropriate environment for informal discussions that encourages follow-up contacts between scientists and companies such as for development of technologies, consultation projects for companies etc.

Organised by the European Pressure Ulcer Advisory Panel
in partnership with Charité-Universitätsmedizin Berlin and Leeds University



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PRELIMINARY PROGRAMME

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WEDNESDAY 16.09.2015

Registration area	
07:30	Registration, badge and bag collection - registration area
07:30 - 09:00	Morning coffee and tea - registration and exhibition area
Refter Hall - Plenary room	
09:00 - 10:15	<p>OPENING CEREMONY Chairs: <i>Dimitri Beeckman, Lisette Schoonhoven</i></p> <ul style="list-style-type: none"> • Opening of the conference by <i>Prof. Guy Vanderstraeten, Dean of the Faculty of Medicine and Health Sciences, Ghent University</i> • Opening of the conference by <i>The President of EPUAP and the EPUAP 2015 Local Organizer, Amit Gefen, Dimitri Beeckman</i> • Pressure Ulcers and Quality of Care – Activities to Stimulate Quality of Care Discussions at a National Level, <i>Prof. dr. Peter Van Bogaert on behalf of the Belgian Federal Council on the Quality of the Nursing activities</i> • Lecture of Appreciation for <i>Prof. dr. Tom Defloor, Professor in Nursing Science at Ghent University and Past President of EPUAP (2005 – 2007), Lisette Schoonhoven, Dimitri Beeckman</i>
10:15 - 11:15	<p>KEY SESSION 1: Ethics, accountability, and health economics in pressure ulcers Chair: <i>Dimitri Beeckman, Lisette Schoonhoven</i></p> <ul style="list-style-type: none"> • Health economics and pressure ulcers: importance, methods and reflections, <i>Lieven Annemans</i> • Assessing the severity of pressure ulcers: unstageable/ungradeable project, <i>Carol Dealey</i> • The cost of prevention and treatment of pressure ulcers from an international perspective: a systematic review, <i>Dimitri Beeckman</i>
11:15 - 12:30	Lunch break, exhibition and poster viewing (in the exhibition area)
Refter Hall - Plenary room	
12:30 - 14:00	<p>KEY SESSION 2: An update of pressure ulcer basic sciences Chair: <i>Dimitri Beeckman, Lena Gunningberg</i></p> <ul style="list-style-type: none"> • Pressure induced deep tissue injury explained, <i>Cees Oomens</i> • The future of support surfaces and technologies for tissue protection: where should we go, and what should we do, <i>Amit Gefen</i> • Biomechanical modeling to prevent ischial and foot pressure ulcers, <i>Yohan Payan</i> • Angiogenesis and wound healing, <i>Liesbet Geris</i> • The association between microclimate and pressure ulcer development, <i>Jan Kottner</i>
14:00 - 14:45	Coffee break, exhibition and poster viewing (in the exhibition area)
14:00 – 14:45 POSTER SESSION IN ZUIDERGANG	
14:45 - 15:30	<p>KEY SESSION 3: Pressure ulcer treatment - beyond the basics Chair: <i>Christina Lindholm, Jeannie Donnelly</i></p> <ul style="list-style-type: none"> • Tackling biofilms and infected pressure ulcers, <i>Ron Legerstee</i> • Wound dressings for pressure ulcer treatment: facts and figures, <i>Erik de Laat</i> • Updated scar management practical guidelines: non-invasive and invasive measures, <i>Luc Téot</i> • The role of negative pressure wound therapy in pressure ulcer treatment: evidence and practice, <i>Lubos Sobotka</i>
	<p>14:15 - 15:45 INTERACTIVE SESSION 2: EPUAP - International society for pediatric wound care (ISPeW) Session, Chair: <i>Guido Ciprandi, Rolf Jernes</i> Pressure ulcers in children: introduction and examples to be discussed, <i>Hilde Beele, Steven Smet</i> Pressure ulcers prevention in NICU and PICU critical areas, <i>Anna-Barbara Schluer</i> Neonatal pressure ulcers. Focus on smallest patients, <i>Guido Ciprandi</i> Final discussion</p>
15:45 - 17:15	<p>INDUSTRY SYMPOSIUM (90')</p>
	<p>16:15 - 17:15 FREE PAPER SESSION 2: Pressure ulcers: Patient safety, quality of care and policy (1) Chairs: <i>Lena Gunningberg, Lenche Neloska</i></p> <ul style="list-style-type: none"> • Strategic Benchmarking: Implementing and Evaluating EPUAP 2014 Guidelines-Envisioning the Possibilities; <i>Nancy Donaldson</i> • Pressure Ulcer and Wounds Reporting in English NHS Hospitals: Pressure Ulcer/Wound Audit (PUWA) and Survey; <i>Jane Nixon</i> • The development of a preventive pressure ulcer prevention policy in a (General Hospital) AZ Nikolaas; <i>Dirk Milliau</i> • Pressure ulcers and quality of care in the Centre Hospitalier de Luxembourg; <i>Andree Marchal</i>
18:30	Welcome reception at the Ghent City Hall

See the programmes for the industry satellite symposia and workshops at page I 12

		07:30
		07:30 - 09:00
		09:00 - 09:45
		09:45 - 11:15
		11:15 - 12:30
Priorzaal	Zaal Rector Blancquaert	
INTERACTIVE SESSION 1: Patient and load handling team University Ghent Chairs: <i>Filip Buckens, Heidi Deconinck</i> Physiotherapy: a complementary therapy, <i>Jo Devleeschouwer</i> Introduction to the practical workshop, <i>Filip Buckens, Heidi Deconinck</i> Practical workshop: Demonstrations of the use of lifting devices Het Pand team		12:30 - 14:00
		14:00 - 14:45
14:45 - 15:30 FREE PAPER SESSION 1: Basic science: Biomechanics and aetiology (1) Chairs: <i>Carina Baath, Jan Kottner</i> <ul style="list-style-type: none"> • Modelling Cell Migration and Differentiation Processes in Muscle and Fat Structures; <i>Fred Vermolen</i> • Computational Modeling of Angiogenesis Using a Cell-Based Formalism; <i>Fred Vermolen</i> • Changes in hypodermic adipose tissue could affect chronic skin wound healing during obesity; <i>Dominique Sigaud-Roussel</i> • Investigating the effect of shear on skin viability, in relation to the development of pressure ulcers; <i>Iris Hoogendoorn</i> 		14:45 - 15:30
15:45 - 16:45 STUDENT FREE PAPERS SESSION: Basic science Chair: <i>Christina Lindholm, Zita Kis Dadara</i> <ul style="list-style-type: none"> • Soft tissue loads in the penis during use of penile incontinence clamps; <i>Ayelet Levy</i> • Tissue loads applied by a novel medical device for closing large pressure ulcers; <i>Rona Greifman</i> • Use of poly (lactic acid) biodegradable microparticles for tissue reconstruction of chronic wounds; <i>Morgane Berthet</i> • Soft tissue loads around the sacrum in a three-dimensional buttocks model when confined to a rigid spinal board; <i>Ayelet Levy</i> 	15:45 - 16:45 FREE PAPER SESSION 3: Innovations in pressure ulcer prevention and treatment Chairs: <i>Jakub Taradaj, Maarit Ahtiala</i> <ul style="list-style-type: none"> • Electrical stimulation in wound healing processes and tissue regeneration; <i>Marino Ciliberti</i> • The Relationship between Nurses Assessment of Early Pressure Ulcer Damage and Sub Epidermal Moisture Measurement: A Prospective Explorative Study; <i>Gillian O'Brien</i> • What does it take to make video consultations succeed – experiences from Sunnaas hospital; <i>Ingebjørg Irgens</i> • Magnetic Resonance Elastography of pressure ulcer related deep tissue injury; <i>Jules Nelissen</i> 	15:45 - 17:15
		18:30

PRELIMINARY PROGRAMME

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THURSDAY 17.09.2015

Registration area	
08:00	Registration, badge and bag collection - Registration area
Refter (Main Auditorium)	Zaal Rector Vermeulen
08:00 - 09:30	<p>INDUSTRY BREAKFAST SYMPOSIUM (90')</p> <p>08:00 - 09:00 FREE PAPER SESSION 4: Innovative approaches in clinical research (Prevention and treatment) Chairs: <i>Carina Baath, Michael Renierkens</i></p> <ul style="list-style-type: none"> • The Relationships between Incontinence, Braden Risk Score, and Pressure Ulcer Stages from the 2013 and 2014 International Pressure Ulcer Prevalence™ (IPUP) Survey; <i>Charlie Lachenbruch</i> • The golden hour for pressure ulcer risk assessment; <i>Richard White</i> • Extracorporeal Shock Wave Therapy in Ulcer Therapy: a single-centre experience and systematic review; <i>Jakub Taradaj</i> • Evaluation of an immersion type mattress for the prevention of pressure ulcers; <i>Peter Worsley</i>
09:30 - 10:30	<p>KEY SESSION 4: EPUAP Book preview, Chairs: <i>Marco Romanelli, Amit Gefen, Mike Clark</i></p> <ul style="list-style-type: none"> • Preview of the book: Science and practice of pressure ulcer management • The critical characteristics of good support surfaces for pressure ulcer prevention, <i>Amit Gefen</i> • How innovative is pressure ulcer prevention and treatment?, <i>Michael Clark</i> <p>KEY SESSION 5: EWMA - EPUAP Session, infection management in pressure ulcer treatment: new insights and evolutions Chair: <i>Lena Gunningberg, Carina Baath</i></p> <ul style="list-style-type: none"> • Infection management: old remedies for old wounds, <i>Rose Cooper</i> • Infection management in pressure ulcers, <i>Rolf Jelnes</i>
10:30 - 11:00	<i>Coffee break and exhibition viewing</i>
10:30 – 11:00 POSTER SESSION IN ZUIDERGANG	
11:00 - 12:00	<p>KEY SESSION 6: The EPUAP awards 2015 Chair: <i>Dimitri Beeckman, Yohan Payan</i></p> <ul style="list-style-type: none"> • Introduction by Prof. Dimitri Beeckman (Chair EPUAP Scientific Committee) • Experienced Investigator Award: Pressure ulcer research: a tortuous road to travel, <i>Cees Oomens</i> • Novice Investigator Award: Translating Pressure Ulcer Risk Factor Research into Clinical Practice, <i>Susanne Coleman</i> • Lifetime Achievement Award: Reflections of a Woundologist, <i>Keith Harding</i> <p>11:00 - 12:30 INDUSTRY SYMPOSIUM (90')</p>
12:00 - 12:30	<p>EPUAP INITIATIVES KEY SESSION</p> <ul style="list-style-type: none"> • International Stop Pressure Ulcer Day, <i>Zita Kis Dadara</i> • The international guideline: update on implementation and development, <i>Lisette Schoonhoven</i> • PuClas3, <i>Dimitri Beeckman</i>
12:30 - 14:00	<i>Lunch break, exhibition and poster viewing</i>
12:30 – 14:00 POSTER SESSION IN ZUIDERGANG	
13:30 - 14:00	EPUAP Annual General Meeting
14:00 - 15:30	<p>KEY SESSION 7: The organisation of pressure ulcer care – best practices and leadership Chair: <i>Amit Gefen, Zita Kis Dadara</i></p> <ul style="list-style-type: none"> • The first Dutch nurse led wound centre, <i>Alita Jaspár</i> • Developing a national pressure ulcer organisation: the Dutch experience, <i>Michel Renierkens</i> • Telemedicine in pressure ulcer risk assessment, prevention and management, <i>Rolf Jelnes</i> • Nurse leadership in pressure ulcer management, <i>Christina Lindholm</i> <p>14:00 - 15:30 INTERACTIVE SESSION 3: Quality improvement projects for pressure ulcers: From implementation to measuring and comparing quality improvement Chairs: <i>Lisette Schoonhoven, Jan Kottner</i></p>
15:30 - 16:15	<i>Coffee break exhibition and poster viewing</i>
15:30 – 16:15 POSTER SESSION IN ZUIDERGANG	
16:00 - 17:15	<p>KEY SESSION 8: Risk factors for pressure ulcer development in specific patients groups - science meets practice Chair: <i>Jane Nixon, Yohan Payan</i></p> <ul style="list-style-type: none"> • Pressure ulcer risk factors from the 2015 French national prevalence study and comparison with previous prevalence studies, <i>Brigitte Barrois</i> • Medical devices and vulnerable skin, <i>Dan Bader</i> • Incontinence - associated dermatitis as a risk factor for pressure ulcer development in a geriatric population?, <i>Sylvie Meaume</i> • Pathophysiological factors and risk assessment methods for pressure ulcers in ICU, <i>Maarit Ahtiala</i> <p>EPUAP 2015 QUALITY IMPROVEMENT AWARDS Preventing Skin Breakdown Projects: Tips and tricks from 5 quality improvement stories Chairs: <i>Dimitri Beeckman, Lena Gunningberg</i></p>
19:30	<i>Boat trip and conference dinner at restaurant "Oude Vismijn"</i>

PRELIMINARY PROGRAMME

See the programmes for the industry satellite symposia and workshops at page 112

		08:00
Priorzaal	Zaal Rector Blancquaert	
<p>08:00 - 09:00 FREE PAPER SESSION 5: Pressure ulcer prevention and management in specific patient groups (paediatrics, surgery, spinal cord injury, ER, older persons, palliative care, etc) (1) Chairs: <i>Luc Gryson, Marco Romanelli</i></p> <ul style="list-style-type: none"> • How to prevent patients developing pressure ulcer (PU) when undergoing cardio-thoracic surgery; <i>Charlotte Walsoe</i> • Can Pressure Monitoring Influence Non-Concordant Patients and Carers in Their Decision Making with Regards to Repositioning and Pressure Ulcer Prevention in the Community; <i>Nicci Kimpton</i> • Pressure Ulcer Prevention in Geriatric Ward; <i>Aase Fremmelevholm</i> • An interdisciplinary team strategy for the prevention of pressure ulcers for at risk ageing patients in community settings; <i>Carolyn Wyndham-White</i> 	<p>08:00 - 09:00 FREE PAPER SESSION 6: Pressure ulcer prevention and management in specific patient groups (paediatrics, surgery, spinal cord injury, ER, older persons, palliative care, etc) (2) Chairs: <i>Erik de Laat, Lenche Neloska</i></p> <ul style="list-style-type: none"> • Cost-effectiveness analysis of nutritional support for the prevention of pressure ulcers in high-risk hospitalized patients; <i>Shelley Roberts</i> • Preventing pressure ulcers in aged care: A randomised controlled trial of the effectiveness of prophylactic silicone foam dressings; <i>Nick Santamaria</i> • Physiological Responses to Pressure Loading and Unloading in Critically Ill Patients as a Predictor of Pressure Ulcer Development; <i>Janet Cuddigan</i> • Prevention of sacral pressure ulcers in pediatric cardiac intensive care unit; <i>Miroslava Hargasova</i> 	08:00 - 09:30
<p>09:00 - 10:00 FREE PAPER SESSION 7: Basic science: Biomechanics and aetiology (2) Chairs: <i>Jakub Taradaj, Maarit Ahtiala</i></p> <ul style="list-style-type: none"> • Features of Dermal Lymphatic Dysfunction in Uniaxially-Compressed Tissues – Implication in Pressure Ulcer Aetiology; <i>Dan Bader</i> • Evaluating control of skin microclimate with AeroSpacer 3D spacer mattress configurations; <i>Dan Bader</i> • A Computational Model of the Competition between Cell Damage and Cell Repair, in the Presence of Oxidative Stress and Mechanical Deformation; <i>Lisa Tucker-Kellogg</i> • Ultrasound Modulates Proinflammatory Cytokine Release in Soft Tissue; <i>David Voegeli</i> 	<p>09:00 - 10:00 INDUSTRY WORKSHOP (60')</p>	09:30 - 10:30
		11:00 - 12:00
		11:00 - 12:00
		12:00 - 12:30
		12:30 - 14:00
		13:30 - 14:00
		14:00 - 15:30
		15:30 - 16:15
		16:00 - 17:15
		19:30

PRELIMINARY PROGRAMME

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FRIDAY 18.09.2015

Registration area		
08:00	Registration, badge and bag collection - Registration area	
Refter (Main Auditorium)	Zaal Rector Vermeulen	
09:00 - 10:00	<p>KEY SESSION 9: Pressure ulcer management: Innovative approaches need to go hand in hand with basic care Chair: <i>Christina Lindholm, Dimitri Beeckman</i></p> <ul style="list-style-type: none"> • Health policy: from a survey of the prevalence of pressure ulcers in nursing homes in the Brittany, France to the start of telemedicine for elderly and disabled people with chronic wounds, <i>Sandrine Robineu</i> • Electric stimulation in practice for treatment of pressure ulcers, <i>Mike Meuwissen</i> • What we should know about repositioning for pressure ulcer prevention and treatment, <i>Zena Moore</i> • Using ITEM as a systematic approach towards pressure ulcer treatment, <i>Steven Smet</i> 	<p>09:00 – 10:00 STUDENT FREE PAPERS SESSION: Clinical science Chair: <i>Evelien Touriany, Hilde Beele</i></p> <ul style="list-style-type: none"> • Risk Factors for Pressure Ulcer in Portuguese Surgical Patients; <i>Marina Batalha Figueiredo</i> • Incontinence-associated dermatitis in elderly: a qualitative phenomenological study on patient experiences; <i>Nele Van Damme</i> • Development and validation of an instrument to monitor the healing of incontinence-associated dermatitis; <i>Karen Van den Bussche</i> • Evidence-based skin care: the development of a basic skin care algorithm with formal care settings, <i>Andrea Lichterfeld</i>
10:00 - 10:45	Coffee break and exhibition viewing	
10:45 - 12:15	<p>KEY SESSION 10: Interactive clinical case discussions Chair: <i>Luc Gryson, Marco Romanelli</i></p> <ul style="list-style-type: none"> • Pediatrics • General • Rehabilitation • Geriatrics • ICU 	
12:15 - 12:45	<p>EPUAP 2016 Annual Meeting – Florence, Italy</p> <p>EPUAP 3rd Focus Meeting 2016 - Berlin, Germany</p> <p>Closing of the conference Chair: <i>Lisette Schoonhoven, Dimitri Beeckman</i></p>	

PRELIMINARY PROGRAMME

See the programmes for the industry satellite symposia and workshops at page I 12

		08:00
Priorzaal	Zaal Rector Blancquaert	
<p>FREE PAPER SESSION 8: Pressure ulcers: Patient safety, quality of care and policy (2) Chairs: <i>Jeannie Donnelly, Jakub Taradaj</i></p> <ul style="list-style-type: none"> • The cost of pressure ulcer prevention and treatment in hospitals and nursing homes in Flanders: a cost-of-illness study; <i>Liesbet Demarré</i> • Priorities for pressure ulcer prevention: mixed methods analysis of patient safety incidents reports from primary care in England and Wales (2003-2013); <i>Ray Samuriwo</i> • Continuous quality improvement project to reduce pressure ulcer prevalence in a regional Belgian hospital; <i>Katrien Vanderwee</i> • Development of outcome measures and performance indicators for PUPIS - a specialist pressure ulcer service in the community; <i>Mark Bowtell</i> 	<p>FREE PAPER SESSION 9: Pressure ulcers: Implementation science and education Chairs: <i>Zita Kis Dadara, Jan Kottner</i></p> <ul style="list-style-type: none"> • Measuring practice change through clinical experts; <i>Ann Marie Dunk</i> • Implementation of evidence based pressure ulcer prevention in hospital units – important factors for success; <i>Eva Sving</i> • INTRODUCING A Care bundle To prevent pressure injury: the INTACT trial; <i>Wendy Chaboyer</i> • The implementation of effective quality management for Pressure Ulcer Prevention at Germany's largest university hospital; <i>Armin Hauss</i> 	09:00 - 10:00
		10:00 - 10:45
		10:45 - 12:15
		12:15 - 12:45

DUTCH SYMPOSIUM PROGRAMME

DONDERDAG 17.09.2015

Tijd: 10:00 – 17:00
Lokaal: Zaal Rector Blancquaert
Sessievoorzitters voormiddag: Mevr. Hilde Heyman, Mevr. Evelien Touriany
Sessievoorzitters namiddag: Dhr. Steven Smet, Dhr. Luc Gryson

10:00 - 10:10	Welkom en inleiding <i>Prof. dr. Dimitri Beeckman; Universiteit Gent, België</i>
10:10 – 10:30	Het ontstaan van diepe weefselschade: inzichten uit de wetenschap <i>Prof. dr. Cees Oomens; Technische Universiteit Eindhoven, Nederland</i>
10:30 – 10:50	De internationale richtlijnen voor decubituspreventie en behandeling zijn er: wat nu? <i>Prof. dr. Lisette Schoonhoven; University of Southampton, UK</i>
10:50 – 11:30	Decubitus en incontinentie- geassocieerde dermatitis: etiologie, preventie en behandeling <i>Prof. dr. Hilde Beele; Universitair Ziekenhuis Gent, België</i>
11:30 – 12:00	Voorspellen van decubitusgenezing met de DECU-STICK bij dwarslaesiepatiënten tijdens conservatieve behandeling <i>Dr. Floris Van Asbeck; De Hoogstraat Revalidatie Utrecht, Nederland</i>
12:00 – 12:30	Organisatie van het decubitus beleid in het ziekenhuis: best practices <i>Adinda Toppets; UZLeuven, België</i>
12:30 – 13:30	Lunch
13:30 – 14:00	De behandeling van biofilms en geïnfecteerde decubituswonden <i>Ron Legerste; Pe@r, Wound Healing and Tissue Repair, Nederland</i>
14:00 – 14:30	Wondverbanden in de behandeling van decubitus: feiten en praktijk <i>Dr. Erik De Laet; UMC Radboud, Nijmegen, Nederland</i>
14:30 – 15:00	De systematische aanpak van decubitus door het gebruik van ITEM <i>Steven Smet; Universitair Ziekenhuis Gent, België</i>
15:00 – 15:30	Electrostimulatie bij hard to heal ulcers, de ervaringen binnen de praktijk <i>Mike Meuwissen; Mitralis Expertise Centrum Wondzorg Heerlen, Nederland</i>
15:30 – 16:15	Koffie pauze
16:15 – 16:45	De uitbouw en implementatie van een verpleegkundig gestuurde wondkliniek: praktijk en ervaringen <i>Alita Jaspar; Mitralis Expertise Centrum Wondzorg Heerlen, Nederland</i>
16:45 – 17:00	Conclusie <i>Dhr. Luc Gryson</i>

DONDERDAG 17.09.2015

Tijd: 10:00 – 17:00
Lokaal: Priorzaal
Sessievoorzitters voormiddag: Dhr. Steven Smet, Dhr. Luc Gryson
Sessievoorzitters namiddag: Mevr. Hilde Heyman, Mevr. Evelien Touriany

10:00 - 10:10	Welkom en inleiding <i>Dhr. Steven Smet, Dhr. Luc Gryson</i>
10:10 - 10:40	De behandeling van biofilms en geïnfecteerde decubituswonden <i>Ron Legerstee; Pe@r, Wound Healing and Tissue Repair, Nederland</i>
10:40 - 11:10	Wondverbanden in de behandeling van decubitus: feiten en praktijk <i>Dr. Erik De Laet; UMC Radboud, Nijmegen, Nederland</i>
11:10 - 11:40	De systematische aanpak van decubitus door het gebruik van ITEM <i>Steven Smet; Universitair Ziekenhuis Gent, België</i>
11:40 - 12:10	Electrostimulatie bij hard to heal ulcers, de ervaringen binnen de praktijk <i>Mike Meuwissen; Mitralis Expertise Centrum Wondzorg Heerlen, Nederland</i>
12:10 - 12:40	De uitbouw en implementatie van een verpleegkundig gestuurde wondkliniek: praktijk en ervaringen <i>Alita Jaspas; Mitralis Expertise Centrum Wondzorg Heerlen, Nederland</i>
12:30 – 13:30	Lunch
13:30 - 13:50	Het ontstaan van diepe weefschade: inzichten uit de wetenschap <i>Prof. dr. Cees Oomens; Technische Universiteit Eindhoven, Nederland</i>
13:50 - 14:10	De internationale richtlijnen voor decubituspreventie en behandeling zijn er: wat nu? <i>Prof. dr. Dimitri Beeckman; Universiteit Gent, België</i>
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15:30 – 16:15	Koffie pauze
16:15 - 16:45	Organisatie van het decubitus beleid in het ziekenhuis: best practices <i>Adinda Toppets; UZLeuven, België</i>
16:45 – 17:00	Conclusie <i>Steven Smet; Universitair Ziekenhuis Gent, België</i>

FRENCH SYMPOSIUM PROGRAMME

YEUDI 17. 09. 2015

Heure: 10:00 – 17:10 (L'enregistrement commence à 09:00)
Salle de réunion: Oude Infirmierie (2ème étage)
Président de séance le matin: Brigitte Barrois
Président de séance l'après-midi: Christian Thyse

10:00 – 10:10	Introduction <i>Mr. Christian Thyse, AfScep Dr. Brigitte Barrois, PERSE</i>
10:10 – 10:30	Optimisation de la prise en charge des escarres: un cas Suisse <i>Mme. Lucie Charbonneau</i>
10:30 – 10:50	IAD, un risque pour le développement d'escarres dans la population gériatrique? <i>Dr. Sylvie Meaume</i>
10:50 – 11:30	Etude nationale de prévalence des escarres réalisée en France : résultats préliminaires de l'enquête décennale (2014) et comparaison avec les enquêtes précédentes (2004 et 1994) <i>Dr. Brigitte Barrois, F. A. Allaert</i>
11:30 – 12:00	Avant l'IAD, l'incontinence, est-elle évitable? <i>Mr. Christian Thyse</i>
12:00 – 13:30	Pause
13:30 – 14:00	Capacités d'ajustement de la microcirculation cutanée face aux pressions <i>Dr. Dominique Sigaudou Roussel, Mme. Bérengère Fromy</i>
14:00 – 14:30	Optimisation de la prise en charge des escarres: un cas Luxembourgeois. <i>Dr. René Dondelinger</i>
14:30 – 15:00	Actualisation des guidelines pratiques de prise en charge des escarres: mesures invasives et non- invasives <i>Prof. Luc Téot</i>
15:00 – 15:30	TLM Plaies chroniques: Télémédecine entre un centre de médecine physique et réadaptation et les structures médicosociales ou le domicile : résultats après un an de téléconsultations. <i>Dr. Sandrine Robineau, Dr. B. Nicolas, A. Chopin, A. Allain, C. Lemeur, M. Cristina, P. Gallien</i>
15:30 – 16:15	Pause
16:15 – 16:45	Spécificités de la prise en charge des escarres chez l'enfant <i>Dr. Benoit Nicolas</i>
16:45 – 17:00	Modélisation biomécanique pour prévenir les escarres ischiatiques et du pied <i>Prof. Yohan Payan</i>

The French language symposium is organised in partnership with Afiscep and PERSE.



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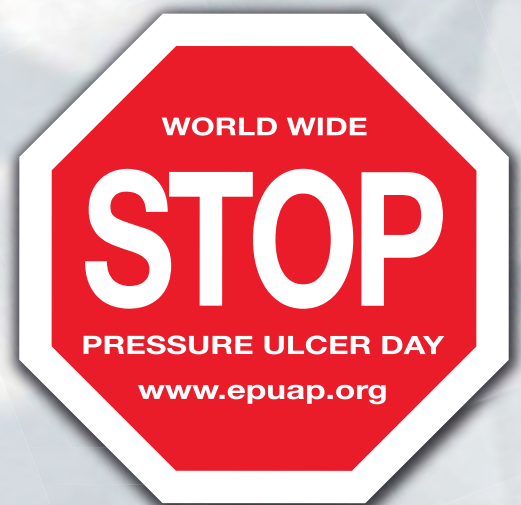
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INTERACTIVE SESSION 1

Patient and load handling team University Hospital Ghent

Physiotherapy: a complementary therapy, *Jo Devleeschhouwer*
Introduction to the practical workshop, *Filip Buckens and Heidi Deconinck*
Practical workshop: Demonstrations of the use of lifting devices, *Patient and load handling team University Hospital Ghent*

Speakers: Jo Devleeschhouwer
Filip Buckens
Heidi Deconinck
Date: 16 September 2015
Time: 12:30 – 14:00
Meeting room: Priorzaal

INTERACTIVE SESSION 2

EPUAP – International Society Paediatric Wound Care (ISPeW) session

Pressure ulcers in children: introduction and examples to be discussed, *Hilde Beele, Steven Smet*
Pressure Ulcers Prevention in NICU and PICU critical areas, *Anna-Barbara Schluer*
Neonatal pressure Ulcers. Focus on smallest patients, *Guido Ciprandi*
Final discussion

Speakers: Hilde Beele
Steven Smet
Anna-Barbara Schluer
Guido Ciprandi
Date: 16 September 2015
Time: 14:15 – 15:45
Meeting room: Zaal Rector Vermeylen

INTERACTIVE SESSION 3

Quality improvement projects for pressure ulcers: From implementation to measuring and comparing quality improvement

In this session key principles of implementation will be introduced and discussed in relation to pressure ulcer guidelines. The model for implementation from Grol and Wensing will be introduced and serve as a structure to implement better practices in health care.

Speakers: Lisette Schoonhoven
Jan Kottner
Date: 17 September 2015
Time: 14:00 – 15:30
Meeting room: Zaal Rector Vermeylen

KEY SESSION 10:

Interactive clinical case discussion

- Pediatrics
- General
- Rehabilitation
- Geriatrics
- ICU

Date: 18 September 2015
Time: 10:45 – 12:15
Meeting room: Refter Hall

KEY SESSION OVERVIEW

WEDNESDAY | 6. 09. 2015

Refter Refter Hall (ground level)

- 10:15 – 11:15 **KEY SESSION 1:**
Ethics, accountability and health economics in pressure ulcers
- 12:30 – 14:00 **KEY SESSION 2:**
An update of pressure ulcer basic sciences
- 14:45 – 15:30 **KEY SESSION 3:**
Pressure ulcer treatment – beyond basics
-

THURSDAY | 7. 09. 2015

Refter Refter Hall (ground level)

- 09:30 – 10:30 **KEY SESSION 4:**
EPUAP book preview
- 11:00 – 12:00 **KEY SESSION 6:**
The EPUAP Awards 2015
- 12:00 – 12:30 **EPUAP INITIATIVES**
- 14:00 – 15:30 **KEY SESSION 7:**
The organisation of pressure ulcer care – best practices and leadership
- 16:00 – 17:15 **KEY SESSION 8:**
Risk factors for pressure ulcer development in specific patients groups – science meets practice

Zaal Rector Vermeylen (1st level)

- 09:30 – 10:00 **KEY SESSION 5:**
EWMA – EPUAP Session: Infection management in pressure ulcer treatment: new insights and evolutions
- 16:00 – 17:30 **EPUAP 2015 Quality Improvement Awards:**
Preventing Skin Breakdown Projects: Tips and tricks from 5 quality improvement stories
-

FRIDAY | 8. 09. 2015

Refter Refter Hall (ground level)

- 09:00 – 10:00 **KEY SESSION 9:**
Pressure ulcer management: Innovative approaches need to go hand in hand with basic care
- 10:45 – 12:15 **KEY SESSION 10:**
Interactive clinical case discussions

HEALTH ECONOMICS AND PRESSURE ULCERS: IMPORTANCE, METHODS AND REFLECTIONS

KS1/1

Lieven Annemans¹

¹ Professor of Health Economics, Ghent University, Faculty of Medicine, department of public health, Ghent, Belgium

The conflict between what societies are able to pay for health care and the population's need for high quality health care is still increasing.

Health economics aims to find the best possible way to spend the available financial means. In order to apply economic thinking to health care, one should view the health sector as a productive sector whose aim is to produce health, by ensuring that people live longer and/or more healthily. Priority must be given to those interventions (both preventive and curative) which result in the greatest amount of health for the money that is invested. Interventions with a good ratio between the invested money and the resulting health outcome are called cost-effective. In health economic evaluations, the net costs of an investment (e.g. prevention of pressure ulcers) are calculated in comparison to not undertaking the investment, and the ratio between these net costs and the net health benefits is then assessed.

In the EU this concept of cost-effectiveness is gaining more and more interest and has an increasing influence in decisions on allocation of health care budgets.

Over the past years an increasing number of health economic studies have been performed and published in the area of pressure ulcers. The lecture discusses the need for such studies as well as the methodological challenges, such as uncertainty, differences in perspective and time horizon of the analysis.

ASSESSING THE SEVERITY OF PRESSURE ULCERS: UNSTAGEABLE/UNGRADEABLE PROJECT

KS1/2

Carol Dealley¹

¹ University Hospital Birmingham NHS Foundation Trust and University of Birmingham, United Kingdom

Introduction: The aim of this audit was to collect information on the outcome for unstageable pressure ulcers (PU). In particular it would demonstrate to commissioners the importance of accurate reporting.

Methods: Data were collected over a 9 month period. Information on position of PUs, their weekly progress and final outcome was recorded. Interested TVNs indicated their interest via the Tissue Viability Society website and were given details on how to register their patients. This also enabled regular group emails to be sent out encouraging ongoing data collection. It was hoped to collect data on 100 patients

Results: By the end of the audit 56 patients had been registered and follow up data collected on 44 and full data on only 36 patients. At the end of the assessment period the final classification of originally unstageable PU was: intact skin: 1 (2.3%); category 2: 1 (2.3%); Category 3: 17 (38.6%); Category 4: 8 (18.2%); unstageable: 17 (38.6%). A Mann Whitney test showed there was no significant difference between stageable and unstageable ulcers ($p=0.13$) with respect to the number of days observed.

Discussions: We had expected that it might take some time to determine the actual category of the PU this was certainly confirmed by the audit with 39% (17/44) being still unstageable/ungradeable at the end of the period of data collection which ranged between 0-167 days.

Clinical relevance: In the light of the findings of this audit using the category unstageable/ungradeable may be a useful addition to PU monitoring schemes.

PRESSURE INDUCED DEEP TISSUE INJURY EXPLAINED

Cees Oomens¹

¹ Eindhoven University of Technology, The Netherlands

Introduction:

Traditionally pressure ulcers were considered to result from prolonged ischaemia. Indeed when external loads occlude blood vessels, tissue is deprived of oxygen and waste products cannot be removed. This will eventually lead to cell death. Impaired interstitial fluid flow and lymphatic drainage contribute to the problem and reperfusion injury might aggravate the problem when the blood stream is restored. However, these mechanisms do not fully explain why severe wounds, often with a vast undermining of intact skin, may develop very fast. These deep wounds often found over bony prominences are currently known as pressure induced Deep Tissue Injury (DTI). The research in Eindhoven was aimed at understanding how DTI develops and although it is known that fat as well as muscle tissue can be implicated in the overall damage process the focus was on skeletal muscle. A review of the current knowledge base will be presented.

Methods:

A multi-scale approach using model systems ranging from single cells in culture, tissue engineered muscle to animal studies with small animals was used. In all model systems a controlled mechanical load was applied to cells or tissues and the effect of that load on the cell or tissue response was measured. In order to determine the heterogeneous internal mechanical state and to interpret the experimental data, the introduction of computational models has proved invaluable.

Results:

This has led to a clear understanding on two damage mechanisms involved in the development of DTI. Direct deformation damage results from high, but physiologically relevant, strains and is a process that leads to the first signs of cell damage in minutes. Ischaemic damage is caused by occlusion of blood vessels, but takes several hours to develop.

Clinical relevance:

Large deformation can usually be avoided by means of good supporting surfaces and awareness i.e. when patients are moved. Ischaemic damage can only be avoided by regular load relieve.

References:

Oomens, C.W.J., Bader, D.L., Loerakker, S., Baaijens, F.P.T., *Pressure Induced Deep Tissue Injury Explained, Annals of Biomedical Engineering*, 43(2), 297-305, 2015.

THE FUTURE OF SUPPORT SURFACES AND TECHNOLOGIES FOR TISSUE PROTECTION: WHERE SHOULD WE GO, AND WHAT SHOULD WE DO

Amit Gefen¹

¹ Tel Aviv University

The future of support surfaces and technologies for tissue protection: where should we go, and what should we do

Amit Gefen, PhD
Professor in Biomedical Engineering, Dept. of Biomedical Engineering, Faculty of Engineering, Tel Aviv University, Tel Aviv 69978, Israel, E-mail: gefen@eng.tau.ac.il

Introduction

The variety of support surfaces is confusing even for the most experienced clinicians. There are adjustable and non-adjustable surfaces, and passive versus active ones, and also combinations. Non-adjustable surfaces are simple and the least expensive – as in standardised hospital foam mattresses or wheelchair cushions, but they cannot be “fine-tuned” to adequately immerse and envelop the wide variety of patient body types. Adjustable supports, particularly air-cell-based (ACB) supports offer superior immersion and envelopment which alleviates localised internal tissue loads – the primary cause of deep tissue injuries. Additional, complementary protection can be provided by means of special dressings on vulnerable body sites to further reduce internal tissue loads.

Methods

Finite element (FE) modelling is powerful in evaluating internal tissue loads and isolating the influence of biomechanical characteristics from other potential risk factors e.g. impaired circulation or tissue repair capacities. The use of FE in design of orthopaedic implants and cardiovascular devices has proven successful for many years, and the wound prevention industry is now adopting FE for evaluating and improving performances of supports and prophylactic dressings.

Results

Using FE modelling, immersion and envelopment as well as adjustability were identified as key features of good supports. For example, ACB cushions provided substantially greater immersion and hence 4 orders-of-magnitude lower muscle, fat, and skin tissue stresses compared to flat foam cushions [1]. The ACB system also provided better protection against disuse-related bone shape adaptation, muscle atrophy, muscle spasms and scars [1,2]. Likewise, use of multi-layer heel dressings was shown to substantially reduce internal tissue loads [3].

Discussion The above examples depict two important phenomena: (1) growing use of FE to evaluate biomechanical efficacies of supports and (2) emphasis on internal tissue loads as the measure of the risk for pressure ulcers and deep tissue injuries.

Clinical Relevance

The future holds a promise for integrative ‘pressure ulcer protection’ solutions that will encompass the adequate support for the client and possible additional use of dressings to further protect tissues at specific sites, based on risk assessment of the individual.

References

- [1] Levy A, Koppalin K, Gefen A. *J Rehabil Res Dev*. 2014;51(8):1297-319.
- [2] Levy A, Koppalin K, Gefen A. *J Tissue Viability*. 2014;23(1):13-23.
- [3] Levy A, Frank MB, Gefen A. *J Tissue Viability*. 2015;24(1):1-11.

WOUND HEALING AND ANGIOGENESIS

Liesbet Geris¹

¹ Biomechanics Research Unit, University of Liège, Belgium
Biomechanics Section, KU Leuven, Belgium
Prometheus, division for Skeletal Tissue Engineering, KU Leuven, Belgium

KS2/4

Introduction:

Wound healing is a well-organised natural repair processes, initiated by trauma. This repair process covers many time and length scale, ranging from the subcellular level up to the organ and even systems level. Progress has been made in describing and understanding wound healing at each of these different levels but much remains to be found out at the different levels and most certainly at the interaction between the different levels. During the last decades, many mathematical models have been established to investigate aspects of the repair process in a numerical way (in silico), in addition to ongoing experimental work.

Clinical relevance:

In recent days, the focus of the mathematical models has shifted from simulation of the healing process towards simulation of the impaired healing process and the in silico design of treatment strategies.

Discussions:

In this talk I will discuss a number of examples of such studies involving computational models. Special attention will be paid to the process of angiogenesis, its importance for wound healing and lessons that can be learned from studying its role in other regenerative and disease processes.

References:

Geris L., Schugart R., Van Oosterwyck H. *In silico design of treatment strategies in wound healing and bone fracture healing*. *Phil. Trans. R. Soc. A* (2010) 368, 2683–2706. doi:10.1098/rsta.2010.0056

BIOMECHANICAL MODELLING TO PREVENT ISCHIAL AND FOOT PRESSURE ULCERS

Yohan Pryan¹

¹ Univ. Grenoble Alpes, TIMC-IMAG, F-38000 Grenoble, France; CNRS, TIMC-IMAG, F-38000 Grenoble, France
Yohan.Pryan@imag.fr

KS2/3

Introduction:

Measuring surface pressures can help in alerting users against skin injuries (Pipkin and Sprigle, 2008), but these measurements cannot predict dangerous internal tissue strains (Linder-Ganz et al., 2008) responsible for most of the deep pressure ulcers.

Methods:

To quantitatively estimate the internal strains from the interface pressures while taking into account the anatomical variability, it is needed (i) to build a patient-specific biomechanical model of the soft tissues/bony prominence and (ii) to use this numerical model to compute the internal strains (Elsner and Gefen, 2008; Loerakker et al., 2011; Luboz et al., 2014 & 2015).

Results:

During this invited lecture, I will review the most recent simulations provided by our group as concerns the estimations of internal strains for patient-specific anatomies of the foot, the heel/calf and the buttocks.

Discussions:

We have proposed to look at what we call "clusters" of maximal strains, i.e. volumes of concentrated high strains. Such clusters should help us to identify where are localized the risks for pressure ulcers.

Clinical relevance:

The clinical relevance is obvious: unless usable biomarkers are discovered in the future, we have no other choice than using a biomechanical model to estimate internal strains with the corresponding risks for pressure ulcers.

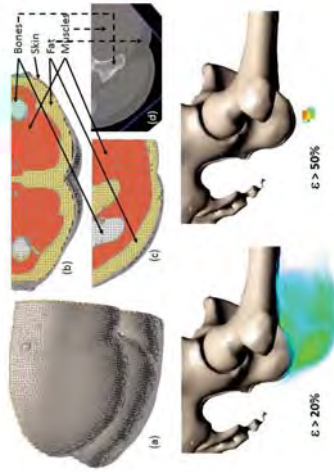


Figure 1: Finite Element model of the buttocks (top) with the estimation of the internal strains (e) clusters (down), from Luboz et al., 2014

References:

Elsner, J.J., and Gefen, A., 2008. Is obesity a risk factor for deep tissue injury in patients with spinal cord injury? *Journal of Biomechanics*, 41:3322–3331.
Linder-Ganz, E., Shabshin, N., Itzchak, Y., Yizhar, Z., Siew-Ner, J., and Gefen, A., 2008. Strains and stresses in sub-dermal tissues of the buttocks are greater in paraplegics than in healthy during sitting. *Journal of Biomechanics*, 41:567–580.
Loerakker, S., Manders, E., Srijkers, G.J., Nicolay, K., Baaijens, F.P.T., Bader, D.L., Coomans, C.W.J., 2011. The effects of deformation, ischaemia and reperfusion on the development of muscle damage during prolonged loading. *Journal of Applied Physiology*, 111(4): 1168-1177.
Luboz V., Perizzelli M., Bucki M., Diot B., Vuillerme N. & Payan Y., 2014. Biomechanical Modeling to Prevent Ischial Pressure Ulcers. *Journal of Biomechanics*, Vol. 47, pp. 2231-2236.
Luboz V., Perrier A., Bucki M., Diot B., Cannard F., Vuillerme N. & Payan Y., 2015. Influence of the calcaneus shape on the risk of posterior heel ulcer using 3D patient-specific biomechanical modeling. *Annals of Biomedical Engineering*, Vol. 43(2), pp. 325-335.
Pipkin L., and Sprigle, S., 2008. Effect of model design, cushion construction, and interface pressure mats on interface pressure and immersion. *Journal of Rehabilitation Research & Development*, 45:875–882.

THE ASSOCIATION BETWEEN MICROCLIMATE AND PRESSURE ULCER DEVELOPMENT

Jan Kottner¹

¹ Charité-Universitätsmedizin Berlin, Germany

Introduction:

Microclimate can be defined as a climate in a local region that differs from the climate in the surrounding region. In the context of skin and tissue integrity, the climate close to the skin surface is relevant. The defining characteristics are temperature, humidity and airflow.

Methods:

The factors skin temperature, humidity and air flow are characterized and the relevance for pressure ulcer development is explained.

Results:

During and after loading skin temperature increases due to (partly) occlusion and changes in blood flow. Increased temperature seems to reduce the cohesive strengths of the stratum corneum, of the dermo-epidermal junction and other cutaneous structures. Increased skin surface humidity and prolonged contact to 'free' water (wetness) weakens the stratum corneum, increases the epidermal absorption of possible irritants and increases the coefficient of friction. Besides elevated shear stresses during loading in deeper tissues, epidermal barrier impairments increase the risk for inflammation and subsequent erosions.

Discussions:

There are clear associations between the microclimate properties temperature, humidity, and airflow and pressure ulcer risk. When considering the skin area, duration and intensity of loading and other factors (e.g. age, disease) these associations are complex. Microclimate properties do not affect the skin only, but also deeper tissues (e.g. heat transfer).

Clinical relevance:

It is recommended to keep the skin dry, avoid local warming and occlusive conditions. On the other hand, skin being too dry (xerosis cutis) or too cool is also at increased risk to break-down. Thus, an optimal balance is needed between both extremes. Appropriate skin care and support surfaces can support pressure ulcer prevention.

TACKLING BIOFILMS AND INFECTED PRESSURE ULCER TREATMENT

Ron Legerstee¹

¹ Pe@r Review

Introduction:

The development of a pressure ulcer is contiguous by nature (i.e. the muscle becomes damaged and necrotic and if the tissue is not relieved from pressure, the next adjacent tissue will be damaged and become necrotic and so on). Similarly, the formation of microbial biofilms on any (moist) biological substrate is a (bio-)logical consequence of what occurred previously¹. Bacteria find their way to damaged tissue because they "sense" the substances produced by damaged tissue. Many microbial species are equipped with pili, fimbriae and/or flagella. These structures are used to communicate amongst and between species or move the bacteria to places of interest. If the circumstances are suitable, several species, present in a wound, can "team up" and make life more comfortable for themselves, but less so for the host^{2,3}. The microbial activities in a biofilm resembles that of a multi-cellular organism. A term once mentioned: "slime city"⁴ seems quite apt.

Methods:

Invited lecture is a presentation of current knowledge in the topic of biofilms and infection in pressure ulcers

Discussions:

If the patient has the right to NOT develop a pressure ulcer, then a pressure ulcer has the right to NOT become infected, and an infected pressure ulcer has the right to NOT become complicated by biofilm formation
Clinical relevance: Although not readily visible, biofilms can play an important role in keeping the pressure ulcer from healing

References:

- 1 Wilson, 2005, *Microbial Inhabitants of Humans - their ecology and role in health and disease*, Cambridge University Press,
- 2 Percival, S.L. & Cutting, K.F., 2010, *Microbiology of wounds*, CRC Press, Boca Raton, FL
- 3 Cooper, R.A., Bjarnsholt, T. & Alheide, M., 2014, *Biofilms in wounds: a review of present knowledge*, *Journal of wound care*, 23(11), pp. 570-572-4, 576-80 *passim*
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KS3/2 WOUND DRESSINGS FOR PRESSURE ULCER TREATMENT: FACTS AND FIGURES

Erik de Laat¹

¹ Radboud University Medical Center, The Netherlands

Introduction:

The choice of the right wound dressing for the treatment of patients with pressure ulcers is important because the dressing supports the healing process.

Methods:

In addition to the EPUAP/NPUAP/PPPII guideline, we selected in online accessible databases recent articles on wound dressings for the treatment of pressure ulcers.

Results:

According to the guideline the selection of a wound dressing is based on the:

- ability to keep the wound bed moist;
- need to address bacterial bioburden;
- nature and volume of wound exudate;
- condition of the tissue in the ulcer bed;
- condition of periwound skin;
- ulcer size, depth and location;
- presence of tunneling and/or undermining;
- goals of the individual with the ulcer.

Moreover, the protection of the peri-ulcer skin must take into account in the decision of the right dressing. Another aspect of the choice of a wound dressing is the cost effectiveness. Some wound dressings are expensive but can still be cost effective on condition that the manufacturer recommendations are followed especially related to frequency of dressing change.

Discussions:

Treat the whole patient, not the hole in the patient¹ is an important starting point in the use of wound dressings for pressure ulcer treatment. There is not one dressing that can heal a pressure ulcer. Wound dressings can at best help create a more favorable wound healing climate. Therefore a complete assessment of the patient and his wound precedes the dressing choice.

Clinical relevance:

In this session we will discuss the facts and if available justified by figures, about dressings for pressure ulcer treatment. This knowledge is important for patients and health care professionals in their day-to-day practice.

References

¹ National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. *Prevention and Treatment of Pressure Ulcers: Quick Reference Guide*. Emily Haesler (Ed.). Cambridge Media: Perth, Australia; 2014.

KS3/3 UPDATED SCAR MANAGEMENT PRACTICAL GUIDELINES: NON-INVASIVE AND INVASIVE MEASURES

Luc Teot¹

¹ Wound Healing and Burns, Montpellier University Hospital

Introduction:

Estimates indicate that each year around 100 million people in the developed world acquire scars following elective surgery and surgery for trauma. 1 Of these, approximately 15% have excessive or unaesthetic scars. Furthermore, a recent survey indicated that 91% of patients who underwent a routine surgical procedure would value any improvement in scarring.

Excessive scarring can have unpleasant physical, aesthetic, psychological and social consequences, including diminished self-esteem, stigmatization, disruption of daily activities, anxiety and depression.

Methods:

There is a wide spectrum of cutaneous scarring ranging from mature linear scars to abnormal raised and widespread hypertrophic scars and major keloids. Hypertrophic scars stay within the boundaries of the original lesion and may spontaneously regress with time. Keloids are excessive scars that grow beyond the boundaries of the original wound. They do not spontaneously regress and frequently recur after being excised.

Results:

Currently a wide variety of different scar management measures has been advocated both to prevent and to treat unaesthetic or excessive scar formation. Recently, an international, multidisciplinary group of 24 experts developed a set of practical, evidence-based guidelines for the management of linear, hypertrophic and keloid scars which could be useful for surgeons, dermatologists, general practitioners and other physicians involved in the prevention and the treatment of scars, an evolution since the publication of a previous set of guidelines by the International Advisory Panel on Scar Management in 2002. This presentation is intended to provide surgeons and other physicians with an overview of the most relevant information from the updated guidelines.

Clinical relevance:

Excessive scarring management using surgical and non surgical treatments

References:

Mustoe TA, Cooter RD, Gold MH, Teot & al. *International clinical recommendations on scar management Plast Reconstr Surg* 2002; 110:560-71
 Middlekoop E, Monstrey S, Teot L, Vranckx JJ eds. *Scar management guidelines MACA COETENS* 1: 109. 2011
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THE ROLE OF NEGATIVE PRESSURE WOUND THERAPY IN PRESSURE ULCER TREATMENT: EVIDENCE AND PRACTICE

Lubos Sobotka¹

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Negative pressure wound therapy (NPWT) is more and more often used for the treatment of acute and chronic wounds. Numerous studies have been published during the last 20 years. They deal mainly with wound due to trauma, surgery, infections, tumors, burns; however only few deal with pressure ulcers.

In spite of numerous studies an exact mechanism of NPWT has not been fully elucidated. For more than 50 years it has been known, that negative interstitial fluid pressure (IFP) is important condition for normal cellular and tissue functions¹. Both IFP and fluid volume in interstitial tissue are regulated within narrow limits. Moreover, all processes connected with inflammation lead to an increased capillary filtration, alterations of IFP and to resulting edema formation². The molecular mechanisms of IFP variations are complex and regulated by several factors like cytokines, growth factors, eicosanoids, hormonal changes and neuromuscular contribution. The resulting changes in IFP are possibly involved both in inflammation and regeneration processes.

The complexity of IFP regulation are supported by observation that negative pressure therapy penetrates less than 1mm below a foam connected with vacuum assisted therapy³. However, even small changes in IFP could be connected with favorable effect of NPWT. It was found that application of NPWT stimulated vascular cell proliferation⁴, improved local circulation⁵ with subsequent decrease of local edema and augmented removal of excessive fluid. Changes in expression profiles of various cytokines and growth factors have also been proposed as basis for understanding NPWT⁶. It is possible that all above mechanisms are not linear but rather parallel and coordinating.

The etiology of pressure ulcerations is complex. In addition to the local ischemia due to tissue compression, the development of ulcerations is influenced by patient physical activity, nutritional state, local and systemic inflammation and related infection. Beneficial value of IFP is only part of the complex mechanism of wound healing. Therefore, in spite of several positive reports, planning and production of randomized clinical studies which could be basis for so called "evidence based medicine" (EBM) recommendation is extremely difficult. Therefore in spite of extensive usage the effectiveness of the NPWT in pressure sore treatment was not proven by clinical randomized studies⁷.

At present time any formulation of EBM recommendation of NPWT in the treatment of pressure ulcers is doubtful due to complexity of the process. Therefore the NPWT indications in pressure ulcers should be based on good knowledge of pathophysiology, clinical experience, intended goals of treatment and control of results. In this sense we propose the "outcome based medicine" approach.

References:

1. Guyton AC, Pather J, Scheel K, McGehee J, interstitial fluid pressure. IV. Its effect on fluid movement through the capillary wall. *Circulation research* 1966;19:1022-30
2. Reed RK, Rubin K. Transcapillary exchange: role and importance of the interstitial fluid pressure and the extracellular matrix. *Cardiovascular research* 2010;87:211-7
3. Murphey GC, Macias BR, Hagens AR. Depth of penetration of negative pressure wound therapy into underlying tissues. *Wound repair and regeneration : official publication of the Wound Healing Society [and] the European Tissue Repair Society* 2009;17:113-7
4. Scherer SS, Pietramaggiore G, Matthews JC, Pissa MJ, Huang S. Orgill DP. The mechanism of action of the vacuum-assisted closure device. *Plastic and reconstructive surgery* 2008;122:786-97
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6. Glass GE, Murphy GF, Esmaili A, Lai LM, Nanchahal J. Systematic review of molecular mechanism of action of negative-pressure wound therapy. *The British journal of surgery* 2014;101:1627-36
7. Dumville JC, Webster J, Evans D, Land L. Negative pressure wound therapy for treating pressure ulcers. *The Cochrane database of systematic reviews* 2015;5:CD0011334.

THE CRITICAL CHARACTERISTIC OF GOOD SUPPORT SURFACES FOR PRESSURE ULCER PREVENTION

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The critical characteristic of good support surfaces for pressure ulcer prevention

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Introduction:

The novel use of finite element (FE) computational modeling for examining the efficacy of wheelchair cushion designs, and their ability to protect patients against sitting-acquired pressure ulcers (PUs) and deep tissue injuries (DTI) will be discussed in this talk.

Methods:

FE model variants describing different possible spinal cord injury (SCI) anatomies with pathoanatomical changes associated with SCI (e.g. weight gain, muscular atrophy, scars) were developed and used to simulate sitting on flat foam cushions, contoured foam cushions and air-cell-based cushions.

Results:

Sufficient immersion and envelopment of the body were identified as key factors, which together represent the potential cushioning performance of a cushion, through minimization of internal tissue deformations. A good wheelchair cushion should be able to accommodate the seated buttocks while providing appropriate immersion and envelopment during the entire time of intended use. Adjustability is another key factor, as the cushion has to be able to accommodate changes in posture and weight shifts associated with daily living, and conform to disuse-related anatomical and physiological changes which are expected post-SCI. Furthermore, the cushion should be durable when exposed to degenerating conditions as expected during its lifespan.

Discussions:

Given the recent advancements in understanding the aetiology of PUs and the availability of novel tools and research methodologies to assess cushion efficacies such as FE modeling, there is still a considerable gap between public policy and the current practice in cushion evaluation, and the challenges and measures that should be applied.

Clinical relevance:

A good wheelchair cushion should first be capable of accommodating the seated buttocks, providing the adequate immersion and envelopment of the seated individual during the initial seating assessment. A good cushion should also be able to conform to individuals with different anatomies, or disuse-related pathoanatomies, and offer optimal biomechanical conditions in the soft weight-bearing tissues of the buttocks. Then, the cushion should be able to maintain its efficacy over the time of intended use. It should also be able to accommodate changes in posture and weight shifts associated with daily living, and conform to the remarkable disuse-related anatomical and physiological changes which are expected in the months and years following a SCI. Furthermore, the cushion should maintain its physical and mechanical properties as well as its performance over time.

HOW INNOVATIVE IS PRESSURE ULCER PREVENTION AND TREATMENT?

KS4/3

Michael Clark PhD¹

¹ Director of Services and Systems
Welsh Wound Innovation Centre
Ynysmaerdy
Wales

Introduction:

Innovation is an often over-used word in health care and in many other facets of human endeavor. This presentation will seek first to define what is 'innovation' and then draw from the new EPUAP book several examples of the truly innovative in pressure ulcer research, prevention and treatment.

THE DEVELOPMENT OF A NEW EVIDENCED-BASED DECISION TOOL FOR PRESSURE ULCER PREVENTION/ MANAGEMENT, PURPOSE

Susanne Coleman¹

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KS6/3

Introduction:

This presentation will highlight the risk assessment work package of the recent NIHR PURPOSE Programme (Pressure Ulcer Programme of Research). It will describe the development a new evidence-based decision tool for pressure ulcer (PU) prevention/management, PURPOSE T and future work building on this programme.

Methods:

The development of PURPOSE T comprised 5 phases and incorporated innovative service user involvement:

1. Systematic review to identify risk factors associated with increased probability of PU development (Coleman et al, 2013).
2. Consensus study using to agree the risk factors, assessment items and structure of PURPOSE T (Coleman et al 2014a).
3. Proposal of a new PU conceptual framework to show the critical determinants of PU development and theoretical causal pathway and to underpin PURPOSE T (Coleman et al, 2014b).
4. Design and pre-testing of the draft PURPOSE T to assess and improve the acceptability, usability and confirm content validity with clinical nurses (Nixon et al, In press).
5. Clinical evaluation of 230 patients from acute/community settings, with expert and ward/community nurses to assess reliability, validity, data completeness and clinical usability (Nixon et al, In press).

Results:

PURPOSE-T incorporates a screening stage; a full assessment stage; use of colour to support decision making; and decision pathways which make a clear distinction between patients with an existing PU(s) (or scarring from previous ulcers) who require secondary prevention and treatment and those at risk who require primary prevention.

Discussions:

Further evaluation of the PURPOSE T is required including sensitivity and specificity in different patient populations; impact upon decision making/processes of care, and effectiveness in reducing PU incidence in practice. The impact of including skin status as an indicator for escalation of preventative interventions also requires investigation. Further development of objective measurement methods of mechanical boundary conditions, individual susceptibility and tissue tolerance; and early indicators of damage are required.

Clinical relevance:

Risk assessment remains a key component of PU prevention and increasing evidence prompted appraisal and identification of the risk factors that should be considered in PU risk assessment and the development of PURPOSE T.

References:

Systematic review, IJNS, Coleman et al 2013
Consensus study, JAN, Coleman et al 2014a
Conceptual framework, JAN, Coleman et al 2014b
PURPOSE Monograph, Nixon et al, In press

Acknowledgement

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INFECTION MANAGEMENT: OLD REMEDIES FOR OLD WOUNDS?

KS5/1

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Introduction:

Ancient civilizations learnt how to utilise local materials to manage wounds. 1 Since the role of microbes in causing infection was established during the nineteenth century, an array of effective treatments has been utilised. 2 However, rapid microbial evolution and the continued emergence of antimicrobial resistance, together with limited investment in searching for new agents has reduced the armoury of effective antimicrobial interventions. 3 Also, increased understanding of the diversity of microbial species and their differing behaviour within wounds has provided insight into some of the reasons for the sub-optimal effects of antimicrobial agents. 4

Methods:

In this presentation the problems in managing wound infection will be discussed and the need for continuing research will be explained.

Discussion:

Will optimal treatment algorithms with existing antimicrobials be developed? Will novel interventions be found, or will we revert to using former remedies?

References:

1. Forrest RD (1982) Early history of wound treatment. *J Roy Soc Med*. 75: 198-205
2. Hugo WB (1991) A brief history of heat and chemical disinfection. *J Appl Bacteriol*. 12: 9-18
3. Gottrup F et al (2013) EWMA Document: Antimicrobials and Non-healing Wounds – Evidence, Controversies and Suggestions. *J Wound Care* 22 (suppl) S1-S9
4. Stewart PS, Costerton JW (2001) Antibiotic resistance of bacteria in biofilms. *Lancet* 358(9276): 135-138

REFLECTIONS OF A WOUNDOLOGIST

Keith Harding¹

¹ Department of Surgery, Wales College of Medicine, Cardiff University, United Kingdom

Wounds have existed since the beginning of time and although progress was made in early times because of increasingly damaging conflicts in recent years it has not been seen as a Global Health problem. The clinical team who look after such patients are not consistent. Understanding of the biology of healing is not at the same stage as that for cancer and the evidence for effective prevention and treatment strategies is lacking. More recently Governments and payers of Health Care have not been convinced of the extent and cost of the problem and it is only recently that such data is emerging and being accepted as accurate. The problem of wound healing has been described as a Hidden Epidemic.

The focus on Wound healing in Cardiff started in 1972 when Professor L. E. Hughes invented a new dressing and undertook a series of studies to evaluate the use of this product in patients with surgical wounds. In 1991 the Wound Healing Research Unit was created as part of the Academic Department of Surgery and has been active in the field since that time. We have developed the first Masters course in Tissue Repair and Wound Healing in the World and have developed and validated the first disease specific quality of Life tool for chronic leg wounds. We have identified a gene signature that appears to predict which chronic wound will heal and have undertaken over 100 clinical trials of aspects of healing. In 2014 we received Government funding to enable us to create a National Wound Healing Centre and it is being seen as a new model of care in the United Kingdom for patients with wounds.

The role of the EPUAP in driving the recognition, research and profile of the problem of pressure injury has been very significant globally. I had the privilege of being the first President of the EPUAP and I can reflect on what has been achieved by a society that is focused and is supported by many excellent academics, researchers and commercial concerns with pride. I would encourage everyone to continue to push for this clinical problem to be addressed with the same vigour as other major clinical problems and diseases.

KS7/1

THE FIRST DUTCH NURSE-LED WOUND CENTRE

Alita Jaspas¹

¹ Mitralis Wound Care Centre, The Netherlands

Title: The first Dutch Nurse led wound centre.

Alita Jaspas, MSc in Wound Healing and Tissue Repair, Mitralis Wond Expertise Centrum Heerlen (The Netherlands)

Introduction:

In 2008, the first nurse-led wound care centre was established in the Netherlands, which focuses on providing wound care for complex acute and chronic wounds (e.g. post-traumatic/surgical wounds, pressure ulcers (PU), leg ulcers (LU), diabetic foot ulcers (DFU), malignant wounds and burns (first and second degree). The initiative is supported and reimbursed by a healthcare insurance company with the prerequisite that the wound care provided could be evaluated accurately and objectively according to a wound documentation method. To this end, a new digital wound documentation system (WoundMonitor® or WM®) was developed by healthcare providers in the wound care centre, due to the lack of an appropriate wound documentation system related to established conditions and regulations of the Dutch market.

Methods:

The retrospective clinical audit includes records collected in WoundMonitor® for patients referred to the nurse-led wound care centre during a representative five-year period (from 1 January 2010 to 1 January 2015). Essential wound characteristics, which reflect the status of the wound, are documented within WM® following a structured validated wound assessment tool, in order to ensure accurate and objective documentation for evaluation (Steward et al. 2009)

Results:

The study provides an overview of the characteristics of a patient population visiting a nurse-led wound care centre, as well as characteristics of their wounds and the dynamics of the wound healing process (e.g. time of treatment, treatment monitoring and outcome).

Discussions:

The results indicated that WM® is a promising system for achieving accurate and consistent wound documentation, although the system is still incomplete and has yet to be validated.

Clinical relevance:

Standard wound documentation systems are important, in order to generate and produce objective, reproducible diagnostic, treatment and outcome findings, with the goal of preventing the problems associated with inaccurate, arbitrary, incomplete and subjective wound healing assessments (Brown 2006, Bauernfeind and Strupeit 2009, Kinnunen et al. 2012)

References:

Bauernfeind, G. and Strupeit, S. 2009. [Quality assurance by professional wound documentation: often professional terminology is lacking]. *Pflege Zeitschrift* 62(6), pp. 333-336.
Brown, G. 2006. Wound documentation: managing risk. *Advances in Skin & Wound Care* 19(3), pp. 155-165, quiz 165-157
Kinnunen, U. M. et al. 2012. Developing the standardized wound care documentation model: a Delphi study to improve the quality of patient care documentation. *Journal of Wound, Ostomy, & Continence Nursing* 39(4), pp. 397-407; discussion 40

DEVELOPING A NATIONAL PRESSURE ULCER ORGANIZATION: THE DUTCH EXPERIENCE

Michel Renierkens¹

¹ Owner Company; Member Pressure Ulcer Netherlands /Trustee Epuap, The Netherlands

Introduction:

Developing a national pressure ulcer organization: the Dutch experience

Methods:

Historie of Pressure Ulcer Foundation Eastern – South Limburg (Decubitus Stichting Oostelijk Zuid-Limburg).
 From Pressure Ulcer Foundation Eastern-South Limburg to Pressure Ulcer Netherlands (Decubitus Nederland)
 The organization.
 The patient.
 Targets of the organization.
 Members of the organization.
 The workgroups of Pressure Ulcer Netherlands.
 The contacts with other organizations in the Netherlands and abroad. EPUAP.

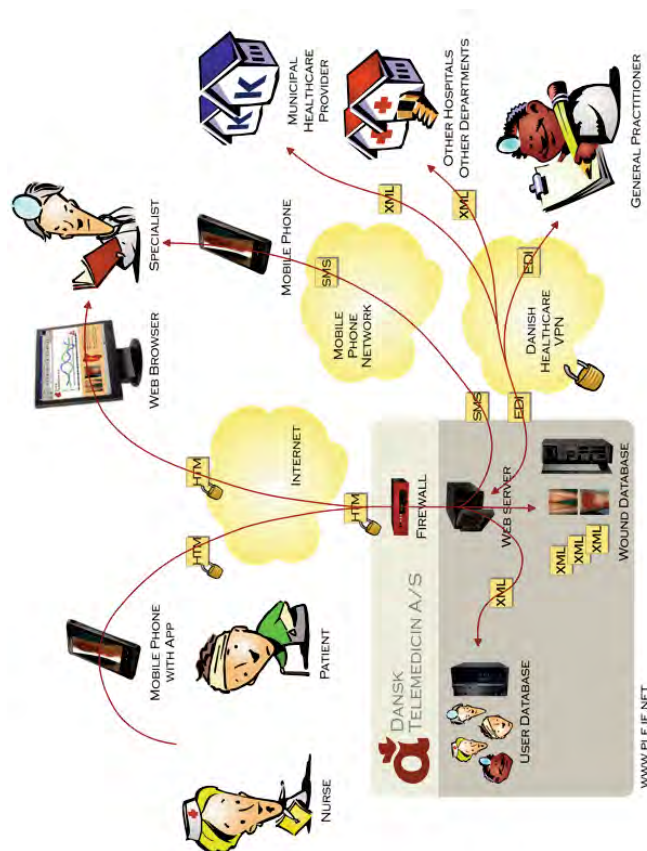
TELEMEDICINE IN PRESSURE ULCER RISK ASSESSMENT, PREVENTION AND TREATMENT

Rolf Jørgensen¹

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The concept of telemedicine covers many different approaches. Taking the phone a consult a GP can be termed telemedicine as well as looking at an X-ray in a center in India, taken in Europe.

Our model we use telemedicine as a communicational tool in the cross-sectional and interdisciplinary handling of patients with chronic wounds. Relevant data are stored in the database, which is accessible to the task force, dealing with that particular patient, including the patient.



It works by using a mobile phone with access to the internet and a laptop, see fig 1.

NURSE LEADERSHIP IN PRESSURE ULCER MANAGEMENT

Christina Lindholm Professor, PhD, SRN¹

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Introduction:

The executive nurse leader is responsible and accountable for the overall management of nursing services, including nursing education, nursing practice and nursing research. The nurse leader is also responsible for ensuring that professional standards and values are maintained. Thus the nurse leader is accountable for the occurrence of pressure ulcers, a nurse-sensitive indicator, which should be benchmarked against other facilities. Different leadership styles have been developed and launched, the transformational and the transactional. Which one is best fit for implementation and maintaining the high standards when it comes to pressure ulcer prevention and treatment?

transformational leader goes beyond managing day-to-day operations for taking her work team to the next level of performance success. Team-building, motivation and collaboration are characteristics. The leaders set goals and incentives to push their subordinates to higher performance levels, and encourage personal growth for each individual employee.

Transactional leadership styles are more concerned with maintaining normal flow and operations: "Keeping the ship afloat".

Both leadership styles are needed for guiding an organization to success. Transformational leadership shoot for ambitious goals, and rapid success can be achieved. The transformational leader identifies the need for change, creates a vision, guides for change and inspires her co-workers. She are often a charismatic person. If she gives too much for too long period, she might hit the wall, and there is often no successor. The mission might lose its energy, which can affect the safety climate for a period.

A descriptive study (2015) (1) was conducted in 45 nursing departments across 9 hospitals. The hospital unit safety climate survey and multifactorial leadership questionnaire were completed by 466 staff nurses. Transformational leadership style was a positive contributor to safety climate, whereas laissez-faire leadership style was shown to negatively contribute to unit socialization and a culture of blame.

1. Merrill KC. Leadership style and patient safety: implications for nurse managers. *J Nurs Adm* 2015;Jun;45(6):319-24

KS8/I

FRENCH NATIONAL PU TEN YEAR PREVALENCE SURVEY (CONDUCTED BY PERSE)

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¹CH de Gonesse, PERSE, France

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PERSE (French national pressure ulcer advisory panel) repeated the national ten year PU prevalence survey in 2014. Two previous identical surveys had been organized in 1994 and 2004.

Survey methodology has been refined in view of new guidelines of scientific societies and technological possibilities.

Main Aim: Describe PU prevalence of in-hospitalized patients (acute care, convalescence stay and nursing home)
Secondary aims : - Describe PU overall prevalence and for each type of ward, in different French region. Compare results. - Describe PU characteristics (global and adjusted on type of wards and regions). - Identify homogenous groups among patients with PU (cluster method, Ward model)

Hospitals taking part in survey were drawn lots all around French country. They receive an invitation to participate : 1075 wards agreed and more than 700 sent back the questionnaires (66%)

Questionnaires listed over than 21600 patients hospitalized in acute, convalescence or nursing home wards. Patients characteristics are registered with average and standard deviation for quantitative variables and prevalence and numbers for qualitative variables.

1700 Patients had PU that is 8 % prevalence. Previous prevalence was 8.6% in 2004.

All forms allow patients and PU injury analyses.

PU forms enable describing PU types, locations, stages, sizes, constituted.

Risks factors are registered for PU locations according to age, sex, risk level, mean disease and comorbidities

First preliminary results are submitted in EPUAP Ghent meeting.

MEDICAL DEVICES AND VULNERABLE SKIN

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KS8/2

Introduction:

There are many clinical situations in which soft tissues are subjected to sustained mechanical loads, typically involving immobile subjects who are bedridden or confined to chairs. This can lead to localised compromise of soft tissues, over a bony prominence, resulting in their breakdown and the development of chronic wounds, termed pressure ulcers (PUs). Also, mechanical-induced breakdown due to, for example neuropathy and impaired foot health, results in diabetic foot ulcers (DFUs) which, if poorly managed, can lead to limb amputations. There are many other states in which interventional medical devices e.g. functional orthoses, which can introduce damaging loads at the skin interface. Indeed medical device-related ulcers (MDRPU) represent a major healthcare problem, accounting for over 30% of hospital-acquired PUs (1). The situation is well documented by the US FDA via the MAUDE <http://www.accessdata.fda.gov/scripts/cdrh/cdohs/cfmaude/search.cfm> database which houses medical device reports by mandatory reporters (manufacturers, importers and device user facilities) and voluntary reporters such as health care professionals, patients and consumers. By contrast, UK Regulatory body has not to date been alerted to many MDRPUs

These cases of soft tissue damage are observed in a large number of clinical settings, for example, respiratory masks in both paediatric and adult intensive care units and the stump-socket interface of amputees. Device-related skin conditions can lead to pain and device rejection. This motivates the present activity designed to optimize safety in the design of medical devices, particularly in the case where individuals exhibit vulnerable skin with impaired tolerance to loading.

Methods:

We have adopted a combined experimental and computation modelling approach to address various aspects of device performance at the skin interface. This is achieved with collaborations between academics, clinicians and industrial colleagues. The former approach adopts both biomechanical (interface pressures) and microclimate (temperature and humidity) measures, associated with the collection and subsequent analysis of biomarkers to assess the skin response to mechanical-induced irritation. The resulting parameters provide input in the form of boundary conditions at the device-skin interface into a computational approach, which has been developed based on realistic finite element (FE) models of appropriate body segments and existing designs of medical devices.

Results:

Typical results have revealed that contact interface pressures on the bridge of the nose for subjects wearing respiratory masks regularly exceed 100mmHg (13.3 kPa), which results in high strain values in the underlying skin and soft tissues. Sensitivity analyses are performed to establish optimal material modulus of the mask, in order to minimise tissue strains whilst maintaining device functionality.

Discussions:

The combined experimental and computational approach will yield valuable information to optimize safety in design for medical devices to accommodate individual variability and skin vulnerability in patients ranging from pre-term infants to elderly requiring functional orthoses.

Clinical relevance:

It is important that clinicians are encouraged to report incidents of medical device-related damage. Such information can be used to highlight the clinical problem and motivate industrial companies to produce improved designs of medical devices, incorporating modulus-matched materials.

References:

1. Black JM et al. (2010) Medical device related pressure ulcers in hospitalized patients. *Int Wound J*, 7(5):358-65.

Acknowledgements

Funding for the UK Network "Medical Devices and Vulnerable skin – optimizing safety in design" (www.southampton.ac.uk/mdvsn), based in the University of Southampton and King's College London was provided from an award by the UK EPRSC/NiHR.

PATHOPHYSIOLOGICAL FACTORS AND RISK ASSESSMENT METHODS FOR PRESSURE ULCERS IN ICU

Maarit Ahtiala¹

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KS8/4

Introduction:

During the last 2-3 decades the pressure ulcer (PU) incidence in high risk ICU patients has decreased from 50% to less than 10% (Takala et al 1996, Bours et al 2001, Nijs et al 2008, VanGilder et al 2008). Braden scale is widely used to assess PU risk in ICU setting but, it has limitations to separate different risk groups within the ICU patients. The study programme focus is on testing the validity of some of the most widely used PU risk factors. In the presentation the results will be discussed in the light of available literature.

Methods:

The study programme includes all 6582 treated ICU patients in the yearly cohorts from 2010 to 2013. Modified Jackson/Cubbin (m)/C risk scale (Ahtiala et al 2014) has been introduced to assess PU risk in mixed ICU. Risk factors such as the m)/C scale, SOFA and APACHE scores are included. These are separately examined as risk factors for the PU development.

Results:

During the 4-year follow-up the pressure ulcer incidence dropped from 11.1 to 4.4%. The severity of the patient population increased yearly as defined with the proportion of high risk patients (m)/C risk score <29) and SOFA scores. From all of the patients, 60% of patients with PUs are in a high risk group, m)/C score < 29. Not all risk factors within the m)/C risk scale are equally important. Furthermore the subscore gradings within the m)/C scale mostly lack linearity. For example age of patients and transportation status within the hospital are not contributing to the overall risk. Length of ICU stay is an important risk factor, but on the other hand sedation status does not seem to be an independent risk factor for PU development. APACHE score does not seem to predict the PU development while total SOFA score as well as some of its subscores predict PU development.

Discussions:

The PU incidence in ICU can markedly be diminished with focused goal orientation. The usage of modified Jackson/Cubbin risk scale has influenced on the achievement of results, even though its subscores lack equal linearity. Not all risk factors have the same weight. Risk scoring system can be improved further.

Clinical relevance:

The study gives important insights on PU risk assessment and predictive risk factors in ICU since it includes large cohorts of mixed ICU patients.

References:

- Ahtiala M, Soppi E, Wiksten A, et al. Occurrence of pressure ulcers and their risk factors in mixed medical-surgical/ICU - A cohort study. *Journal of Intensive Care Society* 15:2-4, 2014.

HEALTH POLICY: FROM A SURVEY OF THE PREVALENCE OF PRESSURE ULCERS IN NURSING HOMES IN BRITTANY (FRANCE) TO THE START OF TELEMEDICINE FOR ELDERLY AND DISABLED PEOPLE WITH CHRONIC WOUNDS?

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Introduction:

The digitalization of the French healthcare system is actually a national issue requiring an ambitious public policy. It began more than two decades ago with experiments in the country. Since 2010 specific laws govern telemedicine activities in France. They are in agreement with the recommendations of the world Health organisation. The ministry of social affairs and health decides and manages this policy: in France the distinction between telemedicine and e-health is very clear and the telemedicine projects or activities are really included inside the health policy. Moreover, the French National Medical Council (CNOM) has clarified the implementation of the Medical Deontological Code when practicing telemedicine in France. Telemedicine is legally capable to be developed all over the country respecting the patient's rights.

Methods:

Close to the health establishments, the regional health agencies (ARS) have the responsibility of the health organisation in the different areas in France. A health cooperation group (GCS) which works for Brittany regional health agency has the mission of developing performant, interoperable and secure digital networks, of respecting the confidentiality of medical data, the service quality and continuity of care for patients. In this context, in 2014, our Rehabilitation Center (Pole MPR Saint Hélier), located in Rennes (Brittany), has been selected for a regional telemedicine project about chronic wounds. First 2 surveys were conducted in 2013: one about the prevalence of pressure ulcers in nursing homes in Brittany and the other was home nurse's survey in Ile et Vilaine (part of Brittany). Based on the results, we proposed a project to address some issues that were highlighted with the investigations. The aim was to improve the care access for patients with heavy disabilities suffering from chronic wounds in nursing homes or at home. We will explain the birth of the project (responding to the national health policy for chronic diseases and nursing homes), the results of investigations and the way it has been integrated into the regional health policy with other regional telemedicine projects to create a single global regional project for deployment of telemedicine in Brittany named Sterenn.

Results:

Since July 2014, over 150 teleconsultations have been done. Targeted population is constituted by patients:

- Whose access to care is decreased due to moving difficulties
- Of which the health care team is struggling in the care (wound care but also disability, nutrition ...)

 The members of our telemedicine team are specialist doctors and nurses for wounds. On request the occupational therapist or dietitian is involved in the consultation (multidisciplinary approach). A secure videoconference is used. It leads to an improvement of the quality of care by promoting access to care, by providing expertise directly to the home (multidisciplinary) by assisting the nurse at home to redo the dressing (training).

After 150 teleconsultations the preliminary results are: 60% of requests come from the nursing home. 40% from nurses at home people. (Pressure ulcers stages 3 and 4, arterial ulcers, venous or mixed). Middle Age 74 years (20-101 years). Only 3 patients refused. The Time to wait for the teleconsultation is on average 14 days. Duration of consultations is on average 25 minutes. In 20% of cases the teleconsultation is extended by a real live training time for the nurse at home guided by the expert nurses of the team. We evaluate professional satisfaction and technical satisfaction. Without teleconsultation, in 83% of cases transportation request for consultation would have been made, in 10% hospitalization. In 7% no request would have been done.

Discussions:

For patients with chronic wounds or pressure ulcers, telemedicine could help us to mitigate the effects of ageing population or the dependence of disabled people with difficulties to move. It could help us to guaranty the access to care for all despite difficult economic conditions. These are challenges for the health policy.

Key words:

telemedicine, pressure ulcer, chronic wound, nursing home, disability, care access, elderly, health policy, regional health agency, Health cooperation group

KS9/2

ELECTRICAL STIMULATION IN PRACTICE FOR HARD TO HEAL ULCERS

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Electrical stimulation (ES) is a growing level of commitment on the treatment of hard to heal wounds. Already, in 2009, the European Pressure Ulcer Advisory Panel (EPUAP) and the National Advisory Panel advised the use of ES in the treatment of hard to heal wounds (1). A review of Koel described the positive findings and results of wound treatment using electrical stimulation (2). This where his conclusions out of twenty RCT's conducted between 1985 and 2008. ES appears to stimulate the production of fibroblasts; stimulates cell migration, angiogenesis and tissue oxygenation and reduces the bacterial load (3).

In the Netherlands ES is not yet used on a large scale for the treatment of hard to heal wounds. In, for example Germany, it is more frequently used. Debus et. al (4) described their positive findings from a retrospective study on the efficacy, tolerability, and safety in the use of ES.

Since november 2013 Mitrallis Expertise Center Wound Care (MECW) does research on the effects of ES in patients with hard to heal wounds (diabetic foot ulcra (DVFU), traumatic (TLU), venous (VLU) and arterial leg ulcers (ALU)). Outcome measures include: improvement of the Push Tool (5) (Pressure Ulcer Scale for Healing), reduction of wound area, improvement of wound / tissue typing and improvement Vas score. All wounds lasted longer than six weeks. The findings after each consultation will be reported in Wound Monitor (6) (digital wound registration system). During the presentation, the findings and results of 60 treated hard to heal wounds, will be discussed. Also, recommendations are made, following the experience gained during the ongoing research.

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KS9/4 USING ITEM AS A SYSTEMATIC APPROACH TOWARDS PRESSURE ULCER TREATMENT

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Introduction:

60% of all chronic wounds, and certainly pressure ulcers, are colonized with polymicrobial biofilms. Local wound care according to TIME doesn't always guarantee rapid wound healing. How can TIME be translated into best practices compliant with the current developments in wound care research and clinical practice?

Methods:

The Wound Care Center (WCC) of Ghent University Hospital provides a poster with the "hospital-specific wound care protocol" in every ward of the hospital since 2006. There has always been an important focus on the presence of infection. An infected wound necessitates a specific interdisciplinary approach and influences the healing potential importantly. The outcome of all further steps of topical exudate control and optimization of wound bed and wound edges, depends on a correct approach and adequate topical (and systemic) treatment of the infection. Results: Because of the extending use of the TIME concept, we anticipated to adopt this concept in a new version of the poster. On the other hand we wanted to keep the focus on the infection aspect. Therefore it was decided to mention TIME as ITEM. In this way we want to draw the attention of nurses and doctors, not only to a possible underlying infection, but indirectly also to other underlying factors which might impair the wound healing process, and which need a more urgent approach than the other wound bed preparation issues such as necrotic tissue, inappropriate moisture and a non-moving wound edge.

Discussions:

A new "hospital-specific wound care protocol" has been developed in which the acronym TIME has been changed into ITEM. Decision-making is based on a flowchart with representative wound photographs. Evaluation of the current practice in our hospital shows an increasing attention to (risk of) infection and other underlying factors in wounds and hence a more optimal way to deal with them. The early detection of risk factors should result in more preventive actions, accurate treatment based on recent developments in wound care and reduce the amount of hard-to-heal wounds.

Clinical relevance:

Infection and inflammation remain a major and probably the most urgent challenge in wound healing, especially in chronic wounds and pressure ulcers. This use of the acronym ITEM instead of TIME might facilitate to deal with this challenge.

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IS3 QUALITY IMPROVEMENT PROJECTS FOR PRESSURE ULCERS: FROM IMPLEMENTATION TO MEASURING AND COMPARING QUALITY IMPROVEMENT

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Summary

Individuals want to receive care that is effective, safe, and patient-centred. Therefore, it is not sufficient to produce, synthesize or publish knowledge in terms of studies or guidance documents; if we want to change clinical practice we need to use the knowledge, in other words implement it in daily practice (Grol et al. 2013). However, it can be difficult to select and adopt new practices and technologies. In order to do that you need to understand the consequences of introducing change, how to best implement the new practice and technologies; how to evaluate success; and how to improve patient care.

In the first part of this session key principles of implementation will be introduced and discussed in relation to pressure ulcer guidelines. The model for implementation from Grol and Wensing will be introduced and serve as a structure to implement better practices in health care.

In order to evaluate the effects of implementation strategies measurements are needed. Ideally, these quality measures should answer the question: Have we been successful? Finding the correct answer to this question is not easy because quality figures are affected by various sources of bias limiting their comparability. Standardization of measurements and risk-adjustment (e.g. stratification) are well known, but how to deal with chance or random variation? In the second part of this session appropriate ways of comparative quality measurements will be discussed with special emphasis on "self-comparisons" (Øvreteit 2001) of services or institutions over time. Run and control charts in will be introduced and their value within quality improvement contexts discussed (Kottner & Halfens 2010; Kottner 2014).

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Pressure Ulcers to Zero Campaign: A Pilot Study in one Dublin Teaching Hospital

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Introduction:

The Pressure Ulcers to Zero (PTO) campaign was introduced across Dublin North East with its primary aim to reduce the number of avoidable pressure ulcers across the healthcare system by 50% by the end of November 2014. The data provided revealed that the actual reduction had been 73%. Using the results collected through the Collaborative and relevant Irish and UK research papers^{1,2}, cost savings and bed days saved has been estimated for all grades of pressure ulcers. Totals Grade 1 €85,058 Grade 2 €367,180 Grade 3 €633,435 Grade 4 €6,545,000. Estimated total bed days saved Totals Grade 1 1540 Grade 2 5170 Grade 3 6985 Grade 4 8525. This pilot study in one teaching hospital included a 35 bedded ward that took part in the pressure ulcer collaborative. The focus was on creating an increased awareness of pressure ulcer prevention and a Multidisciplinary team (MDT) approach including the implementation of an adapted SSKIN Bundle.

Methods:

The following were implemented.

1. Intentional rounding and a multidisciplinary approach including revision of patient seating, reducing shear, correct use of barrier creams, revision of current pressure relieving devices and implementation of the nutritional MUST tool.
2. Utilisation of the green safety cross highlighting the incidents of pressure ulcers at ward level.
3. Compliance sheet recording the documentation of the aspects of the SSKIN bundle is recorded and audited weekly.
4. Bulletin board information for staff including a newly developed algorithm chart, updated care plan incorporating new SSKIN bundle, the grading chart and posters identifying patient's pressure points.

Results:

Numbers of pressure ulcers reduced from three ward acquired pressure ulcers in April two in May and zero in June. There was effective use of green cross recording numbers, grade and location of pressure ulcers. Compliance of sskin bundle sheet increased from 60% -90% in two months. Increased awareness of pressure ulcers versus excoriation.

Discussions:

There have been some challenges with resources and getting the teams together. But overall improved education has raised awareness for patient's staff and families. Good communication and a great enthusiasm for this project have been key to its success.

Clinical relevance:

A reduction in pressure ulcers means reduced pain and suffering to patients. Reduced costs both in treatment and bed days are evident. This is just one example that if managers support quality improvement initiatives, teams we can achieve great results. Overall the key learning was the importance of working together, good collaboration and communication.

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Pressure ulcer preventive strategies at national level - not just effort, but productive activity

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Introduction:

Preventive strategies to reduce the incidence of pressure ulcers (PU's) are an integral part of the activities of healthcare facilities in the Czech Republic for the long time. The National Prevention Strategy of PU's is a comprehensive plan that will help increase the number of well-educated professionals in prevention of PU's, influence the quality of care and incidence of PU's on national level.

What did you do and how did you do it? Which actions and steps did you take?

The endorsement bodies (e.g. Ministry of Health, Czech Nurses Association and Czech Wound Management Association) in the Czech Republic adheres to the challenges of EPUAP and provides for institutions, healthcare professionals, professional companies and organizations support in a variety of activities for the third year. Under the patronage of the Ministry of Health (MoH) Principal Nurse two round tables focused on prevention of PU's have been conducted in 2014 and it will continue this year. An information portal was created www.dekubitum.eu as a source of valuable information for general public and professionals. Individual hospitals could publish their activities there and also on the websites of the MoH. Participant from the Czech Republic, as an official representatives at the EPUAP meetings, transmit the latest information to the wider public on the portal, in professional journals and at conferences [1, 3, 4, 5, 6, 7].

What were the results?

Which improvements did you see?: The main important and clinically useful results are: translated Quick Reference Guide (EPUAP), Educational and informational portal (www.dekubitum.eu), New Ministerial safety and security goal "Prevention of PU's": Improvements are evident in clinical practice in usage of preventive tools and equipment and system for monitoring the incidence of PU's in all hospitals that have implemented a quality management system validated by an external certification authority. It also increases the number of participating hospitals into National system for reporting adverse events, where incidence of PU's is observed.

Discussion and further steps:

The main goal is to continue with mentioned activities and also to know all important information in relation to the prevention and treatment of PU's. Therefore one of the most recent activity is preparation of the National pressure ulcer registry. Another activity is already mentioned preparation of the Ministerial safety and security goal which allows national changes in education (undergraduate and postgraduate, implementation of prepared national guidelines etc.). The translation of the Quick Reference Guide (2014) was also done as one of the first steps (actually waiting for approval from EPUAP).

Clinical relevance:

According to the National strategy it will be mandatory for all health care facilities to ensure continuous education of professionals under the same framework. They have the opportunity to use centrally prepared educational materials published on the websites of MoH (www.mzcr.cz), the Czech Nurses Association www.cnnn.cz [1, 2, 6, 8, 9], as well as link to the materials at webpages of Czech wound management association (www.csl.cz). National strategy sets priorities in education for professionals and lay person and supports objective evaluation of the patient's general condition, local symptoms on the skin and effective management and team working strategy for prevention of PU's.

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QI 3

Reducing Hospital Acquired Pressure Ulcers within the Intensive Care Department using a multidisciplinary team approach and the Plan, Do, Check, Act quality improvement process

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Introduction:

Pressure ulcers are a real and definite problem in our medical system 1. Regardless of all our new equipment and knowledge, pressure ulcers are not on a downward trend 2. Pressure ulcers are growing in incidence 3, and it is usually the most vulnerable, elderly and weak of our society who yields to these complications 4.

What did you do and how did you do it? Which actions and steps did you take?:

Monthly hospital acquired pressure ulcer incidence data were collected and recorded by the Tissue Viability department. The month of March 2013 was noted to be very high with a total incidence rate of 16. Of this number, 12 were hospital acquired pressure ulcers, with 6 of these occurring in the ICU department.

Our main objective was to reduce hospital acquired pressure ulcers in the Intensive Care Unit (ICU). The three main interventions were: correct and timely risk assessment of the patient, frequent patient offloading/relieving pressure and moisture management.

Firstly, the Tissue Viability Team (TVT) ensured all pressure ulcer prevention guidelines and policies were reviewed and updated and staff was following evidence based practice. Nursing staff were encouraged to risk assess patients, using a validated risk tool, the Braden, within a six hour time frame from admission, and complete and document a skin assessment every time they repositioned the patient. Patients with low Braden scores were scored and colour coded with high risk signs placed outside their rooms to highlight their skin vulnerability to all staff.

All ICU patients are nursed on specialised pressure relieving mattresses, however the duration and length of time between turns was an issue. It was decided to standardise repositioning times, and off load patients changing from a 3 hour time period to a 2 hour time period, with the aid of a turning clock. The third area examined was managing moisture by cleaning, moisturizing, and protection skin with the introduction of barrier creams and sprays and a faecal management system.

What were the results? Which improvements did you see?:

The interventions employed achieved their goal, and incidences of hospital acquired pressure ulcers decreased. For the remainder of 2013 our pressure ulcer incidence rate for the ICU remained below 2. The TVT continued to monitor and audit pressure ulcer incidence on a monthly basis.

Within the ICU department due to our highlighted awareness of pressure ulcer prevention, nurses, doctors and the allied health care professionals were more educated, knowledgeable and informed on pressure ulcers in general.

Discussion and further steps:

Pressure ulcers are a mostly avoidable incidence 5. Research has shown that when nursing staff is educated and knowledgeable on pressure ulcer prevention, nursing practice can change and improve 6. According to Land 7 pressure ulcer prevention is such a vital recurring aspect of nursing care that many staff fail to concede its importance and consequence in maintaining standards of care.

Unfortunately, due to manpower and time restraints, we limited our quality improvement process to our ICU department. We are planning to initiate and develop this quality improvement process throughout the facility.

Clinical relevance:

Hospital acquired pressure ulcers can cause a significant disturbance and problem to the patient and their families 2. The effect of pressure ulcers also affects the nursing staff and allied health care professionals, by increasing their work load, changing their patients' plan of care and prolonging the patient's length of stay in the medical facility 8. Prevention of pressure ulcers is the key and essential aspect of nursing practice.

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Implementing a Pressure Monitoring Program for Proper Patient Repositioning and Individual Support Surface Selection to Aide in the Prevention of Hospital-Acquired Pressure Ulcers

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Introduction:

Pressure ulcers (PUs) continue to develop effecting 7.4 million people annually worldwide and are a tremendous cost to global health care. 1,2,3 Individualizing specialty mattress selection and repositioning techniques to maximize pressure redistribution is challenging at the bedside. 4 Research suggests that repositioning interventions are ineffective and caregivers are unaware of the effectiveness of their repositioning techniques. Utilizing specialty mattresses to prevent all PUs is costly and not always necessary.

What did you do and how did you do it? Which actions and steps did you take?:

Continuous Bedside Pressure Mapping and Monitoring systems (CBPM) were added to our Surgical Intensive Care Unit (SICU). Patients at high risk for developing PUs utilized the CBPM with a rented fluid-immersion simulation air support surface. Patients at moderate to low risk utilized the CBPM with a hospital-owned high specification foam/air (non-powered) mattress. Over a month trial 10 patients were followed with CBPM. The CBPM systems displays a color-coded image showing the pressure existing beneath patients in real-time. Bedside caregivers were asked to reposition the patients normally, blinded from the feedback of the CBPM system. Initial pressures were recorded and then caregivers were shown the real-time color image and then allowed to make adjustments including "micro-shifts" (small adjustments made with draw sheets) and to adjust air settings in airbeds prior to second measurement. A comparison of pressures post reposition with and without the caregivers using the CBPM images were made.

The CBPM also allows for support surface assessment for each individual, and when high pressures could not be managed with the hospital-owned mattress, an air surface and CBPM was rented. The support surfaces were chosen to be rented on low to moderate risk patients only when lower pressures could not be achieved using the hospital-owned mattress.

What were the results?

Which improvements did you see?: Bedside caregivers were able to "micro-shift" patients and adjust airbed settings to lower peak pressures by 25% using the image from the CBPM systems on both hospital-owned mattresses and rented support surfaces. Caregivers utilized the CBPM to aide in better repositioning techniques and addressed pressure issues each time they went into the room, instead of relying on a false sense of security with the standard every 2 hour turning schedules.

When using the CBPM system with a hospital-owned mattress instead of a rented surface, a savings of \$19/day/patient was realized. No patient developed a PU during the study. A cost savings was achieved while enhancing patient quality outcomes.

Discussion and further steps:

CBPM shows caregivers that every patient cannot be repositioned the same way and each patient has different high pressure points that could be decreased by implementing "micro-shifts" and airbed adjustments to maximize pressure redistributions. Using the CBPM to guide repositioning, caregivers are able to decrease the amount of pressure each patient is experiencing. CBPM allows caregivers to monitor these pressures at all times and intervene if higher pressures would display on the monitor.

Current standard of care is to rent an air support surface for patients that are at risk of developing PUs. These costly surfaces are rented without knowing if the hospital owned mattress can adequately redistribute pressure. Use of the CBPM system aides in initial determination of the effectiveness of hospital owned mattresses for individual patients prior to automatically renting.

Clinical relevance:

With the use of CBPM, cost-effective support choices are now available to help prevent PUs. Caregivers understand the importance of CBPM-guided "micro-shifts" to effectively reposition individual patients. The assumption of pressure relief being obtained by simply turning the patient was shown to be false. By using real time CBPM, optimal pressure redistribution and appropriate support surface choice was accomplished supporting PU prevention while decreasing overall cost.

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Q15

Preventing pressure ulcers in the community setting. Implementing an adapted SSKIN bundle and prevention project using a PDSA model; incorporating a visual aid for carers and relatives of early stage grade 1 pressure ulcer

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Introduction:

There is little research into community specific health care settings and pressure ulcer prevention strategies. With research largely based at acute organizations or nursing homes.

We are becoming an increasingly aging population with complex co-morbidities. Clients largely wish to remain at home. Where care is necessary, there personal care needs will be done by a carer formal or informal. Whereas early stage pressure damage identification and risk assessment is instigated by community nursing staff, it is the long term care provider with the most contact with the client who is most likely to observe increased risk and skin damage.

The research highlights the poor inter/intra rater reliability in grading pressure ulcers Defloor & Schoonhoven (2004). Carers need to be well equipped how to identify and what immediate actions to take to prevent rapid deterioration.

What did you do and how did you do it? Which actions and steps did you take?

Designed work plan project with multiple streams of work to reduce our pressure ulcer incidences. Implemented a Community adapted SSKIN bundle.

- Designed a visual Aid poster for public domain and carers to raise awareness of early identification blanching and non-blanching erythema based on research.
- Set up key contacts with the quality teams at the local authority's to discuss access to care provider forums to train on SSKIN in order to access carers.
- Set up a Multi-Disciplinary team pressure ulcer learning panels, following a root cause analysis, identifying themes and patterns.
- Set up a community multi-disciplinary pressure ulcer group.
- Provided training at local authority care provider forums.
- External resource page for public and carers under construction
- Webinars for free access training for carers and nursing homes.
- Supported pressure ulcer lead and district nurse home visits with carers at patient bedside prevention planning for complex patients using SSKIN tools.
- SSKIN training delivered across Hounslow and Richmond incorporating health and social care staff

What were the results? Which improvements did you see?

- In 3 months since SSKIN implementation launch April 2015 we have seen a
- 14% decrease in grade 2
- 30% increase in grade 3
- 50% decrease in grade 4

Difficult to hypothesize results from data at this stage, data by Q-4 2016 will start to demonstrate themes and patterns which highlight areas of improvement and challenges specific to community organizations.

Discussion and further steps:

The Aim of the Data over the next 12-18 months as the SSKIN bundle becomes embedded in community practice will hopefully show a decline in the reported avoidable pressure ulcers and a reduction to the number of grade 2 pressure ulcers.

Benchmarking in community setting is a fairly new territory, with data mainly being reliant on the safety thermometer, this is generally felt amongst tissue viability specialist as not an accurate reflection of pressure ulcer

prevalence and incidence rates in the community. Where the community SSKIN bundle proves successful, this will be shared to other community health settings and local authority's demonstrating joint prevention benefits.

Clinical relevance:

A localized deeper dive look into occurrences and the emerging patterns around community reported pressure ulcers may shed more light into how we can heighten our preventative strategies and focus our actions moving forward.

With the increase in elderly population we must find different ways of prevention strategies. We can no longer rely on community nurses alone.

Whereas historically the patient's own understanding of risk has been poor with little accessible literature, we must work closer with our housebound patients in explaining their care plan, risks and consequences of non-compliance. Only then may there decision to not participate or follow there prevention care plan be an informed decision.

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WEDNESDAY | 6. 09. 2015

- 14:45 - 15:30 **FREE PAPER SESSION 1**
Basic science: Biomechanics and aetiology (1)
Priorzaal
- 16:15 - 17:15 **FREE PAPER SESSION 2**
Pressure ulcers: Patient safety, quality of care and policy (1)
Zaal Rector Vermeylen
- 15:45 - 16:45 **FREE PAPER SESSION 3**
Innovations in pressure ulcer prevention and treatment
Zaal Rector Blancquaert
- 15:45 - 16:45 **STUDENT FREE PAPERS 1**
Basic science
Priorzaal
-

THURSDAY | 17. 09. 2015

- 08:00 - 09:00 **FREE PAPER SESSION 4**
Innovative approaches in clinical research (prevention and treatment)
Zaal Rector Vermeylen
- 08:00 - 09:00 **FREE PAPER SESSION 5**
Pressure ulcer prevention and management in specific patient groups (paediatrics, surgery, spinal cord injury, ER, older persons, palliative care) (1)
Priorzaal
- 08:00 - 09:00 **FREE PAPER SESSION 6**
Pressure ulcer prevention and management in specific patient groups (paediatrics, surgery, spinal cord injury, ER, older persons, palliative care) (2)
Zaal Rector Blancquaert
- 09:00 - 10:00 **FREE PAPER SESSION 7**
Basic science: Biomechanics and aetiology (2)
Priorzaal
-

FRIDAY | 18. 09. 2015

- 09:00 - 10:00 **FREE PAPER SESSION 8**
Pressure ulcers: Patient safety, quality of care and policy (2)
Priorzaal
- 09:00 - 10:00 **FREE PAPER SESSION 9**
Pressure ulcers: Implementation science and education
Zaal Rector Blancquaert
- 09:00 - 10:30 **STUDENT FREE PAPERS 2**
Clinical science
Zaal Rector Vermeylen

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Jane Nixon
- 3 The development of a preventive pressure ulcer prevention policy in a (General Hospital) AZ Nikolaas.
Dirk Milliau
- 4 Pressure ulcers and quality of care in the Centre Hospitalier de Luxembourg
Andree Marchal
- 5 Modelling Cell Migration and Differentiation Processes in Muscle and Fat Structures
Fred Vermolen
- 6 Computational Modeling of Angiogenesis Using a Cell-Based Formalism
Fred Vermolen
- 7 Changes in hypodermic adipose tissue could affect chronic skin wound healing during obesity
Dominique Sigaudou-Roussel
- 8 Investigating the effect of shear on skin viability, in relation to the development of pressure ulcers.
Iris Hoogendoorn
- 9 Electrical stimulation in wound healing processes and tissue regeneration
Marino Ciliberti
- 10 The Relationship between Nurses Assessment of Early Pressure Ulcer Damage and Sub Epidermal Moisture Measurement: A Prospective Explorative Study
Gillian O' Brien
- 11 What does it take to make video consultations succeed – experiences from Sunnaas hospital
Ingebjørg Irgens
- 12 Magnetic Resonance Elastography of pressure ulcer related deep tissue injury
Jules Nelissen
- 13 The Relationships between Incontinence, Braden Risk Score, and Pressure Ulcer Stages from the 2013 and 2014 International Pressure Ulcer Prevalence™ (IPUP) Survey.
Charlie Lachenbruch
- 14 The golden hour for pressure ulcer risk assessment
Richard White
- 15 Extracorporeal Shock Wave Therapy in Ulcer Therapy: a single-centre experience and systematic review
Jakub Taradaj
- 16 Evaluation of an immersion type mattress for the prevention of pressure ulcers
Peter Worsley
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- 19 Pressure Ulcer Prevention in Geriatric Ward
Karin Christensen
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- 21 Cost-effectiveness analysis of nutritional support for the prevention of pressure ulcers in high-risk hospitalized patients
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Dan Bader
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Andrea Lichterfeld

STRATEGIC BENCHMARKING: IMPLEMENTING AND EVALUATING EPUAP 2014 GUIDELINES--ENVISIONING THE POSSIBILITIES

Nancy Donaldson¹, Diane Brown², Carolyn Aydin³, Nancy Stotts⁴

¹ Collaborative Alliance for Nursing Outcomes

² Kaiser Permanente Northern California

³ Cedars' Sinai Health System

⁴ University of California San Francisco

Introduction:

The Collaborative Alliance for Nursing Outcomes (CALNOC) is America's first nursing sensitive benchmarking registry. Pressure Ulcer (PU) Prevalence was an initial CALNOC indicator and endorsed by the National Quality Forum as a measure of hospital quality. Over 250 hospitals in 6 states collect unit level PU prevalence data, plus process of care measures including PU risk status and implementation of prevention interventions. Hospitals also submit unit level staffing data reflecting the structure of patient care.

Methods:

CALNOC data collection methods, validation strategies and analytics have been previously reported and continuously refined [1]. Robust and customized online reporting enables hospitals to examine structure, process and PU outcomes in temporal contiguity and compare unit performance within and between hospitals in their dynamic benchmarking cohorts [2].

Results:

CALNOC hospitals have significantly reduced PUs and demonstrate highly reliable processes of care. Resulting CALNOC research has contributed to understanding the impact of microsystem variables on PU outcomes and advancing PU prediction and prevention [3, 4].

Discussion:

CALNOC's benchmarking model has the potential to inform and perhaps enhance development of innovative international benchmarking capacity. CALNOC's powerful reporting capacity, plus research use of the dataset, serves as an exemplar for advancing practice, inquiry and public policy through collaborative benchmarking.

Clinical relevance:

We posit that strategic PU process and outcome benchmarking, plus staffing effectiveness assessment, fosters clinical reliability and PU prevention. Strategic benchmarking may ultimately be key to implementation and evaluation of EPUAP's 2014 PU Guidelines.

Acknowledgements

Initial development of CALNOC was supported by American Nurses Association grants. In-kind support was contributed by ANA/California, The Association of California Nurses Leaders, Cedars' Sinai Health System, Kaiser Permanente, California, and the University of California San Francisco. CALNOC research has been funded by the Gordon and Betty Moore Foundation, the Robert Wood Johnson Foundation, and the Agency for Healthcare Research & Quality.

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PRESSURE ULCER AND WOUNDS REPORTING IN ENGLISH NHS HOSPITALS: PRESSURE ULCER/WOUND AUDIT (PUWA) AND SURVEY

Isabelle Smith¹, Susanne Coleman², Sarah Brown¹, Lyn Wilson¹, Jane Nixon¹

¹ Clinical Trials Research Unit, Leeds Institute of Clinical Trials Research, University of Leeds

² Leeds Institute of Clinical Trials Research University of Leeds

Introduction

The English NHS have monitoring systems to reduce pressure ulcer (PU) harm, including Safety Thermometer (5Th) (prevalence), Incident Reporting Systems (IRS) and Serious Incident reporting (STEIS). This project comprised a PUWA to assess the accuracy of current monitoring systems and a survey of their implementation locally.

Methods

2461 patients were required to estimate the sensitivity of the 5Th with precision of $\pm 7\%$. We identified a stratified random sample of NHS Trusts providing in-patient services in England and randomly selected wards from a range of specialities. Data collection was conducted on the 5Th date (October 2014). The PUWA utilised 'gold-standard' prevalence methods including skin inspection by two trained nurses [1]. Following the PUWA, a third nurse, (blind to PUWA), extracted records from the monitoring systems. The PU monitoring survey questionnaire comprised 41 items.

Results

From 24 of 34 (72.7%) Trusts who participated, the PUWA assessed 2239 patients from a bed-base of 2468 beds across 121 wards.

Existing PUs: PUWA prevalence was 7.1% (160/2239), compared to the 5Th prevalence of 4.7% (105/2239). The 5Th had a weighted sensitivity of 48.2% (95% CI 35.4%-56.7%) and weighted specificity of 99.0% (95% CI 98.99%-99.01%).

Existing and healed PUs: PUWA identified 189 (8.4%) patients with an existing/healed PU compared to 135 (6.0%) on IRS. The IRS had an unweighted sensitivity of 53.4% (95% CI 46.3% to 60.4%) and an unweighted specificity of 98.3% (95% CI 97.7% to 98.8%). 83 patients had one or more potentially serious PUs on the PUWA and 8 (9.6%) were reported on STEIS.

All 24 Trusts completed the survey. The results showed great variation between Trusts in relation to the components reported within 5Th prevalence and IRS/STEIS incident monitoring systems and definitions used for key variables.

Discussions

The PUWA results indicate high levels of PU under-reporting for all categories across existing monitoring systems. The high level of under-reporting of category 3 and 4 ulcers raises particular concerns because such ulcers are a serious patient harm. The survey results preclude Trust to Trust comparisons. This work led to the development of PU monitoring recommendations.

Clinical relevance

Local intelligence gathering, handover reports and clinical records should be reviewed in order to provide accurate and accessible information about patient PU status to the attending clinical team or those undertaking PU harm surveillance. To prevent inappropriate interpretation and comparisons of PU data between NHS organisations, key stakeholders need to be clear about the system purpose, detail/definitions of data items and limitations. Acknowledgements
Tissue Viability Society funded this project.

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3 THE DEVELOPMENT OF A PREVENTIVE PRESSURE ULCER PREVENTION POLICY IN A (GENERAL HOSPITAL) AZ NIKOLAAS.

Dirk Milliau¹, Boel Eva²

¹ Az Nikolaas; Moerlandstraat 1

² Az Nikolaas

Introduction:

Before 2013, the prevalence of pressure ulcers at AZ Nikolaas was substandard compared with thirty other Belgian hospitals. Since pressure ulcers are a quality parameter, our goal was: 'to reduce the prevalence of pressure ulcers at the hospital to less than 5%'

Methods:

- 1) A monthly screening of the prevalence of pressure ulcers, measured by the departments themselves.
- 2) Monthly unannounced bedside audits of three departments by three wound care nurses .
- 3) A twice-yearly audit of high-risk departments.
- 4) Mandatory reporting of pressure ulcers category III and IV to the Wound Care Service

Results:

As a result of a prevention and intervention policy, we have obtained a continuous decline in the overall prevalence of pressure ulcers within the hospital.

For us, the first international STOP pressure ulcers day was the go-ahead to launch the intense pressure ulcers policy. Six months later we are already seeing the first results.

Figure 1: Prevalence of pressure ulcers during hospitalisation

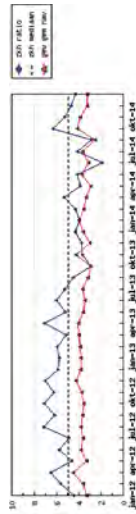
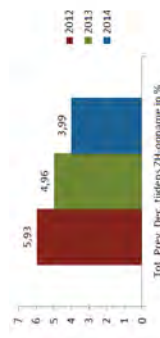


Figure 2: Pressure ulcer prevalence during hospitalisation per year



Starting from the new prevention and intervention policy, on average the pressure ulcer prevalence decreases by 1% each year, reaching 4% by the end of 2014.

The results of the twice-yearly audit indicate that despite an increase in the number of patients at risk over the years, the prevalence figures for pressure ulcers occurring in the hospital in 2013 are 8.5% lower compared to 2011.

Discussions:

Until mid-2013, our hospital was still above the average scores of hospitals that used Navigator as a benchmark. Since the start of our intensive prevention policy, our prevalence figures compete for the first time with the average Navigator scores.

With unannounced monthly audits we can see whether the departments are screening veraciously and we can give instant feedback.

The mandatory disclosure of each pressure ulcer injury category III and/or IV has taught us that we should not forget the operating room and A&E department as sources.

Clinical relevance:

By starting an improvement project using a strict pressure ulcer prevention and intervention policy for pressure ulcers can reduce prevalence.

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4 PRESSURE ULCERS AND QUALITY OF CARE IN THE CENTRE HOSPITALIER DE LUXEMBOURG

Andree Marchal¹

¹ Centre Hospitalier de Luxembourg

Introduction:

The Centre Hospitalier de Luxembourg is a 579 beds acute hospital founded in 1976. Since 1998 we take part in a national quality program in which one of the goals is the reduction of pressure ulcer rates.

Methods:

- Set up of dashboards for the general direction and nursing managers. In those dashboards, we follow not only the pressure ulcers rates but also different risks detections (pressure ulcer risk, nutritional status) and prevention actions (rates of pressure point relieves, nutrition therapy rate).
- Redesign of the institutional process of pressure ulcer cares with a new alert system for care givers. In 2014, the whole process of screening, prevention and treatment of pressure ulcers has been redesigned. We organized a better screening with earlier alerts to the head nurse, systematic use of prevention materials, alerts to nutritionists, to nurse specialists in wound cares, ...
- Follow up of national indicators / national benchmark
- We compare our results with rates of France, Switzerland and other hospitals in Luxembourg.
- Records reviews
- Closed record reviews are organized to analyze the workflow and the cares provided to individual patients.

Results:

For the last 3 years, our acquired pressure ulcers rate is under 3 %. Those results are encouraging when compared with France, Luxembourg and Swiss rates.

Discussions:

Current outcomes support us in all we have implemented. Nevertheless we want to remain vigilant and better identify risk factors (intrinsic and extrinsic). End 2015, we are planning a prevalence survey to better identify those factors.

Clinical relevance:

Clinical outcomes are the drivers of our efforts. We try to combine clinical expertise, managerial implication and seamless processes in order to achieve those results.

References:

Books

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5 MODELLING CELL MIGRATION AND DIFFERENTIATION PROCESSES IN MUSCLE AND FAT STRUCTURES

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² Delft Institute of Applied Mathematics, Delft University of Technology

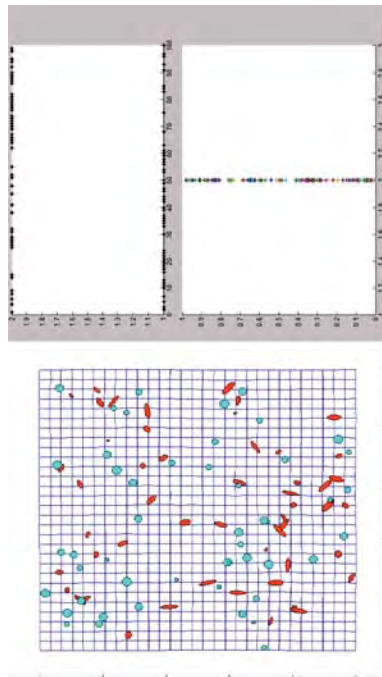
³ Tel Aviv University

Introduction:

The evolution of fat and muscle tissue is an important biomedical process for bed-bound patients. Since commonly the patients are immobile, they may not develop muscle tissue, but under some conditions they will be more prone to the development of fat. This important problem is modeled in the present study.

Methods:

The approach is mathematical in this study in the sense that the cell positions and cell state, as well as their phenotypes are outputs of a calculation environment. The model considers a chemical and a mechanical interaction between the extracellular matrix and the cells. Cell types that are dealt with are mesenchymal stem cells that possess the ability to differentiate to all types of phenotypes depending on their chemical and mechanical environment. The phenotypes that we consider here are adipocytes (fat cells) and myocytes (muscle cells). The approach takes into account the gradual nature of the differentiation process by solving a model based on diffusion, convection and reaction. The solution method is based on the finite–element method.



Results:

We present the amount of muscle and fat cells under several mechanical conditions. These mechanical conditions refer to different levels of physical exercise of the patient involved. The model takes into account the intensity of the loading as well as the frequency of the physical exercise and is consistent in predicting higher amounts of muscle under high loading frequencies and sufficient loading intensity. In Figure 1, some preliminary results are shown where myocytes (elongated red ellipses) and adipocytes (blue circles) and mesenchymal cells are shown.

Discussions:

As far as we are currently, there is not yet any experimental validation, but the model is consistent from a conceptual point of view. The study just started and more results are to be expected by the date of the presentation. Clinical relevance: The model presents a tool for the prediction of the portion of fat and muscle tissue as a function of time and as a function of the chemical and mechanical environment. This comes down to predicting the structure of tissue as a result of diet, physical exercise and possible medication.

References:

No documentation of this study has yet been written down. The work is done in the framework of the MSc-graduation of Seb Harrevelt.

6 COMPUTATIONAL MODELING OF ANGIOGENESIS USING A CELL-BASED FORMALISM

Fred Vermolen¹, Frans Bookholt², Sue Gibbs³

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² Delft Institute of Applied Mathematics, Delft University of Technology

³ Vrije Universiteit Amsterdam

Introduction:

Pressure ulcers may give rise to tissue damage as a result of cell death because of a long interval of time over which cells are exposed to mechanical pressures. Another feature is the closure of the small blood vessels which prevents the supply of oxygen and hence frustrates the oxygen and nutrients level in the tissue. To this extent, the vascular distribution in the tissue is of vital importance and this is the mechanism that we will model in this study.

Methods:

The methods that we will use here are based on mathematical modeling where individual cells migrate determined by gradients of the concentration of chemokine. The chemokine distribution is determined by the regeneration by cells, which could be macrophages, by the endothelial cells and by diffusion through the extracellular matrix in the tissue. The equations are solved using finite-element methods, and the concentrations are needed as input on the cells to determine the displacement of the cells. In the model, it is accounted for stalk and tip cells that determine the dynamics of the vascularization process.

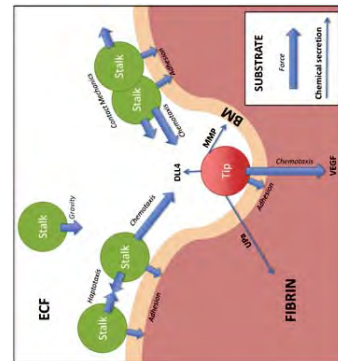


Figure 1: The tip- and stalk endothelial cells that migrate into the tissue and form the blood vessels.

Results:

The results that we present are three-dimensional where the cells are displayed as well as the concentration of several chemokine. The degree of vascularization will be quantified for several biological case-studies.

Figure 2: An example of the distribution of small blood vessels: concentration of chemokine, epithelial cell distribution, and several projections.

Discussions:

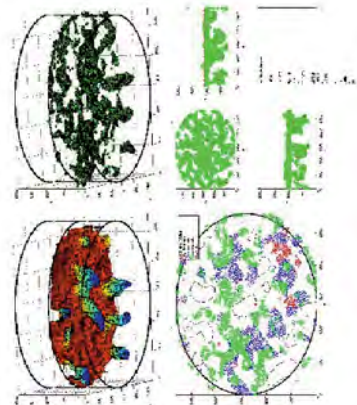
The model is based on rigid mathematical principles and the most important biological features are embedded within the model. The model is also validated along with in-vitro experiments that were carried out in the group of Sue Gibbs in Amsterdam. The agreement is very good from a qualitative point of view. From a quantitative point, the parameters need to be adjusted.

Clinical relevance:

The degree of vascularization can be evaluated for several chemical situations, which could reflect the efficiency of the immune system in case of wounding. This degree of vascularization reflects the physical condition of the tissue in the sense that the amount of oxygen within the tissue is related with the viability of the cells in the tissue.

References:

Frans Bookholt. *Simulating sprouting angiogenesis using a new 3D substrate dependent cell-based model*. MSc-thesis at Delft University of Technology, 2014



7 CHANGES IN HYPODERMIC ADIPOSE TISSUE COULD AFFECT CHRONIC SKIN WOUND HEALING DURING OBESITY

Begey Anna-Laure¹, Nguyen-Tu Marie-Sophie¹, Dominique Sigaud-Rousselet²

¹ Umr 5305 Cnrs

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Introduction:

The role of obesity in the appearance of skin pressure ulcers remains controversial. In obesity, hypodermic adipose tissue grows at the expense of surrounding tissues. The aim of the present study was to evaluate blood perfusion and related lesions after skin compression in obese mice and to determine the effect of the hypodermic adipose tissue changes on subsequent skin wound healing.

Methods:

C57BL6 male mice (10 weeks) were randomly assigned to a control or hypercaloric diet (HCD) for 4 and 12 weeks. Skin compression was induced by a magnetic force using 2 magnets for 2 hours repeated 3 times alternated with 30 min of pressure release. Skin perfusion was examined using laser Doppler imaging before skin compression, immediately after compression release, 24 h and 5 days later and at wound closure. Skin injuries were determined by photography and the percentage of wound closure was determined. We studied the changes in mice adipose tissue weights and in adipose cell size distribution in hypodermic (hWAT) and subcutaneous (scWAT) layer using multiziser IV (Beckman Coulter). The lipolytic response was investigated measuring the glycerol produced. We also examined in vitro insulin sensitivity of each adipose tissue.

Results:

In HCD4 and HCD12, the body weight of obese mice was increased compared to non-obese ($p < 0.001$). hWAT lipolytic response was lower than scWAT responses in HCD4 mice, but was higher than scWAT responses in HCD12 mice. The bimodal distribution of adipose cell sizes of hWAT was not observed in HCD4 mice compared to scWAT tissue whereas it was observed in HCD12 mice. Adipocyte cell size increased in all adipose tissue only in HCD12 mice.

At 24-hour post-compression release the compressed area was ischaemic in the 4 and 12-week HCD groups. A heterogeneous distribution of blood perfusion was observed using the colour-coded map of the skin perfusion on the compressed area. The chronology of wound healing was different between 4 and 12-week HCD groups

Discussions:

Applying several cycles of skin compression could be more reliable than a single pressure application to mediate pressure skin necrosis in obese mice. During obesity several parameters can affect the development of skin lesions related to pressure loads, including increased skin adiposity and changes in pressure transmission. These limitations reinforce the need for further studies to advance our understanding of skin lesions occurring during obesity.

Clinical relevance:

Since obese patients generally present with slower wound healing, preventing skin lesions could reduce the risk of chronic wounds developing in such patients.

INVESTIGATING THE EFFECT OF SHEAR ON SKIN VIABILITY, IN RELATION TO THE DEVELOPMENT OF PRESSURE ULCERS.

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Introduction:

The exact aetiology of pressure ulcers is still under debate, but the most important factors are considered: pressure and/or shear, immobility and ischemia. Pressure is a force perpendicular to the skin, and shear is a static force parallel to the skin. The importance of shear has been acknowledged for a long time but has been mostly addressed in a descriptive manner rather than a quantitative manner. In general, it is thought that shear leads to increased stresses within the tissues and can cause twisting and blocking of the capillaries as well as separation of skin layers. The aim of this research is to investigate the load-bearing-ability of human skin in-vivo, and in particular assessing the effect of shear on tissue viability.

Methods:

A measurement device has been built to systematically apply pressure and shear to the skin and to measure the effect of this load on tissue viability at two measurement depths simultaneously (see Figure 1). Tissue viability is estimated by tissue oxygenation and perfusion, measured with the 'Oxygen to See' using a combination of Laser Doppler spectroscopy and white light spectroscopy. The measurement depths are approximately 1mm and 8mm deep. Various combinations of pressure and shear will be applied at anatomical locations. For each magnitude of pressure we want to apply multiple levels of shear to achieve valid assessment of the effect of shear.

Results:

The effect of pressure and shear will be analysed during load application and after load removal, and compared between healthy subjects and patients at risk. A first pilot measurement shows a decrease in tissue viability with increasing pressure (see Figure 2), and a more severe decrease if a small amount of shear is added.

Discussions:

The pilot measurement showed good feasibility of the experimental set-up. This research is unique in the simultaneous measurement of tissue viability at two measurement depths and investigating the effect of shear by comparing a different shear levels instead of comparing a conditions of sole pressure with a conditions of pressure and shear. In the latter conditions the total force is much larger. We expect that shear has a larger effect on tissue viability compared to pressure alone.



Figure 1. Overview of measurement set-up. Measurements system incorporates tissue viability and force sensors (real time monitoring). Pressure and shear can be applied through the set-up by placing weights.

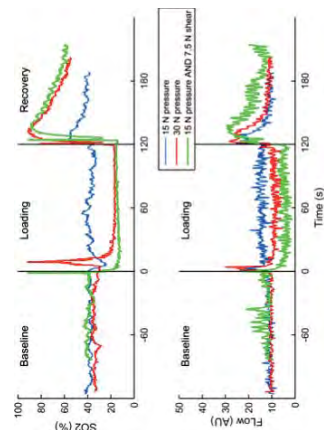


Figure 2. Example of tissue viability data measured during 3 different loading conditions at the sacrum of a healthy subject. Measured with the 'Oxygen to See' at approximately 1 mm depth.

ELECTRICAL STIMULATION IN WOUND HEALING PROCESSES AND TISSUE REGENERATION

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Introduction:

Wound treatment with electrical stimulation (ES) is known to lead to the following cell and tissue reactions in the wound and the surrounding skin:

- Acceleration of the proliferation and migration of cells that are important for wound healing processes
- Reduction of accompanying wound pain

The EPUAP/NPUAP treatment guidelines for pressure ulcers (PU) recommend ES as the only treatment ranked with the highest possible level of recommendation. Contemporary clinical studies are missing which describe how this compares on tissue level with negative pressure wound therapy (NPWT) in ambulatory home care.

Methods:

50 patients with pressure ulcers stage 3-4 had been treated with ES. There of 10 patients had been treated with NPWT followed by ES. The wound evolution was documented with qualitative controls. Outcome criteria were the wound bed preparation and the healing processes. A wound biopsy was executed to evaluate the healing process during the treatment with ES. In defined cases wounds treated with ES and NPWT were histologically compared.

Results:

Improvement of wound bed on 44 patients over 50; Accelerated wound healing processes in 90% of the cases Healing processes were halted after 4 weeks of NPWT while it continues if treated with ES.

Discussions:

The results demonstrate treatment of PUs stage 3-4 with ES is highly effective and can be successfully implemented in daily homecare.

Clinical relevance: Effectiveness of NPWT and Electrostimulation in Pressur Ulcers

References:

1. Bowler, P.G., Davies, B.J. The microbiology of infected and non-infected leg ulcers, *Int J Dermatol*. 1999; 38:573-578
2. Birke-Sorensen, H., Malmisjo, M., Rome, P. et al. International Expert Panel on Negative Pressure Wound Therapy (NPWT-EPT). Evidence-based recommendations for negative pressure wound therapy: Treatment variables (pressure levels, wound filler and contact layer) – Steps towards an international consensus, *J Plast Reconstr Aesthet Surg*. 2011; 64, S1 – S16
3. Weed, T., Ratliff, C., Drake, D. Quantifying bacterial bioburden during negative pressure wound therapy: does the wound VAC enhance bacterial clearance. *Ann Plast Surg*. 2004; 52(3): 276-279
4. Boone, D. et al. Bacterial burden and wound outcomes as influenced by negative pressure wound therapy. *Wounds*.

10

THE RELATIONSHIP BETWEEN NURSES ASSESSMENT OF EARLY PRESSURE ULCER DAMAGE AND SUB EPIDERMAL MOISTURE MEASUREMENT: A PROSPECTIVE EXPLORATIVE STUDY

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¹ Naas General Hospital

² RCSI, School of Nursing

Introduction:

Studies 1-3 have demonstrated the feasibility of using sub epidermal moisture measurement which rises in the inflammatory process as a predictor of early pressure ulcer damage. Once identified, and prevention strategies are implemented or heightened, more severe pressure ulcer damage may be averted. This study aimed to explore the relationship between nurses' assessment of at risk patients' skin and the assessment of skin using sub epidermal moisture measurement.

Methods:

A descriptive prospective observational design was employed. Following ethical approval and written informed consent, data were collected daily for 4 weeks, from patients assessed as being at risk of pressure ulcer damage within an acute health care facility in Ireland. Data included nurses (n=372) documented assessment of the patient's skin condition and researcher red sub epidermal moisture measurement over the sacrum and both heels.

Results:

47 patients were included, 38.3% (n=18) male and 61.5% (n=29) female, with a median age of 74.7 years, 34% (n=16) developed signs of early pressure damage. The mean number of days for nurses to detect this damage was 5.0 (SD 5.1; max 11, min 3), whereas the mean number of days that it took sub epidermal moisture measurement to detect damage was 1.1 (SD 0.75; max 2, min 1). Correlations were low for the left heel (r=-.23), medium for the right heel (r=.43) and strong for the sacrum (r=.65) between nurses' visual assessment and sub epidermal moisture measurement.

Discussions:

All patients with sustained elevated sub epidermal moisture levels went on to develop visual signs of pressure ulceration. However, importantly, sub epidermal moisture measurement identified early damage, on average, 3.9 days earlier than nurses' assessment. Given that pressure ulcers develop from within the deeper tissues, knowing that early pressure ulcer damage is present can facilitate heightening of prevention strategies to avoid extension. Clinical relevance: The earlier that pressure ulcers can be detected, the earlier interventions can be implemented to circumvent further extension, avoiding their associated morbidity and mortality.

References:

1. Bates-Jensen, B., McCreath, H., Pongquan, V. & Apeles, N. Subepidermal moisture differentiates erythema and stage 1 pressure ulcers in nursing home residents. *Wound Repair Regen* 16, 189-97 (2008).
2. Bates-Jensen, B., McCreath, H. & V.P. Subepidermal moisture is associated with early pressure ulcer damage in nursing home residents with dark skin tones: pilot findings. *J Wound Ostomy Continence Nurs* 36, 277-84 (2009).
3. Harrow, J. & Mayrovitz, H. Subepidermal moisture surrounding pressure ulcers in persons with a spinal cord injury: a pilot study. *J Spinal Cord Med* 37, 719-28 (2014).

WHAT DOES IT TAKE TO MAKE VIDEO CONSULTATIONS SUCCEED – EXPERIENCES FROM SUNNAAS HOSPITAL

Ingebjørg Irgens¹

¹ Sunnaas Rehabilitation Hospital

Introduction:

Sunnaas rehabilitation Hospital uses videoconferencing in the patients' rehabilitation process, to cooperate with municipality health services and other public services. The "Telemedicine pressure sore project" was initiated to test computer-based videoconferencing in order to follow up patients with spinal cord injury and pressure ulcers patients in their home, in collaboration with nurses from the municipality health services. In this presentation we will discuss what it takes to succeed in applying video consultations in patients' home

Methods:

An approach about technology, procedures, working methods, adjustments and leader involvement

Results:

The project benefitted from existing telemedicine infrastructure at Sunnaas: a multidisciplinary telemedicine team, technical support, studios and technology. Cisco Jabber videoconference software together with Norwegian Health Network (NHN) ensured safe communication and was a key to meet the strict Norwegian regulations for exchanging patient information. Success factor are related to usability and integration into daily routines, service and support, continuous improvement and involvement from leaders as well as dedicated clinicians. Early analyses of cost/benefits seem to be positive on a society level, but cost challenges are still to be solved.

Discussions:

The project results were positive regarding technology and the healing of pressure sores. Human factors as well as technical solutions are key factors to succeed. It is however important that money follows good functioning health innovation.

Clinical relevance:

The results are transferrable to other groups of patients with chronic conditions.

References:

Will be presented at the presentation.

MAGNETIC RESONANCE ELASTOGRAPHY OF PRESSURE ULCER RELATED DEEP TISSUE INJURY

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¹ Eindhoven University of Technology; Academic Medical Center Amsterdam

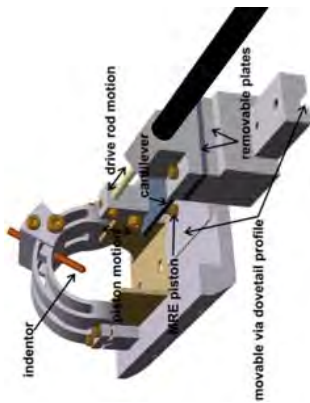
² Eindhoven University of Technology

³ Academic Medical Center Amsterdam

Introduction:

We have investigated the feasibility of using Magnetic Resonance Elastography (MRE) to quantify muscle-tissue mechanical properties and changes therein related to the development of pressure ulcers.[1][2][3] MRE measurements were performed before and after damage-inducing indentation of the tibialis anterior (TA) muscle of Sprague Dawley rats (SD rats).[4]

Fig.1. Detail of indentation and MRE actuator part of setup.



Methods:

MR Compatible indentation and MRE setup: A detail of the used setup for both indentation and MRE is shown in Fig.1. The MRE piston is actuated at 900 Hz via a drive rod attached to an electromagnetic shaker and cantilever.

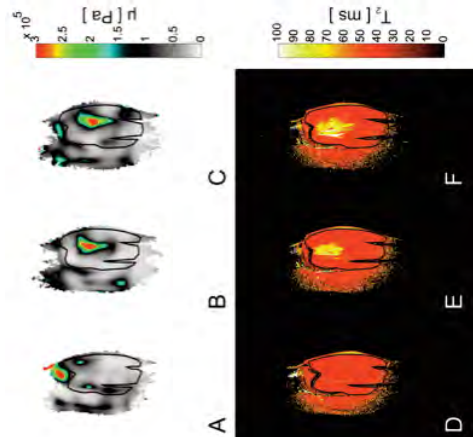
Rat model: 11 to 13 week-old SD rats (female, n=5) were measured. The rat leg was placed in the setup. The MRE actuator piston was gently placed against the tendon at the distal side of the TA muscle. Indentation of the TA muscle, for a period of 2 hours, took place in the MR scanner.

In vivo MRI: Skeletal muscle injury was assessed with T2-mapping MRI and changes in mechanical properties with MRE. Measurements were performed before and up to 90 min after indentation. Data Analysis: MRE elastograms representing the shear stiffness μ and quantitative T2-maps were calculated.

Fig.2. (A-C) Elastograms and (D-F) T2-maps (A,D) before, and (B,E) at 45 min and (C,F) 90 min after indentation.

Results:

In Fig.2 MRE elastograms (A) before, as well as (B) at 45 min and (C) 90 min after 2 h of indentation are shown together with the corresponding T2-maps (D-F). The TA muscle boundaries are outlined in the images. Increased shear stiffness was observed in the TA in the elastograms that were measured following 2 hours of indentation. T2-maps after indentation revealed elevated T2 values indicative for muscle damage in areas that co-localized with increased shear stiffness. T2 enhancement can be associated with increased amounts of intracellular and extracellular free water, as a result of inflammation, edema, and haemorrhage.



Discussions:

Current study for the first time demonstrates that changes in muscle-tissue mechanical properties associated with sDTI can be quantified by MRE. We expect that a better knowledge of changes in soft tissue mechanical properties due to damage, measured with MRE, will provide new insights in the aetiology of pressure ulcer related deep tissue injury.

Clinical relevance:

Better understanding of aetiology and promising tool for early detection.

References:

- [1] Linder-Ganz et al., Conf Proc IEEE Eng Med Biol Soc, 2003 [2] Gefen et al., J. Biomech. Eng., 2005 [3] Deprez et al., Med. Phys., 2011 [4] Loerakker et al., J. Appl. Physiol, 2011

THE RELATIONSHIPS BETWEEN INCONTINENCE, BRADEN RISK SCORE, AND PRESSURE ULCER STAGES FROM THE 2013 AND 2014 INTERNATIONAL PRESSURE ULCER PREVALENCE SURVEY AND 2014 INTERNATIONAL PRESSURE ULCER PREVALENCE (IPUP) SURVEY.

Charlie Lachenbruch¹, David Ribble¹, Kirsten Emmons¹, Catherine VanGilder¹

¹ Hill-Rom

Introduction:

Exposure to moisture such as incontinence is recognized as a factor in the development of pressure ulcers. Using the 2013 and 2014 International Pressure Ulcer Prevalence Surveys (IPUP), the present study will compare the likelihood of developing a FAPU by severity of ulcer for the incontinent patient population as compared to the non-incontinent population.

Methods:

Facilities that participate in IPUP perform house wide patient assessments over a 24 hour period on a pre-determined day. Aggregate data were analyzed by incontinence category for the number and severity of FAPUs that were not device-related, and in the pelvic region.

Results:

219,233 records were analyzed. Patients with fecal, urinary, or both fecal and urinary incontinence were compared to patients without incontinence (Table 1). Odds ratios by pressure ulcer stage indicate FAPUs are much more likely to occur in patients with incontinence, especially fecal incontinence. It is interesting to note that the odds ratios increase as the stage of FAPU becomes more severe rather than being associated primarily with superficial skin damage.

Table 1: Overall Ratio of FAPU Rate by Stage and Incontinence Category to Rate for Patients with No Incontinence (p-values for all Odds Ratios < 0.0001)

PU Stage	Fecal Incontinence	Urinary Incontinence	Fecal and Urinary Incontinence
Stage I	3.19	2.91	3.05
Stage II	5.88	3.83	4.25
Stage III	13.28	8.99	11.31
Stage IV	31.47	19.50	23.74
Deep Tissue Injury	12.62	6.48	7.54
Unstageable	15.25	8.99	11.49

Discussion:

Incontinence significantly increased the rate of FAPU vs. patients with no incontinence. Additional results (not shown) indicate that Braden scores accurately predicted higher stage ulcers but severely underestimated the risk of Stage I and Stage II PUs. These results reinforce the probable importance of incontinence in pressure ulcer etiology, and clarify a differential pattern in the relationship between incontinence status vs. PU stage.

Clinical relevance:

Even patients at low PU risk have increased of stage I and II pressure ulcers if they are incontinent. Because many of these lower stage wounds progress in severity, the importance of management of incontinence should not be underestimated.

References:

- 1) National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. *Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline*. Emily Haesler (Ed.). Cambridge Media: Perth, Australia; 2014.
- 2) Beekman D, Van Lancker A, Van Hecke A, Verhaeghe S. *A systematic review and meta-analysis of incontinence-associated dermatitis, incontinence, and moisture as risk factors for pressure ulcer development*. Res Nurs Health. 2014 Jun;37(3):204-18.

THE GOLDEN HOUR FOR PRESSURE ULCER RISK ASSESSMENT

Catherine Sharp¹, Richard White²

¹ Nurse Expert Witness

² University of Worcester; Institute of Health and Society

Introduction:

The 'Prevention and Treatment of Pressure Ulcers: Quick Reference Guide' (1) recommends screening as soon as possible after admission but within a maximum of eight hours'. This is good advice but pressure ulceration can begin in as little as one hour (2). How did the authors come up with '...eight hours' as the maximum time in which it would be safe to screen for risk?

This screening window will not translate into good practice. Will eight hours sitting or lying in one position, predisposes to PU formation. No assurance is given in the Guide (1) that this will not occur. Furthermore, the strength of evidence, denoted 'C' is not supported by any citation of supporting evidence.

The Guide 'provides an indication to the health professional of the confidence one can have that the recommendation will do more good than harm, and can be used to assist in prioritizing pressure ulcer related interventions (p1). The consequences of leaving any patient in one position for up to eight hours before screening for pressure ulcer risk, then intervening, are dire even though the time for onset of a pressure ulcer is not exact but a range of probable times (3).

Clinical relevance:

Screening must be conducted as soon as possible after admission (3); the recommendation that screening can be carried out up to '...a maximum of eight hours' is unfounded and dangerous. There is evidence that inflammatory mediators are released within the first four hours of exposure to pressure (4).

Screening patients on admission using clinical judgement, focusing on immobility, the only evidence-based risk factor for pressure ulcer development (5), is the way to determine risk. Reducing delays in screening for pressure ulcer risk and providing pressure relief within the first 'golden hour' must be considered as the foundation of pressure ulcer prevention.

References:

1. National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. *Prevention and Treatment of Pressure Ulcers: Quick Reference Guide*. Emily Haesler (Ed.). Cambridge Media: Perth, Australia; 2014.2.
- Koslak M. *Archives of Physical Medicine and Rehabilitation* [1959, ;40(2);:62-9].
- Gefen A. *How Much Time Does it Take to Get a Pressure Ulcer? Integrated Evidence from Human, Animal, and In Vitro Studies Ostomy Wound Manage*. 2008;54(10):26-35.
- Stojadinovic O, Sawaya A, Bourne JW. *PLoS One* 2013 Aug 14; (8):e69223.
- Sharp CA, McLaws ML. *Int Wound J*. 2006 Dec;3(4):344-53.

EXTRACORPOREAL SHOCK WAVE THERAPY IN ULCER THERAPY: A SINGLE-CENTRE EXPERIENCE AND SYSTEMATIC REVIEW

15

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¹ Department of Physiotherapy Basics, Academy School of Physical Education; Trustee of Eupap, UK

Introduction:

Extracorporeal shock wave therapy (ESWT) is a relatively new medical procedure aimed to improve the healing process of patients with pressure ulcers (PUs). ESWT is defined as a sequence of biphasic, high-energy acoustic pulses that generate transient pressure disturbance and propagate rapidly in three-dimensional space; this therapy is associated with a sudden rise of pressure applied directly into tissues without any damaging effect. ESWT has been used to accelerate wound healing for over ten years, but its results are still controversial.

Methods:

Computer research of the following databases was performed: MEDLINE, PubMed, Scopus, EBSCOhost, and PEDro. The main keywords used for selection purposes were: wound healing, pressure ulcer, extracorporeal shock wave therapy, shock wave treatment, focused shock wave (fESWT), radial shock wave (rESWT), and defocused shock wave (dESWT). Only articles published between 2000 and 2015 that involved clinical trials on human subjects, written in English, and with full-version available were included.

Results:

Of the 393 articles found, 3 met the publication date (year 2000–2015), study type (clinical study), language (English only), and abstract availability (yes) criteria. The three studies (n = 475 patients with PU and wounds of varying etiologies as limitation of all these trials) included to review and evaluated using Cochrane Collaboration Group standards. In addition, the author's own experience with an ESWT in four patients with PUs is reported.

Discussions:

Results of the systematic literature review suggest there is lack of strong evidence documenting that ESWT application is a very effective for the treatment of PUs. Sham-controlled, randomized, multicenter, blinded clinical trials with the highest methodological quality and scientific data reliability are needed to ascertain ESWT efficacy. Clinical relevance: This report will be helpful in preparing the NPUAP/EPUAP/PPPIA 2019 update of the international guidelines.

References:

Larking AM et al. Randomized control of extracorporeal shock wave therapy versus placebo for chronic decubitus ulceration. *Clin Rehabil.* 2010;24(3):222–229. Schaden W et al. Shock wave therapy for acute and chronic soft tissue wounds: a feasibility study. *J Surg Res.* 2007;143(1):1–12. Wolff KS et al. The influence of comorbidities and etiologies on the success of extracorporeal shock wave therapy for chronic soft tissue wounds: midterm results. *Ultrasound Med Biol.* 2011;37(7):1111–1119

EVALUATION OF AN IMMERSION TYPE MATTRESS FOR THE PREVENTION OF PRESSURE ULCERS

16

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² Faculty of Health Sciences, University of Southampton

Introduction:

The incidence of pressure ulcers (PUs) can be reduced by using effective support systems and regular patient repositioning. A reactive system has been designed to provide effective pressure redistribution through immersion within a simulated fluid environment. This study examines these claims by assessing objective parameters, using protocols previously reported^{1,2}. Additionally, the perceived comfort and safety of volunteers were recorded in different postures.

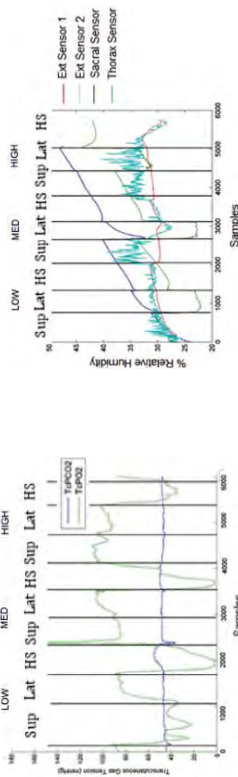
Methods:

Institutional ethics was granted for the study. Transcutaneous gas electrodes were attached to the sacrum, and each volunteer positioned supine on the immersion mattress (Dolphin FIS, Joerns, US). The test period involved three internal pressures and three randomly ordered postures i.e. supine lying, right turn and high sitting. Measures at the interface included pressure, temperature and humidity recorded for each 10 minute phase. Each volunteer completed a comfort and safety score. Trends in the gas tensions over the test period were categorised 1:

- Category 1. Minimal changes in TcPO₂ and TcPCO₂.
- Category 2. >25% decrease in TcPO₂ with minimal change in TcPCO₂
- Category 3. >25% decrease in TcPO₂ associated with a >25% increase in TcPCO₂

Results:

18 volunteers were recruited - mean age of 60 years and mean BMI of 25.9 kgm⁻². The immersion settings yielded mean internal pressures of 11.1 mmHg, 18.2 mmHg and 24.1 mmHg. Collated responses from all test conditions showed 86% had a Category 1 response. There were 8% category 2 (Fig 1A) and 6% category 3 responses, generally exhibited by two subjects. There was no consistent trends between physiological response and either immersion settings or posture. However, associated with high sitting, there was an increase in body angle and, in some cases, increase in peak pressures over selected sites. Temperature and humidity tended to increase (Fig 1b), although postural movements reversed the trends. For most conditions comfort and safety scores were high (>4/5).



a b Figure 1. Temporal variations of (a) transcutaneous gas tensions (revealing Category 2) (b) relative humidity levels in one subject over the 9 phases of the test protocol.

Discussions:

The majority of volunteers maintained adequate tissue viability i.e. Category 1 response, during all support phases. Volunteers were generally comfortable and safe on the immersion mattress, although bottoming out was occasionally revealed in high sitting posture on the low immersion setting.

Clinical relevance:

Immersion based therapy generally provided pressure redistribution for volunteers in three postures. The methodology will be adopted to assess its efficacy with at risk patients.

References:

[1] Chai, Bader (2013) *J Mech. Behav. Biomed. Mater.* 28,427-35; [2] Woodhouse et al. (2015) *Clin. Biomech.* 30, 166-174

HOW TO PREVENT PATIENTS DEVELOPING PRESSURE ULCER (PU) WHEN UNDERGOING CARDIO-THORACIC SURGERY

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Introduction:

A pressure ulcer (PU) is a severe complication following an operation. It's a setback for the patient; it's painful and prolongs the hospital stay and an unpredictable expense to the hospital's resources and economy. Several studies show that the development of a PU, from the exposure to pressure until the PU breaks through the skin, can take up to four days. This may support the hypothesis that the development of PU originates in the operating theatre. The patient is exposed to pressure perioperatively and as a consequence at risk of developing PU. It is essential that the prevention of PU is initiated in the operating theatre as an integrated part of nursing care.

The purpose of the study is to research the development of PU, to identify risk factors, to gain knowledge of the prevention of PU in the operating theatre and to implement nursing interventions.

Methods:

A review comprising of:

A) A systematic literature search in CINAHL and PubMed.

B) A critical evaluation of the 25 included academic articles and analysis of content relevance.

Results:

Results showed that several factors such as intrinsic, extrinsic factors and comorbidities increase the patient's risk of developing PU. Especially the extrinsic factors such as shearing, friction, moisture and hypothermia are factors, which can be minimized. Type of mattress and positioning aids are an important choice, when positioning the patient and are extrinsic factors, which can be optimized.

Clinical relevance:

Implications for clinical practice: The prevention of PU has become an integrated part of nursing practice. The nursing standards regarding the extrinsic factors have been revised, introduced and implemented interdisciplinarily. The quality of care has improved as standards are based on evidence/best practice. Hypothermia has been researched further and interventions relating to patients at risk of hypothermia, when undergoing cardiac surgery, have been introduced. The specific requirements when positioning the bariatric patient have been addressed. Cooperation between the wards, the operating theatre and the intensive care unit has been established in order to plan the prevention of PU, when the patient is transferred. As part of a larger Randomized Clinical Trial, we are researching if a low or high Mean Arterial Pressure MAP, when the patient is on Extra Corporal Circulation ECC, has any influence on whether the patients develop PU.

CAN PRESSURE MONITORING INFLUENCE NON-CONCORDANT PATIENTS AND CARERS IN THEIR DECISION MAKING WITH REGARDS TO REPOSITIONING AND PRESSURE ULCER PREVENTION IN THE COMMUNITY

Nicci Kimpston¹, Bridie Kent²

¹ Peninsula Community Health; Tissue Viability

² Plymouth University; Nursing Research

Introduction:

40% category 3-4 pressure ulcers in Cornwall are due to patients unable or unwilling to sleep in bed. Patients report that pressure relieving cushions are too high, unstable and uncomfortable [1]. Patients can be reluctant to utilise equipment and, as yet, there is no available evidence to establish levels of pressure created when seated for sustained period.

Methods:

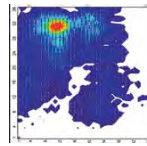
The ForeSite System which consists of a chair cover embedded with sensor cells that continuously measures the patient's surface pressures, identifying areas of the body that have been under sustained pressure.

Quantitative and qualitative data have been collected to understand the adoption, barriers and benefits of exposure to this technology, by patients and carers in the community setting.

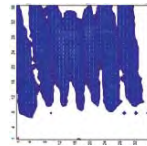
Results:

- 10 participants over 3 month period:
- 90% healing/healed.
- 90% new/alternative changes
- 100% found it useful
- 3 turning regime improved
- 1 mattress downgraded
- 2 medium risk mattresses not upgraded to high risk equipment
- 1 monitor too bright at night; 1 map slippery; 1 increase in care costs
- Total savings £3,000

Monitor images:



Before Intervention
Peak Pressure
256 mmHg
Mean Pressure
25.35mmHg



After Intervention
Peak Pressure
47.12 mmHg
Mean Pressure
23.96 mmHg

Discussion:

Interface pressures do not provide the full picture associated with the amount of pressure exerted on muscle tissue and deformation of cells, which results in deep tissue injury [2], [3]. MRI scans provide some insight into areas of high pressures but are costly and not reproducible in large numbers or in the community. Monitoring of interface pressures appears to facilitate patients adjusting their positions in line with monitor images and has not previously been the focus of routine use in any form of care setting.

Clinical relevance:

This technology has the potential to reduce community acquired pressure ulcers, reduce hospital admissions or service uptake associated with pressure ulcers, enhancing quality of life for patients and their carers. It also provides nurses with real time information to inform decision making.

References:

1. Gorecki C, Nixon J, Madill A, Firth J, Brown JM. What influences the impact of pressure on health-related quality of life? A qualitative patient-focused exploration of contributory factors. *Journal of Tissue Viability* 2012; (21): 3-12
2. Oomens CWJ, Loerakker S, Bader DL. The importance of internal strain as opposed to interface pressures in the prevention of pressure related deep tissue injury. *Journal of Tissue Viability* 2010; (19): 35-42
3. Gefen A. The Compression Intensity Index: A practical anatomical estimate of the biomechanical risk for a deep tissue injury. *Technology and Health Care* 2008; (16): 141-149

PRESSURE ULCER PREVENTION IN GERIATRIC WARD

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Introduction:

From literature we know that the most important initiative to prevent pressure ulcers is frequent changes of position. Thus, at the majority of wards at Odense University Hospital a turning regime with turns every second hour is applied.

With pressure endangered patients it is often difficult for the staff to evaluate, whether the patient himself has been able to change position. Especially at night, scheduled turns may cause an unnecessary disruption of sleep, and a sound sleep is vital for the body's possibility to regenerate both physically and mentally.

Methods:

The Mobility Monitor is a technological device which is connected to an alarm being activated when the acceptable limit for movement is reached/exceeded. Information about the patient's mobility is continuously registered electronically. Data is shown on a screen in the duty office.

The following questions have been investigated:

1. Can the MM be implemented in clinical practice on geriatric wards?
2. Can the MM register the patients' mobility and contribute to improved turning regimes?
3. Does the MM provide useful information about patients' risk of developing pressure ulcers?
4. How does the staff experience the use of the MM in daily use?

Results:

26 patients participated.

7 patients developed signs of pressure ulcer because nursing personnel did not always react correctly to the alarms. Based on the existing data it seems that old age, extended hospitalization, and reduced functional capacity are central indicators for developing pressure ulcers.

Discussions:

Additionally, it is underlined that Odense University Hospital yearly spends a considerable amount on alternating pressure air mattresses, the effect of which is not documented. The staff finds it easier to turn patients on these mattresses, but the patients find it more difficult to move and get out of bed without assistance. Therefore, we need to investigate and assess whether a better pressure ulcer prophylaxis and advantages for the patients can be achieved by using ordinary mattresses.

Clinical relevance:

The expected effect of the Mobility Monitor is to supervise the mobility of bed-bound patients and warn us when risk of immobility arises. A fixed limit as to the period of insufficient movements is set, and the MM will activate the alarm when this limit is reached. Thus, the staff will know to which extent the patient is capable of moving himself in bed, and when assisted movements are required. A bigger study/review will follow to investigate the above findings/conclusions.

AN INTERDISCIPLINARY TEAM STRATEGY FOR THE PREVENTION OF PRESSURE ULCERS FOR AT RISK AGEING PATIENTS IN COMMUNITY SETTINGS

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Introduction:

In the region of Geneva our department of health has set objectives for the promotion of health of the ageing population for them to remain at home as long as possible. Recommendations for the elderly include measures for healthy life style, prevention of chronic diseases with adapted nutrition and physical activity and promotion of interdisciplinary collaboration.

Interdisciplinary approaches, breaking organizational barriers are identified as mandatory. Moreover international evidence-based guidelines highlight the importance of an interdisciplinary approach with a holistic clinical assessment and identification of risk factors in order to set up adjusted preventive and treatment measures.

Methods:

A community project was created for one of the homes for the elderly, representing 200 beds with the aim to implement EPUPAP preventive and treatment recommendations adapted to local environment. Our aim is to obtain state recognition for our project including strategic and financial support to enable duplication to the whole community (53 homes for the elderly). Alongside the project, an educational strategy was initiated with the University in pre-registration Bachelor curriculum for nurses with the project to expand to interprofessional education (IPE), involving the 4 health departments (nursing, nutrition/dietetics physiotherapy, medical imaging technology). IPE is renowned as an effective educational measure to improve collaboration and quality care within health care professions.

Results:

The project was presented to our health authorities who have accepted to support the initiative and part of financial costs. This has generated the possibility to initiate the creation of our educational and implementation strategy and tool kit. The interprofessional and networking strategies enrich the project. Moreover our clinical and educational team is invited to present the project

Discussions:

Our presentation aims to emphasize our clinical experiences as specialized nurses in community and home settings identifying lack of paramedical knowledge for at risk patients with costly consequences.

Clinical relevance:

Emphasis is made on the importance of clinical recording, structured reasoning and judgment to improve accurate implementation of optimal preventive measures. This is achieved by educational initiatives and clinical guidance.

References:

- [1] *Thisletwharte..J(2012). Interprofessional education : a review of context, learning and the research agenda. Medical Education, 46, 58-70*
- [2] *European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel. Prevention and treatment of pressure ulcers: quick reference guide. Washington DC: National Pressure Ulcer Advisory Panel ; 2009.*

COST-EFFECTIVENESS ANALYSIS OF NUTRITIONAL SUPPORT FOR THE PREVENTION OF PRESSURE ULCERS IN HIGH-RISK HOSPITALIZED PATIENTS

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Introduction:

Malnutrition is a risk factor for pressure ulcers (PU) [1]. Current guidelines recommend nutritional support be offered to patients at risk of PU and malnutrition. The objective of this study was to assess the cost-effectiveness of nutritional support compared to standard care in preventing PU in high-risk hospitalized patients.

Methods:

The analysis was from the perspective of the State health department in Queensland, Australia, using a health state transition Markov model. Evidence for the relative effectiveness was synthesized from a meta-analysis of randomized controlled trials. Other model inputs were systematically identified from the literature, including results from a pilot trial using nutrition for PU prevention in a Queensland public hospital [2]. Resources were valued using 2014 prices and the time horizon of the analysis was one year. The net monetary benefit was calculated, which is the incremental effectiveness valued in monetary terms minus the incremental cost. Model results were tested in a univariate analysis and decision uncertainty was characterized using a probabilistic sensitivity analysis.

Results:

Our model estimated that around 15% of patients would have PU in the standard care group compared with 11% in the nutritional support group. Compared to standard care, nutritional support was cost saving at AU\$425 per patient, and slightly more effective with an average 0.005 quality-adjusted life years gained. At a willingness-to-pay of AU\$50,000 per quality-adjusted life year gained, the net benefit from nutritional support was AU\$532 per patient, with 84% probability being cost-effective.

Discussions:

Investing in nutritional support for high risk hospitalized patients was cost-effective in preventing PU. That is, nutrition support was as effective and less costly than standard care. This is consistent with previous research [3]. Costs were saved by avoiding downstream costs of wound management and extended hospitalization.

Clinical relevance:

Nutrition support can result in substantial cost savings for hospitals in terms of PU prevention. For an estimated yearly high-risk hospital population of 20,000, we calculate annual cost savings for all public hospitals in Queensland alone to be around AU\$8.5 million.

References:

1. Banks, M., et al., *Malnutrition and pressure ulcer risk in adults in Australian health care facilities*. *Nutrition*, 2010. 26(9): p. 896-901.
2. Roberts, S., B. Desbrow, and W. Chaboyer. *Feasibility of a patient-centred nutrition intervention to improve oral intakes of patients at risk of pressure ulcer: a pilot randomised control trial*. *Scandinavian Journal of Caring Sciences*, 2015; p. (in press).
3. Banks, M.D., et al., *Cost effectiveness of nutrition support in the prevention of pressure ulcer in hospitals*. *European Journal of Clinical Nutrition*, 2013. 67(1): p. 42-46.

PREVENTING PRESSURE ULCERS IN AGED CARE: A RANDOMISED CONTROLLED TRIAL OF THE EFFECTIVENESS OF PROPHYLACTIC SILICONE FOAM DRESSINGS

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Introduction:

Pressure ulcers are a major problem for aged care residents internationally with prevalence rates reported to range from 15% to more than 30%. These largely preventable wounds contribute to significant morbidity and mortality in these vulnerable individuals. The aim of this study was to determine if the use of prophylactic soft silicone foam dressings, which have proven to be clinically and cost effective in the acute care setting 1, can be successfully used in the aged care setting to prevent pressure ulcers.

Methods:

A prospective randomised controlled trial was conducted with 61 aged care residents in two nursing homes in Melbourne Australia. All residents were bed or chair bound and all had a Braden risk score of 12 or less. All residents received standard pressure ulcer prevention strategies and intervention group residents (n=31) additionally had a five layer silicone foam dressing applied to their sacrum and silicone foam dressings applied to each heel. The skin was inspected daily and the dressings changed every three days for a period of 30 days.

Results:

The mean age of the participants of the trial was 80 for controls and 84 for intervention group participants. Residents in the control group had a median of 3 comorbidities whereas intervention group residents had a median of 4 comorbidities. A total of 3 residents in the control group developed 3 pressure ulcers (2 stage 4 and 1 stage 3). No residents in the intervention group developed a pressure ulcer during the one month intervention period (p<0.05).

Discussions:

Aged care residents who are bed bound have a high risk of pressure ulcer development. This is the first trial that has explored the clinical effectiveness of multilayer silicone foam dressings in this cohort. The findings suggest that this class of dressings may be effective in preventing the development of these wounds through redistribution of pressure, minimization of shear force and microclimate management.

Clinical relevance:

It is suggested that the use of prophylactic dressings should be considered for high risk aged care residents.

References:

- Santamaria N, Gertz MF, Sage S et al. 2013 A randomised controlled trial of the effectiveness of soft silicone foam multi-layered dressings in the prevention of sacral and heel pressure ulcers in trauma and critically ill patients: The Border Trial *Int Wound J* doi:10.1111/ijwj.12101.

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PHYSIOLOGICAL RESPONSES TO PRESSURE LOADING AND UNLOADING IN CRITICALLY ILL PATIENTS AS A PREDICTOR OF PRESSURE ULCER DEVELOPMENT

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Introduction:

HAPU rates remain unacceptably high in critically ill patients. Impaired systemic perfusion and oxygenation have been implicated as significant population-specific risk factors; however, few studies have investigated the role of local tissue oxygenation and perfusion. This study examines the relationship between local tissue responses to pressure loading and unloading and subsequent development of pressure ulcers.

Methods:

This is a prospective cohort study. Fifteen critically ill adults without pressure ulcers were enrolled and followed until discharge, death or 10 days. Data were collected daily on risk factors, compliance with prevention and pressure ulcer outcomes. Five subjects developed > Category II pressure ulcers. On Day 1, each subject participated in a test of tissue tolerance to pressure. Laser Doppler Flow (LDF), transcutaneous oxygen pressure (PtO₂), transcutaneous carbon dioxide pressure (PtCO₂) and skin temperature (skint) were measured on the heel at baseline, every 2 minutes during a 10-minute period of pressure loading (i.e. placing the heel on the bed surface) and every 2 minutes during a 20-minute period of unloading (i.e. heel "floated"). There were no significant differences between groups for minimum, maximum or average interface pressure during pressure loading.

Results:

There were no significant differences between groups for age, APACHE II scores, lowest daily blood pressure, pulse oximetry, Braden scores or arterial blood gases (ABGs)/ other relevant lab values. Differences in tissue tolerance measures (LDF, PtO₂, PtCO₂ and skint) at baseline and nadir/zenith during periods of loading and unloading were examined. The investigators hypothesized that LDF and PtO₂ would decrease during loading and recover to baseline levels with unloading and reperfusion. PtCO₂ would increase during loading and "washout" with reperfusion during unloading. These expected patterns were seen for both group (see Figure 1 and 2). Those who later developed pressure ulcers had significantly lower PtO₂ at baseline ($p = .007$) and with the highest point of recovery during unloading ($p = .001$). PtO₂ remained at zero after 20 minutes of unloading in 3 of the 5 subjects with pressure ulcers and did not recover during extended periods of monitoring.

Discussions:

LDF readings during unloading demonstrated some level of reperfusion in all subjects. However, reperfusion did not consistently result in tissue re-oxygenation and carbon dioxide washout. Critically ill patients at higher risk for pressure ulcers may have a pre-existing tissue oxygen debt and fail to re-oxygenate tissue adequately.

Clinical relevance:

Routine clinical testing of tissue tolerance is not practical. This study provides preliminary evidence for further investigation of the role of tissue oxygen debt (despite normal ABGs) in pressure ulcer development.



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PREVENTION OF SACRAL PRESSURE ULCERS IN PEDIATRIC CARDIAC INTENSIVE CARE UNIT

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Introduction:

In pediatric population pressure ulcer (PU) can occur within 2-6 hours upon admission to intensive care unit (ICU). In pediatric cardiac intensive care setting risk factors for PU after cardiac operation are prolonged surgery time, perfusion abnormalities, immobility and delayed positioning after cardiac surgery due to hemodynamic instability. In literature review, the incidence of PU in pediatric acute care can range from 7 to 17%. The aim of study is to evaluate initial experience with implementation of sacral PU prevention strategy in pediatric cardio surgical patients.

Methods:

A prospective study evaluating sacral PU prevention strategy in 242 children after cardiac surgery was performed from June 2014 to March 2015. The strategy included application of five layers foam dressing to sacral area of each patient prior to cardiac surgery, skin integrity evaluation every second day during the stay in ICU, demographic and surgical data, size of the dressing applied and effect of preventive dressing in PU prevalence.

Results:

From June 2014 to March 2015, 242 patients underwent cardiac surgery with median operation time 2,55 hours (range 1,25-9 hours). One hundred and seventy patients (70,3%) were operated with cardiopulmonary bypass and 72 (29,7%) patients without. In 176 patients the protocol was applied, indicating 72% compliance with the strategy. Compliance with the strategy in patients with bypass surgery was 94,4% and in patients with non-bypass surgery was 50%. PU developed in 12 patients. Of them, 10 patients had preventive dressing applied and 2 did not have. In 11 patients PU was stage 1. In one patient, preoperative PU stage 1 worsened to stage 3 during extracorporeal membranous oxygenation support.

Discussion:

Our study, evaluating experience with implementation of sacral PU prevention strategy, showed inadequate compliance with the strategy, especially in non-bypass surgery patients. Despite the low compliance, the prevalence of 4,7% is lower than reported in literature. We may expect that higher compliance with strategy will lead to an even more favourable result.

Clinical relevance:

Strength of evidence: C.

References:

- 1) EPUAP, Recommendations from the New Guideline 2014, Prevention and treatment of pressure ulcer, Clinical practice guidelines, august 2014.
- 2) Schlier A.B., Halfens R.J. et. al: Pediatric Pressure Ulcer Prevalence: A Multicenter, Cross-Sectional, Point Prevalence Study in Switzerland. *Ostomy Wound Manage.* 2012, 58(7):18-31.
- 3) Caroline Schöber-Flores: Pressure Ulcers in the Pediatric Population. *Journal of the Dermatology Nurses' Association*, 2012 Oct;45(4):295-306.

25 FEATURES OF DERMAL LYMPHATIC DYSFUNCTION IN UNIAXIALLY-COMPRESSED TISSUES – IMPLICATION IN PRESSURE ULCER AETIOLOGY

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Introduction:

It is recognised that several mechanisms are involved in the aetiology of pressure ulcers (PUs) including mechanical-induced ischaemia, ischaemia-reperfusion injury, impaired lymphatic and interstitial fluid flows and direct cell damage. Many of these mechanisms have been examined separately, or in combination, using cell-based, animal and human models. However, investigations involving impaired lymphatic flow have been confined to the use of radioisotope clearance techniques in an animal model [1,2]. Near-infrared (NIR) optical imaging associated with the fluorophore, Indocyanine Green (ICG), has been recently employed to monitor lymphatic vessels non-invasively in various organs in humans. The aim of the present work was to examine the feasibility of this approach under uniaxial loading of soft tissues.

Methods:

Institution ethics was granted for the study. Exclusion criteria included any prior history of conditions known to affect the skin, lymphatics, kidney or the immune system. A micro-dose of ICG (50ml, 0.05% w/v) was injected intradermally to both forearms. An NIR system (Fluobeam 800, Flooptics, France) imaged its lymphatic clearance. Loading was applied to the volar aspect of one forearm using a curved-edged indenter at an equivalent pressure of 60 mmHg (8 kPa) for 45 minutes. The contralateral forearm acted as the unloaded control. Upon removal of the load (T45), still images were captured from both sites at 5 minute intervals for 45 minutes (T90). The images, acquired for 20 msec, were amplified using Image J to delineate the lymphatic vessels. Signal pattern types were described at T45 and T90.

Results:

Nine participants were tested. Loading was associated with a decreased incidence of directional drainage (DD) of ICG within delineated vessels, at both T45 (Fig 1b) and T90. Loading was also associated with non-directional dispersal (NDD) of ICG within the interstitium. Signal intensity within NDD was often greatest at stress concentration areas, producing a 'halo pattern', corresponding to the indenter edges.



Figure 1: Typical images at T45 displaying the signal patterns (a) directional drainage (DD) in the control arm, and (b) non-directional drainage (NDD) in the loaded arm.

Discussion:

This methodology has proved successful in visualising lymphatic vessels in skin subjected to uniaxial pressures of 60 mmHg, equivalent to those encountered in clinical situations of prolonged sitting.

Clinical relevance:

Lymphatic clearance was demonstrated to be impaired during prolonged mechanical loading of soft tissues, thereby revealing its potential role in PU development. Future work with this methodology will inform the effectiveness of periodic pressure relief regimens.

References:

[1] Miller and Seale (1981) *Lymphology* 14, 161-66; [2] Miller and Seale (1987) *J. Biomech. Eng.* 109,48-54.

26 EVALUATING CONTROL OF SKIN MICROCLIMATE WITH AEROSPACER 3D SPACER MATTRESS CONFIGURATIONS

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Introduction:

Relatively few studies have examined the effects of microclimate at the loaded support interface 1-3. However, recent industrial interest has been generated with the advent of novel materials within support surfaces. One such example involves spacer fabrics 4, produced by advanced knitting techniques, which are durable, washable, breathable lightweight odourless materials, which are made from 100% recyclable material. This study utilises a lab-based system 5 to examine the performance of support surfaces incorporating spacer fabrics, as monitored using an array of environmental sensors.

Methods:

The human analogue involves a tank filled with 20 L water maintained at 37°C (Fig.1). At its base, water flowed via a peristaltic pump through a network of plastic tubing. Small holes in the tubing enabled water release, equivalent to a sweat rate of 1.5 mL/min for 25 minutes. Humidity and temperature sensors, stitched onto a cotton sheet placed on the test surface, monitored microclimate conditions for 8 hours. Tests utilised combinations of support surfaces incorporating spacer fabrics, with and without active airflow.

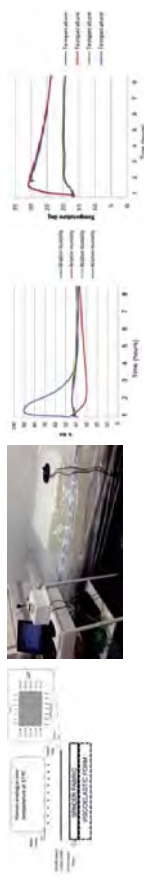


Figure 1. Schematic and image of test system used to monitor microclimate.

Figure 2. (a) Relative humidity and (b) temperature changes over test period for the spacer fabric with active airflow.

Results:

Relative humidity (RH) increased at the loaded interface reaching values in excess of 90% within 10 minutes for all test conditions. These values remained for the viscoelastic foam and spacer fabrics with no airflow. However, in the presence of active airflow, RH slowly reduced to basal levels over the test (Fig. 2A), corresponding to a mean moisture vapour transfer capability of 15.6 g/m²/hr. For all combinations, interface temperature increased to mean peak of 34°C. Little subsequent change occurred with the viscoelastic foam. By contrast, the spacer fabric permitted heat dissipation resulting in a mean reduction of 8°C. Control sensors recorded constant ambient temperatures (Fig 1B). This resulted in a heat flux of 1.12-1.50 W/m² for spacer fabric with air flow.

A B

Discussions:

Findings revealed that with active airflow, the spacer fabric can reduce RH through moisture vapour transfer. Further testing will evaluate the optimal combinations of spacer fabric material and active airflow systems.

Clinical relevance:

Spacer fabrics provide the potential to control the microclimate of immobile individuals with vulnerable skin.

References:

[1] Nicholson et al. (1999) *Med.Eng. & Phys.* 21, 701-12 [2] Reger et al. (2001) *Arch. Phys. Med. Rehab.* 82, 597-603 [3] Figliola (2003) *Ostomy and Wound Management* 49, 32-42 [4] Mao and Russell. (2007) *Textile Res. J.* 77: 914-922 [5] Chai 2011 PhD Thesis Queen Mary, London.

A COMPUTATIONAL MODEL OF THE COMPETITION BETWEEN CELL DAMAGE AND CELL REPAIR, IN THE PRESENCE OF OXIDATIVE STRESS AND MECHANICAL DEFORMATION

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Introduction:

Oxidative stress may arise during pressure ulcer formation due to ischemia-reperfusion [1], calcium disruption, or release of necrotic debris (such as myoglobin [2]) into the extracellular environment [3]. Our aim is to simulate the combined effects of oxidative stress and mechanical deformation, in a system where damage and repair are in dynamic competition.

Methods:

We used computational modelling to perform a qualitative simulation of the dynamics of cell stress, cell repair, and cell death among muscle cells. Selected model-based predictions were tested experimentally in a culture of C2C12 muscle cells subject to prolonged mechanical deformation (12% strain).

Results:

In both simulations and experiments, mechanical deformation induced release of intracellular contents and oxidative stress. When we simulated the ability of oxidative stress to slow the speed of cellular repair, the result was a significant increase in vulnerability to mechanical deformation and greatly increased regions of cell death. We conclude that the combined effects of oxidative stress and mechanical injury are greater than the sum of their parts. We discuss the resemblance of the theoretical results to *in vitro* tests with mechanical deformation.

Discussions:

The ongoing race between damage and repair allows small differences in cellular capacity to be amplified over space and time. However, the computational model predicts only qualitative trends, not absolute magnitudes, because the exact kinetics of damage and repair depend on each patient and each wound.

Clinical relevance:

Our model predicts that the spatial propagation of cell death could be mitigated by rapid clearance of oxidative stress. Therefore, antioxidant regimens may have protective benefits for preventing a nascent injury from growing larger.

References:

- [1] Zweier et al., *Cardiovasc Res*, 70(2):181, 2006. PMID: 16580655
- [2] Reeder et al., *Curr Med Chem*, 12(23):2741, 2005. PMID: 16305469
- [3] Makhssous et al., *PM&R*, 2(11):1063, 2010. PMID: 21093844
- [4] Gefen et al., *J Biomech*, 41(4):845, 2008. PMID: 18068175
- [5] Howard et al., *Nat Commun*, 2:597, 2011. PMID: 22186893

ULTRASOUND MODULATES PROINFLAMMATORY CYTOKINE RELEASE IN SOFT TISSUE.

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Introduction:

Ultrasound therapy has been shown to promote cytokine release *in vitro*1 and has been suggested to improve the healing rates of pressure ulcers2. Unfortunately much of the evidence is conflicting, and it is difficult to draw firm conclusions on effectiveness3. Traditionally US is thought to promote the release of proinflammatory cytokines and speed up the inflammatory phase of tissue repair5. Thus the aim of this study was to investigate the effect of US on proinflammatory cytokine release *in vivo*.

Methods:

Fifteen healthy volunteers were recruited following ethics approval. Microdialysis fibres were implanted at a depth of 1mm at two separate sites on the volar aspect of the non-dominant forearm. The fibres were perfused with PBS (3µl/min) and each site randomly allocated to receive either non thermal low intensity US at a pulse ratio of 1:4 and an intensity of 0.5 W/cm2 and sham ultrasound (SUS) for 10 minutes. Dialysate was collected for 30 minutes prior to intervention and every 30 minutes following intervention and pro-inflammatory cytokines (IL-1β, IL-6, IL-8, TNFα) quantified via immunoassay.

Results:

The mean (± SEM) baseline concentrations of IL-1β, IL-6, IL-8 and TNFα were 0.9 (0.2), 3.5 (0.8), 14.3 (4.1) and 0.3 (0.08) pg/ml. There was no significant difference in baseline values between the two sites. A significant (p<0.05) increase in all cytokines from baseline was observed following the application of sham US, with the mean (± SEM) concentrations of IL-1β, IL-6, IL-8 and TNFα rising to 2.8 (0.5), 11.4 (1.6), 31.6 (3.6) and 0.8 (0.2) pg/ml. In contrast the increase seen in all cytokines, except TNFα, following HFUS was significantly (p<0.01) reduced, the mean (± SEM) IL-1β, IL-6, IL-8 and TNFα concentrations being 0.8 (0.1), 5.6 (0.7), 20.1 (2.3), and 0.4 (0.05) pg/ml (Figure 1).

Discussions:

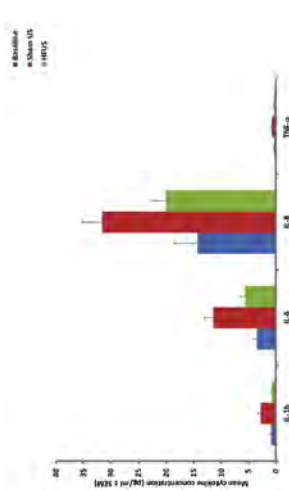
This study demonstrates that US is able to modulate cytokine release in the superficial soft tissue and significantly reduces the release of proinflammatory cytokines compared to sham US.

Clinical relevance:

This suggests that current thinking concerning the mechanism of action of therapeutic US may need to be re-evaluated, and further studies are needed to explore the mechanisms involved and the potential benefits to the management of pressure ulcers.

References:

1. Maeshige N. et al (2010) *Journal of Wound Care*, 19(2), p63-68.
2. Reher, P. et al (1999) *Cytokine*, 11(6), p 416-423.
3. Akbari Sari A. et al (2006) *Cochrane Database of Systematic Reviews, Issue 3*. Art. No.: CD001275. DOI: 10.1002/14651858.CD001275.pub2.
4. NPUAP, EPUAP, PPPA (2014) *Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline*.
5. Watson T (2011) *Tissue Repair* <http://www.electrotherapy.org/modalities/tissurerepair.htm>.



THE COST OF PRESSURE ULCER PREVENTION AND TREATMENT IN HOSPITALS AND NURSING HOMES IN FLANDERS: A COST-OF-ILLNESS STUDY

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Introduction:

The economic impact of pressure ulcer prevention and treatment is high. The results of cost-of-illness studies can assist the planning, allocation, and priority setting of healthcare expenditures to improve the implementation of preventive measures. Data on the cost of current practice of pressure ulcer prevention or treatment in Flanders, a region of Belgium, is lacking.

Methods:

A cost-of-illness study was performed using a bottom-up approach. Data were collected in a series of prospective multicentre cross-sectional studies between 2008 and 2013. Data collection included data on risk assessment, pressure ulcer prevalence, preventive measures, unit cost of materials for prevention and treatment, nursing time measurements for activities related to pressure ulcer prevention and treatment, and nursing wages. The cost of pressure ulcer prevention and treatment in hospitals and nursing homes was calculated as annual cost for Flanders, per patient, and per patient per day.

Results:

The mean (SD) cost for pressure ulcer prevention was €7,88 (8,21) per hospitalised patient at risk per day and €2,15 (3,10) per nursing home resident at risk per day. The mean (SD) cost of pressure ulcer prevention for patients and residents identified as not at risk for pressure ulcer development was €1,44 (4,26) per day in hospitals and €0,50 (1,61) per day in nursing homes. The main cost driver was the cost of labour, responsible for 79-85% of the cost of prevention. The mean (SD) cost of local treatment per patient per day varied between €2,34 (1,14) and €77,36 (35,95) in hospitals, and between €2,42 (1,15) and €16,18 (4,93) in nursing homes.

Discussions:

Related to methodological differences between studies, the cost of pressure ulcer prevention and treatment in hospitals and nursing homes in Flanders was found to be low compared to other international studies. Recommendations specific to pressure ulcer prevention are needed as part of methodological guidelines to conduct cost-of-illness studies.

Clinical relevance:

Reliable risk assessment policy and continuous monitoring and adoption of preventive measures may decrease healthcare expenditures by lowering the costs of prevention for patients not at risk and lowering the cost of treatment.

Reference:

Demarré L, Verhaeghe S, Annemans L, Van Hecke A, Grypdonck M, & Beekman D. (2015). *The cost of prevention and treatment of pressure ulcers in hospitals and nursing homes in Flanders*. *International Journal of Nursing Studies*. doi.org/10.1016/j.ijnurstu.2015.03.005

PRIORITIES FOR PRESSURE ULCER PREVENTION: MIXED METHODS ANALYSIS OF PATIENT SAFETY INCIDENTS REPORTS FROM PRIMARY CARE IN ENGLAND AND WALES (2003-2013)

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Introduction:

Pressure ulcers (PUs) are a key indicator of care quality (1, 2). Patient safety incident reports contain free text descriptions of the incidents that contain information which can be used to model the sequence of events leading up to harmful outcomes, as well as the related contributory and contextual factors (3, 4).

Methods:

Retrospective, cross-sectional mixed methods study of a random sample of 2000 PU-related safety incident reports received by the National Reporting and Learning System between 2003 and 2013. The analytical process included detailed data coding using multi-axial frameworks to describe the event and reported contributory factors. Frequency distributions and cross-tabulations supported the identification of relationships between incident types, contributory factors and outcomes. Thematic analysis of reports provided insight about contextual issues. Clinicians and patient safety experts reviewed analyses to identify key areas for improvement.

Results:

One in 20 primary care patient safety incident reports written in England and Wales describe PUs. A large number of patients were transferred from secondary to primary care settings with pressure ulcers. Contributory factors identified within the majority of reports included:

1. Communication barriers between secondary and primary care professionals;
2. Inappropriate equipment and support to prevent and treat pressure ulcers in the community; and,
3. Unsafe practices by healthcare professionals in the community.

Discussions:

Candidate areas for improving PU prevention practices in primary care included interventions to improve communication between secondary and primary care and methods to encourage regular skin inspection for patients with any wound. Development and testing of concepts and related ideas for practice improvement include: risk-stratification to screen high-risk patients discharged to community; infrastructure to support reliable multidisciplinary communication between secondary and primary care services; equipment provision and design; and support and advice for carers on PU prevention.

Clinical relevance:

A grounded change model has been generated to inform quality improvement initiatives to reduce PU related harm in primary care.

References:

1. IHI. *How to guide: Prevent pressure ulcers*. Cambridge, MA: Institute for Healthcare Improvement (Available at www.ihl.org), 2011.
2. Power M, Fogarty M, Madsen J, Fenton K, Stewart K, Brotherton A, et al. *Learning from the design and development of the NHS Safety Thermometer*. *International Journal for Quality in Health Care*. 2014;26(3):287-97.
3. Rees P, Carson-Stevens A, Williams H, Panesar S, Edwards A. *Quality improvement informed by a reporting and learning system*. *Archives of Disease in Childhood*. 2014;99(7):702-3.
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CONTINUOUS QUALITY IMPROVEMENT PROJECT TO REDUCE PRESSURE ULCER PREVALENCE IN A REGIONAL BELGIAN HOSPITAL

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¹ Olivvan Lourdesziekenhuis Waregem

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DEVELOPMENT OF OUTCOME MEASURES AND PERFORMANCE INDICATORS FOR PUPIS - A SPECIALIST PRESSURE ULCER SERVICE IN THE COMMUNITY

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² Rehabilitation Engineering Unit; Abmu Health Board

Introduction:

Pressure ulcer (PU) prevention is an important nursing quality indicator for hospitals. The aim of this project is to reduce PU prevalence and to increase adequate prevention strategies.

Methods:

In a regional Belgian hospital, a PU prevention project was implemented according to the PDCA-cycle. A baseline PU prevalence measurement was executed in March 2012 on 9 nursing wards. An evidence-based PU risk assessment and prevention protocol was developed by the multidisciplinary PU commission. All of the involved nurses and physiotherapists followed an education and training session. A PU link nurse was appointed to every ward. PU prevalence is measured 4x/year (NPUAP & EPUAP, 2009). Since 2013, compliance with the PU prevention protocol is evaluated 4x/year, bedside and unannounced. Additionally, 1x/year, every ward is audited externally, unannounced. Feedback is provided to the wards to improve quality of care.

Results:

In total, 1926 patients were screened. The results of the baseline PU prevalence measurement in March 2012 were 18.4% for Category I-IV and 12.1% for Category II-IV. In December 2014, measurement showed a PU prevalence of 6.9% for Category I-IV and 2.9% for Category II-IV.

Compliance with the risk assessment protocol shows an increase from 58% to 81%. Compliance with the lying protocol shows fluctuations between 50% and 80%. Compliance with the sitting protocol displays fluctuations between 60% and 90%.

During the project, several problems and points of improvement were detected. The internal logistic system was changed to guarantee 24/24h availability of alternating mattresses. High figures of heel PUs lead to the purchase and implementation of visco-elastic wedge-shaped heel cushions. The hospital also invested in additional visco-elastic seat cushions.

Discussions:

The implementation of this project is successful, the PU figures show a continuous decrease. Compliance with adequate prevention can further improve. In literature also, figures of full adequate prevention are rather low (Vanderwee et al., 2007). Influencing attitudes of nurses towards PUs may be further explored, as research revealed that attitudes were significantly correlated with the application of fully adequate prevention (Beeckman et al., 2011).

This project increased the awareness for prevention of PU. However, it is a continuous and ongoing project. Point in development is an automatic notification system of hospital-acquired PU.

Clinical relevance:

This project shows that in clinical practice, improvement is possible by using important tools such as regular measurements of PU prevalence, compliance with an evidence-based prevention protocol and providing feedback to the wards and hospital board.

Introduction:

Collection of reliable and informative outcome measures in relation to pressure ulcers in the community presents many challenges (1). The Pressure Ulcer Prevention and Intervention Service (PUPIS), in Swansea, provides a multi-disciplinary approach to harder-to-heal pressure ulcers in the community. Service performance measures have been explored and a database designed to collate information from routine clinical assessment.

Methods:

Key performance indicators were established to provide monthly summaries of service activity and efficiency (2). Outcome measures were devised to provide knowledge of service efficacy. Primary measures were wound details, but also collated were: sitting times; quality of life (3); dressings and care involvement.

Results:

Six months of data were collated, relating to 120 referrals. Caseload data has promoted performance-related discussions and actions. The service is meeting targets such as initial assessment within 2-3 weeks.

Early outcome measure data suggest we are predominantly seeing category 3 or 4 pressure ulcers. Common wound sites are ischial tuberosity (40%), sacrum/coccyx (20%), and heel (20%). One third of our patients are confined to bed when we see them at initial assessment. Immobility was the foremost reported confounding factor for skin breakdown. Further data will be presented in relation to the outcomes following PUPIS intervention. Discussions: The data is offering significant advantage to service management and subsequent clinical outcomes. Greater use of recognized assessment tools and cross-centre comparisons will increase external validity.

Some measures may be insufficiently sensitive to show an effect of intervention, in light of the array of factors that influence wound status (4). PUPIS involvement rarely remains for the entire life of a wound, and healing is rarely the only goal of intervention. Patient-centred outcomes such as function, posture, mobility and independence, must continue to be captured. Quality of life measures may be focused using a patient goal setting process.

Clinical relevance:

There are significant benefits in knowing more about the people and pressure ulcers we see, and in better defining the benefits we have with them. Most evident is knowledge of where to focus training/resources, and proving the efficacy of our service. We can also learn of the effectiveness in different forms of intervention. The routine collection of outcome measures is a key requirement in exhibiting evidence-based practice.

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MEASURING PRACTICE CHANGE THROUGH CLINICAL EXPERTS

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Introduction:

In 2014 Graves & Zheng estimated that costs to the Australian healthcare budget from pressure injuries were US\$1.65 billion per annum. Since the introduction of Australian Commission on Safety and Quality Health Care (ACSQHC) Standard 8 in 2012 health services have been forced to provide measurable evidence in the prevention and management of pressure injuries. In 2012 Australia's first Tissue Viability Unit (TVU) was established within the Canberra Hospital (CH). The TVU acquires high quality data on wound types. Early incidence reporting by the TVU allows for timely and accurate assessment and management of pressure injuries, providing a better understanding of why they develop, how resources might be more efficiently allocated, and how patient impact might be reduced. The conceptual framework that underpins the growth and development of the Tissue Viability nurses, together with the measurable impact that these nurses have had in managing pressure injuries, will be presented.

Methods:

Collate a minimum data set on the incidence of wound types especially pressure injury (currently 36% of the monthly wound reviews). Expert review and identification of location, stage classification, and whether facility-acquired provides a capability to provide detailed reporting to executive directors that meets governance and reporting requirements for both CH and ACSQHC.

Results:

The annual prevalence of pressure injuries shows a marked reduction of facility-acquired pressure injuries since the establishment of the TVU from 14.6% in 2012 to 3.7% in 2015 despite annual prevalence studies showing that 67% of patients have been assessed as being at risk of pressure injury development.

Discussions:

ACT Health now has a comprehensive data set on the incidence of pressure injuries and is able to combine this with annual prevalence data. This combination of data allows for reporting at the executive levels of health and meets ACSQHC Standards. Developing expertise in clinical practice associated with pressure injury has enabled the collection of accurate data, the associated analysis that has influenced evidence based quality outcomes, and the implementation of research projects focussed on preventative strategies.

Clinical relevance:

Pressure injury data is essential in influencing evidence base practice clinical practice guidelines, and the utilisation of resources in a challenging health service environment. The TVU has adopted a systematic approach to the development of clinical expertise in pressure injury management, and the subsequent utilisation of these skills throughout the workforce for the benefit of all.

References:

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IMPLEMENTATION OF EVIDENCE BASED PRESSURE ULCER PREVENTION IN HOSPITAL UNITS – IMPORTANT FACTORS FOR SUCCESS

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Introduction:

There is up to now a lack of knowledge on how to best implement evidence based care [1]. A multi-faceted unit-tailored intervention consisted of 1) introduction, 2) one-day training and 3) quality measurement every month was performed at five hospital units in Sweden. Prevention activities were significantly improved, but a lack of prevention was shown for 48% of risk patients [2]. It is of importance to learn more about why or why not different implementing strategies work. Therefore the aim of this study was to describe registered nurses', assistant nurses' and first-line managers' experiences and perceptions of the multi-faceted intervention.

Methods:

Focus groups interviews with nurses (n=5) and individual interviews (n=5) with first line managers was performed. The interviews were analyzed using qualitative content analysis.

Results:

The findings revealed in one theme, 'Changed understanding enabled changed actions – through one's own performance and reflection of pressure ulcer prevention'. Important factors for changed practice were described having a common outlook among the nurses on how to prevent, easy access to pressure-reducing equipment, and support by an external facilitator.

Discussions and Clinical relevance:

These results can be interpreted as aspects of the so called 'black box' in that the nurses perceived insights in how their own prevention affected the patient status. Effects of feedback on changed practice are small to moderate [3]. Possibilities for the staff to communicate of the care provided beside and in feedback situations could be one way of increasing these effects. To facilitate the implementation process toward evidence based care is important, both to increase knowledge and to create awareness of change needed.

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INTRODUCING A CARE BUNDLE TO PREVENT PRESSURE INJURY: THE INTACT TRIAL

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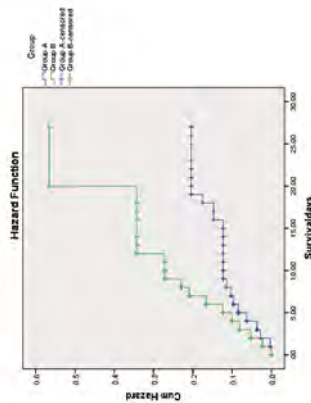
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Introduction:

International guidelines recommend several strategies for pressure injury prevention (PIP) however implementation is often suboptimal. With end-user input, the guidelines were used to develop a patient-centred PIP care bundle (PIPcB). Its effectiveness for preventing pressure injury (PI) in at-risk hospitalised patients was tested.

Methods:

The INTACT trial was a 2-year multi-site, parallel group, pragmatic cluster-randomised trial assessing the effect of a PIPcB on PI development in at-risk patients (i.e. with reduced mobility). Eight Australian hospitals were randomised to receive intervention or control. The intervention was aimed at the cluster (hospital) and individual (patient). It was based on patient participation and contained three PIP messages: 1) keep moving; 2) eat a healthy diet; and 3) look after your skin. Nurses received education about the intervention and engaging patients in PIP. The primary outcome was PI incidence.



Results:

1,585 patients (800 control, 785 intervention) were enrolled in the trial and 63 withdrew (3.9%). All analyses were based on intention-to-treat. PI occurred in 10.6% of control and 6.4% of intervention patients, with relative risk of 0.61 (95%CI:0.43-0.84). The absolute risk reduction was 4.2%. Time to PI analyses yielded an incidence rate ratio of 0.47 (95%CI:0.33-0.65). The Kaplan Meier curve shows time to PI event were faster in control group than treatment group with a hazard ratio (HR) of 0.50 (95%CI: 0.35-0.71) (see Figure). HR estimates remain steady when adjusted for confounders (age, gender, BMI, baseline PI, admission cause and independence of residence). Number needed to treat was 23 (95%CI: 14 to 69), indicating that one PI is avoided if 23 high risk hospitalised patients are treated with the PIPcB. Two thirds of all new PI were Stage 1 but there were significantly more in the control group. Although this trial was a cluster randomised trial, ICC was fairly low (0.02).

Discussions:

The 50% reduction in hazard of PI incidence among patients who received the PIPcB compared to those who received standard care indicates the clinical efficacy of the treatment. Educating 25 high-risk hospitalised patients would avoid one new PI, indicating the intervention is effective and may have huge healthcare savings. Hence, the PIPcB warrants serious attention by supporters for global action on PIP should our findings be replicated.

Clinical relevance:

This PIPcB, focusing on patient participation and simple PIP messages has the potential to improve patient engagement in PIP care and decrease PI incidence in hospitalised patients with limited mobility.

THE IMPLEMENTATION OF EFFECTIVE QUALITY MANAGEMENT FOR PRESSURE ULCER PREVENTION AT GERMANY'S LARGEST UNIVERSITY HOSPITAL

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Introduction:

Pressure Ulcer (PU) frequencies are accepted quality indicators for nursing and patient safety. In German hospitals over 72,000 patients developed a PU category 2+ and over 2,400 patients a PU category 4 in 2012 [1]. PU are painful, costly, and are often avoidable through application of evidence-based prophylactic measures, described in many guidelines worldwide [e.g. 2, 3]. For successful guideline implementation many interventions are known [2, 4]. To reduce PU incidence the Charité – Universitätsmedizin Berlin continuously applies and improves many interventions since 2007.

Methods:

The nosocomial PU incidence is reported quarterly. Since 2009 ward performance in PU prevention and documentation is evaluated based upon 13 criteria in accordance with our institutional guideline for PU prevention. Reports include a summary score of achievement in percent per ward. Since 2010, every nosocomial PU category 4 triggers a structured multidisciplinary case conference with involved nursing and medical staff, experts for anaesthesia and wound management, ward managers and staff from the clinical quality and risk management. Health professionals receive regular training in PU prevention and classification on ward and institutional level.

Results:

Between 40 and 60 wards with more than 1000 patients were audited annually. For general wards the summary score of achievement increased from 58% in 2009 to 88% in 2014. Likewise, the score improved in ICUs from 82% to 94%. PU incidence decreased from 0.93% in 2009 to 0.80% in 2014. The rate of nosocomial PUs category 4 decreased from 8 patients in 2010 up to 1 patient in 2014. Since 2013 all nosocomial PUs category IV were classified as non-avoidable, also from an independent external expert group. During a large training program in 2012 about 1,500 nurses were trained.

Discussions:

Evidence-based guidelines to prevent PUs are the foundation for the implementation of measures to improve patient care. Continuous monitoring and feedback improves awareness. Regularly performed evaluation on ward level and feedback increases achievement of objective and reduces variance between the wards. With the combination of implementation interventions a decrease in PU incidence could be achieved.

Clinical relevance:

PU risk management takes place on all wards in direct patient contact on a daily routine base. Through the use of a digital risk assessment tool a selective preventive approach is possible for over 140,000 patients annually. To sustain the implementation effects regular trainings, evaluation of ward performance as well as case conferences are necessary and helpful.

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SOFT TISSUE LOADS IN THE PENIS DURING USE OF PENILE INCONTINENCE CLAMPS

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Introduction:

Male urinary incontinence is a common repercussion following prostate cancer treatment [1]. Penile clamps are used to mechanically occlude the urethra and minimize urine leakage for short durations; however, these devices may cause soft tissue damage if the sustained deformations exceed tissue tolerance levels. Here, we used a three-dimensional (3D) finite element (FE) computational model of the penis to investigate the strains and stresses developing in the soft tissues during use of various penile incontinence clamps.

Methods:

Using the ScanIP[®] module of Simpleware[®] [2], we segmented and meshed the geometrical model based on an anatomical illustration of the penis, which included the skin, fat, tunica albuginea (TA), corpus cavernosum and corpus spongiosum (CS). 3D orthotropic material properties were assigned to the skin and TA, while all other tissues were considered linear elastic [3]. In the Preview module of FEBio [4], a uniform circumferential pressure was applied in a 1cm-width band, to simulate a soft cuff-type incontinence clamp. We examined effective and maximal shear strain and stress distributions in the soft tissues of the penis during 50% occlusion of the urethra.

Results:

Effective strain and stress distributions in an axial cut through the penis are shown in the bottom panels of Figure 1. Effective stresses in skin, fat and TA reached 11.7, 67 and 120 kPa, respectively, and the corresponding effective strains reached 14.1%, 17.4% and 16.6%. As predicted, maximal deformations were found in the CS around the urethra.

Discussion:

In addition to the pain and discomfort associated with the use of incontinence clamps, soft tissue damage is a devastating complication of dealing with male urinary incontinence. Soft tissues can generally withstand high deformations for short periods, before irreversible tissue damage initiates. However, if these loads are prolonged, as is the case of normal penile clamp wear, then soft tissue deformations must be lowered in order to minimize risk of penile tissue damage.

Clinical relevance:

Future work will include modeling different designs of penile clamps and interface materials in order to evaluate the safety and efficacy of available devices. Our goal is to identify design characteristics which will provide the safest mechanical conditions in the soft tissues of the penis and thus minimize the risk of tissue damage while effectively managing male incontinence.

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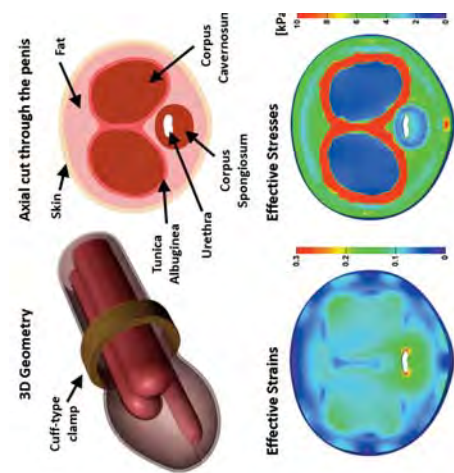


Figure 1

USE OF POLY (LACTIC ACID) BIODEGRADABLE MICROPARTICLES FOR TISSUE RECONSTRUCTION OF CHRONIC WOUNDS

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Introduction:

Our project is to develop an innovative therapeutic option for pressure ulcer wounds based on the use of polylactic acid (PLA) biodegradable microparticles (MPs) delivering healing mediators.

The goal is to (i) stimulate the repithelialization to accelerate healing and reduce the risk of infection, (ii) limit skin fibrosis and promote reconstruction of a functional dermis.

To achieve this goal, our PLA-MPs carry an antioxidant (vitamin E), or a fibroblast growth factor (FGF-2). Vit. E protects against the reactive oxygen species (ROS) involved in inflammation process. FGF-2 stimulates the growth of fibroblasts. Drug loaded MPs are topically delivered on a murine model of excisional wound developed for qualitative analysis of the dermal reconstruction. The functionality of the novel dermis is evaluated by exploring the microcirculation.

Methods:

Strategies for drug vectorization: 1) Vit. E was encapsulated into PLA-MPs by nanoprecipitation process, and its efficiency was evaluated by an indirect method based on HPLC. Biological activity was quantified in vitro by measurement of intracellular ROS in fibroblast cell lines. 2) FGF2 loading onto PLA-MPs surface was performed by passive adsorption and evaluated by colorimetric assay. MPs-FGF2 biological activity was determined in vitro by measurement of the fibroblast proliferation and in vivo using a murine model of wound. Cutaneous vasodilation was quantified by Laser Doppler Flowmetry in physiological and pharmacological studies.

Results:

After characterization by dynamic light scattering (DLS) analysis, PLA-MPs-Vit E obtained have a diameter of 220 nm and are monodisperse. Vit E encapsulation rate has been estimated to be 90%. Encapsulated Vit. E has induced a decrease in the production of intracellular ROS of 20%, superior or equal to the decrease obtained with free Vit. E.

PLA-MPs carrying FGF-2 have a size of 200 nm and are monodisperse by DLS measurements. The FGF2 adsorption efficiency is 80%. Free or adsorbed FGF-2 results have shown to accelerate in vivo the wound closure compared to untreated wounds. MPs-FGF2, free FGF-2 or naked MPs treatments have induced in vivo a microvascular function restoration. MPs-FGF2 treatment is the only one to allow a complete restoration of endothelial function of blood vessels.

Discussions:

Those preliminary studies have allowed the characterization of the biological activities of drugs carried by PLA particles. Their activities are not impaired by the formulation process, on the contrary PLA-MPs delivery may increase their effect in vitro and in vivo.

Clinical relevance:

Contribution of biodegradable MPs-PLA to increase the effectiveness of therapeutic drugs involved in the treatment of chronic wound, either after encapsulation or adsorption.

TISSUE LOADS APPLIED BY A NOVEL MEDICAL DEVICE FOR CLOSING LARGE PRESSURE ULCERS

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Introduction:

Closure of large pressure ulcers or other wounds caused by ablative surgery or trauma constitutes a substantial but frequent reconstructive challenge. Closing the wounds with surgical sutures is a common solution yet involving high-tension closure. Alternative methods of closure such as skin grafting are often associated with complex surgical procedures, significant morbidity and extended hospitalization and recovery periods [1]. Here we modelled a tension relief system (TRS) device based on plates adhered to the skin near the wound margins which distributes the force necessary to stretch the skin over a relatively wide area.

Methods:

In order to evaluate the efficacy of the TRS and compare it to sutures we employed finite element modeling (FEM) and simulated three cases of (real) large wounds which were treated with TRS, each located in a different organ and with different dimensions: back, leg and scalp (Fig. 1). The wound was simulated as a three-dimensional model: multi-layered skin overlying muscle or bone [2]. For both the TRS and suture-based closure approaches, a "tied" constraint was assumed as the contact between plates/sutures and skin. Both plates and sutures were horizontally displaced toward wound closure.

Results:

Wounds closure both by TRS and sutures induced localized effective stresses in the skin reaching maximum values near the plates and the sutures (Fig. 2a, b). Peak effective stresses in the skin were substantially greater in all simulations of sutured wounds (Fig 2c). Peak shear stresses in the skin were also significantly higher in sutured wounds compared to TRS closed wounds: 105-255MPa vs16-39.5MPa, respectively.

Discussions:

We introduced a new FEM methodology for simulating closure of large wounds. We observed that the loads developed in the skin are considerably greater in the suture-based cases compared to the TRS. Elevated closure stresses can cause skin rupture or ischemia [3]. Due to the reduced tension, the TRS was found very effective in closure of large wounds, especially pressure ulcers.

Clinical relevance:

To make these simulations more realistic and clinically relevant, we modeled the TopClosure® (IVT Medical Ltd., Raanana, Israel), which is an external TRS intended to reduce tissue loads from the skin during wound closure procedures.

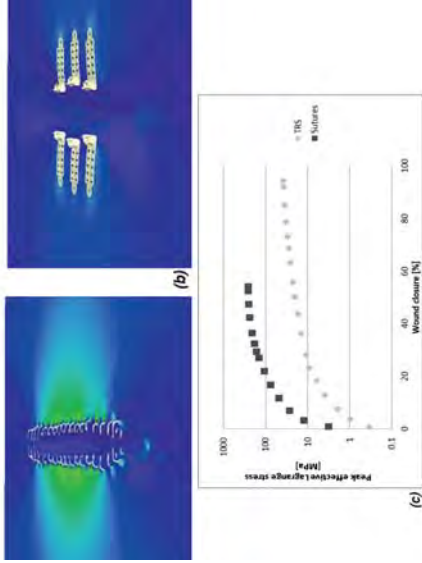
References:

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Figure 1: Modelled wounds: (a);back, (b);leg and (c);scalp wound



Figure 2: Effective stresses on the skin during wound closure procedure: caused by (a) sutures, (b) TRS and (c) a comparison between TRS and sutures.



SOFT TISSUE LOADS AROUND THE SACRUM IN A THREE-DIMENSIONAL BUTTOCKS MODEL WHEN CONFINED TO A RIGID SPINAL BOARD

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Introduction:

Spinal boards are used to immobilize the spine when a spinal injury is suspected; however, prolonged immobilization of the spine may lead to development of pressure ulcers (PUs) and deep tissue injury (DTI), especially around the sacrum [1]. Here, we investigated the strains and stresses developing in the soft tissues around the sacrum during supine lying on a rigid spinal board, using a three-dimensional (3D) finite element (FE) computational model, which extends the two-dimensional FE modeling of Oomens [1].

Methods:

We used an MRI dataset of the suspended buttocks to develop an anatomically realistic 3D model of the buttocks in supine position. Using ScanIP® module of Simpleware® [3] we segmented and meshed the pelvic bone, femurs, muscles, fat and skin, and added a flat rigid support. Using FEBio [3], we applied a vertical displacement load on the pelvic bone, which was measured from weight-bearing and suspended MRI datasets. The hyperelastic material parameters of the soft tissues were iteratively adjusted to match the contours of the weight-bearing MRI dataset. We examined effective, compressive and maximal shear strain and stress distributions in muscle, fat and skin tissues around the sacrum.

Results:

Peak effective and shear strains were obtained in fat tissues, where the greatest extent of deformations occurred. Peak effective and shear stresses were obtained in the skin, in and around the contact area with the rigid support. Compression stresses peaked in muscle and fat tissues immediately below the sacrum, where PUs associated with use of a spinal board indeed tend to appear.

Discussions:

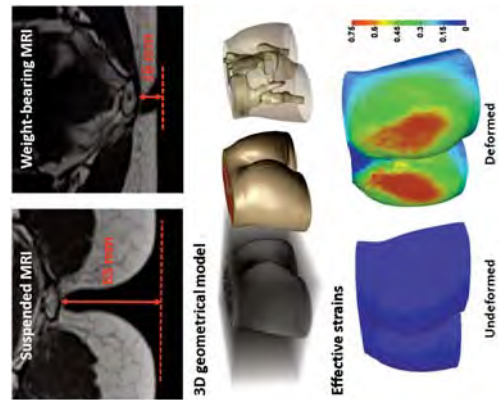
Sacral PUs are associated with sustained increased deformations of the soft tissues of the buttocks due to prolonged recumbency. Our results illustrate the biomechanical conditions in the soft tissues which may form when a patient is confined to a rigid spinal board. Unlike hospital beds and home mattresses, the rigid spinal board provides no immersion/envelopment which results in extremely high deformations, strains and stresses in tissues near the sacrum.

Clinical relevance:

Considering that soft tissues can withstand greater deformations for relatively short periods before irreversible tissue damage initiates, even short immobilization on a spinal board can lead to onset of PUs and DTIs. Therefore, guidelines for spinal immobilization should further highlight the importance of keeping the time spent on a spinal board to an absolute minimum.

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RISK FACTORS FOR PRESSURE ULCER IN PORTUGUESE SURGICAL PATIENTS

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Introduction:

Pressure Ulcers (PU) are internationally defined as a localised lesion on skin and/or underlying tissue, generally over a bony prominence, resulting of pressure or a combination of this with torsional forces. These wounds are recognised as a public health problem as well as a indicator of nursing care quality. They are one of the most prevalent complications experienced by hospitalised patients. Among the all the patients, surgical patients are considered as more susceptible to a PU.

Methods:

Our study focus on "What are the risk factors associated with the development of Pressure Ulcers in the surgical patient?". We propose a research which makes use of a quantitative methodology and descriptive-correlational character with 3 main goals:

- Identify the risk factors for developing PU by surgical patients;
- Verify the exist of relationship between the identified factors and the prevalence of PU in surgical patients;
- Identify the incidence of PU in surgical patients.

Data for this research is collected via questionnaire, comprising three main parts, corresponding to the pre, intra and post-operative. This will allow us to evaluate the risk factors of PU that may be present in each phase. This data collection instrument is being applied to patients undergoing average and long term interventions in several public hospitals in the central region of Portugal.

Results:

The results are expected to match the ones already reported by the related scientific literature. In particular, the several risk factors identified as predictors of PU in surgical patients.

Discussions:

State of art establishes several factors that increase the risk of PU in surgical patients. Some of these risks are inherent to the surgical patient (intrinsic) and to the operating room (extrinsic). Each risk factor by itself may not increase the risk of PU however the combination of several factors may increase that risk.

Clinical relevance:

To the best of our knowledge, no data of the incidence of PU in surgical patients is available in Portugal. Thereby, this study will enable us with more information on this field, help us improving the nursing practice focusing on care quality and health improvements.

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INCONTINENCE-ASSOCIATED DERMATITIS IN ELDERLY: A QUALITATIVE PHENOMENOLOGICAL STUDY ON PATIENT EXPERIENCES

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¹ Ghent University

Introduction:

Incontinence is a widespread problem in all health care setting. One of the main complications of incontinence is inflammation of the skin in the genital and anal region, also known as incontinence associated dermatitis (IAD). IAD is a known risk factor of pressure ulcer development (Beeckman et al. 2014). Prevalence figures of IAD vary between 5.6% and 50%. Little is known about the impact of incontinence associated dermatitis on quality of life of the elderly. Studies on patient experiences with skin disorders in the same body region are restricted to patients with decubitus (Hopkins et al. 2006). The aim of this study was to gain insight into the experience and needs of elderly with incontinence associated dermatitis.

Methods:

Semi-structured interviews were held with 11 hospitalized patients, older than 65 years, with IAD for 14 days or longer. Participants were selected by purposive sampling to gather different categories of incontinence associated dermatitis (redness with intact skin, redness with skin damage, skin infection). As part of a phenomenological approach, the interview transcripts were analyzed thematically.

Results:

The analysis of the transcripts revealed three main themes: physical symptoms, psychological functioning and social functioning. Pain (described as burning, tingling, gripping) was the most experienced physical symptom. Pain intensity raised in case of contact with urine or stool, wound care, paying attention to the IAD or worrying about co-existing health problems. Pain intensity lowered through cooling down, relieving pressure and distraction. Psychological functioning was influenced by uncertainty and feelings of dependency. Patients used different strategies to cope with the (symptoms of) IAD, like using skin care products, comforting thoughts and social support. The presence of a confidential advisor (nurse, partner) was important because IAD was often experienced as taboo.

Discussions:

While more interviews are required to reach data saturation it is reasonable to conclude that IAD has a profound impact upon patient's live, including physical, psychological and social functioning.

Clinical relevance:

Care providers can make important differences in the experience of IAD in elderly. A few examples are: helping to relieve symptoms, giving information to reduce uncertainty, showing empathy to reduce feelings of dependency and being a confidential advisor.

References:

Beeckman D., Van Lancker, A., Van Hecke, A. & Verhaeghe, S. (2014) A systematic review and meta-analysis of incontinence-associated dermatitis, incontinence, and moisture as risk factors for pressure ulcer development. *Res Nurs Health*, 37(3), 204-18.
Hopkins A., Dealey, C., Bale, S., Delfloor, T. & Worboys, F. (2006) Patient stories of living with a pressure ulcer. *J Adv Nurs*, 56(4), 345-53.

DEVELOPMENT AND VALIDATION OF AN INSTRUMENT TO MONITOR THE HEALING OF INCONTINENCE-ASSOCIATED DERMATITIS

Karen Van den Bussche¹, Anke Desmecht¹, Fien Vanden Neucker¹, Nele Van Damme¹, Steven Smet², Dimitri Beeckman¹

¹ Ghent University

² Uz Gent; Wound Care Centre

Introduction:

Incontinence-associated dermatitis (IAD) is defined as a skin inflammation that occurs as a consequence of exposure of the skin to urine and feces. IAD is a widespread problem in all care settings, with a prevalence between 5.6 and 50%. This large difference is explained by the potential confusion with superficial pressure ulcers. Some IAD assessment tools have been developed, but with limitations in terms of the validity and use in everyday practice. The aim of the study is to develop and validate an instrument to monitor the healing of IAD.

Methods:

The instrument was developed based on a literature review of existing instruments. Content validity was evaluated in a Delphi procedures by ten experts. The instrument included three topics: (1) location of the IAD injury, (2) skin condition (including color and denudation) and (3) infection (including skin discoloration and purulent exudate). Four point rating scales were developed to assess the severity of the IAD injury. Reliability of the instrument was evaluated using a convenience sample of caregivers from six health care facilities who were asked to assess an IAD injury of one patient using three images over time. A gold standard was established by two experts. Data collection took place in March 2015.

Results:

The participants were 225 nurses, 36 nursing students and 10 wound care experts from Flanders. 86,4% were female and 79,4% had no specific education within wound care. Preliminary results of the known-groups technique show no significant differences for both the score on denudation, on infection and the total score between the gold standard score and the mean score of the nurses, students and wound experts. In one image, a significant difference in the total score was found between the gold standard (score:210) and the mean score of the nurses (1034,8±396 ; p=0,039).

Discussions:

Preliminary known-group analysis showed promising results. Further analysis will explore the (1) construct validity, (2) interrater reliability and (3) discrimination index of the instrument. These analyses will be conducted in short term to be presented at the time of the conference.

Clinical relevance:

The categorization of the IAD injury through skin inspection is vital. The use of a validated IAD assessment tool could improve clinical decision making, care and research on the healing of IAD injuries. To date there is no validated instrument available.

References:

Beeckman, D., Van Lancker, A., Van Hecke, A. & Verhaeghe, S. (2014) A systematic review and meta-analysis of incontinence-associated dermatitis, incontinence, and moisture as risk factors for pressure ulcer development. *Res Nurs Health*, 37(3), 204-18.

EVIDENCE-BASED SKIN CARE: THE DEVELOPMENT OF A BASIC SKIN CARE ALGORITHM WITHIN FORMAL CARE SETTINGS

Andrea Lichtenfeld¹, Armin Hauss², Christian Surber³, Tina Peters¹, Ulrike Blume-Peytavi⁴, Jan Kottner⁵

¹ Clinical Research Center for Hair and Skin Science, Department of Dermatology, Charité-Universitätsmedizin Berlin

² Clinical Quality and Risk Management, Charité – Universitätsmedizin Berlin

³ University Hospital Basel

⁴ Klinik Für Dermatologie

⁵ Charité-Universitätsmedizin Berlin

Introduction:

Maintaining and improving skin health and integrity are major goals in acute and long-term care. Innumerable patients and residents worldwide receive daily hygiene and skin care interventions including washing, bathing, showering and applications of various lotions, creams and ointments but little is known about benefits and clinical efficacy [1,2]. The aim of this project was to develop guidance for basic skin care.

Methods:

Based on a systematic literature review a clinical algorithm for basic skin care in institutional care settings was developed. A first algorithm draft was sent to experts in the fields of dermatology, skin pharmacology/pharmacy, nursing science and basic skin care research. Based on feedback the draft was revised and discussed in a face-to-face meeting resulting in a final version.

Results:

The target groups are adult patients or residents in institutional or home care settings with intact skin and/or signs of dryness or moisture related changes. Patients with skin diseases and skin lesions are not addressed. The algorithm distinguishes between general and special basic skin care. General skin care includes all interventions and activities that all hospital patients or care receivers should receive. A skin assessment after admission helps to decide whether special skin care is needed. Special skin care recommendations are geared by "humid" areas where skin is in direct contact with skin, urine and/or feces and "dry" areas including skin regions exposed to air and/or clothes. The algorithm provides general guidance for basic skin cleansing and caring including frequency, type of cleansing and product categories for several skin conditions and areas.

Discussions:

Skin care is an integral part of nursing practice in institutional care settings but comprehensive guidance is missing so far. The algorithm supports the therapeutic goal of the maintenance of a healthy and intact skin barrier. Applying a two-step approach is considered useful to identify special skin care needs early. Is the skin intact and there are no other risk factors "general skin care" interventions are appropriate. If care receivers show risk factors like advanced age or incontinence "special skin care" is required to counteract the increased vulnerability and susceptibility to skin problems.

Clinical relevance:

The skin of aged, immobile and/or multiple diseased persons underlie structural and functional changes that result in increased vulnerability [1, 2]. The therapeutic goal of the proposed skin care algorithm is the improvement of skin function and the maintaining of a healthy and intact skin barrier.

References:

- [1] Kottner J et al. *Br J Dermatol*. 169:528-42, 2013.
- [2] Cowdell F et al. *Intr J Older People Nurs*. 17(epub) 2013.

POSTER SESSIONS ZUIDERGANG

WEDNESDAY 16.09.2015

14:00 – 14:45 **PRINTED POSTERS PRESENTATIONS**
P1, P2, P3, P4, P6, P8, P9, P10, P11, P12

THURSDAY 17.09.2015

10:30 – 11:00 **PRINTED POSTERS PRESENTATIONS**
P13, P14, P15, P16, P20, P23, P24, P25, P26, P28

12:30 – 14:00 **PRINTED POSTERS PRESENTATIONS**
P29, P30, P31, P33, P35, P36, P37, P38, P42, P43, P44, P45, P46, P47, P49

E- POSTERS PRESENTATIONS

**SCREEN 1 - EPUAP Travel Grants Preventing Skin Breakdown Projects:
Tips and Tricks from 5 Quality Improvement Stories Session**

SCREEN 2 - E-posters
E5, E7, E17, E18, E19, E21, E22

15:30 – 16:15 **E- POSTERS PRESENTATIONS**

SCREEN 1 - E- posters
E27, E32, E34, E39, E40

SCREEN 2 - E-posters
E41, E48, E50, E57, E58

PRINTED POSTERS PRESENTATIONS

P51, P52, P53, P54, P55, P56, P59, P60, P61, P62

The printed poster and e-posters presenters should be in the poster area in the time frame mentioned above and should be prepared to offer information to the interested conference delegates.

All posters (printed and electronic) will be displayed during the whole period of the conference.

POSTER PRESENTATIONS OVERVIEW

- P1 Mechanical properties and damage etiology of human skin resulting from large amplitude shear deformation
Jibbe Soetens
- P2 and family/carer experiences of the SSKIN care bundle
Emma Fleming
- P3 An innovative textile to support the reduction of bedsore development
Anne Timm
- P4 A comparison of the effects of pressure redistribution properties in mattresses when covered with different types of polyurethane-coated fabric
Richard Haxby
- E5 Introducing a new low cost gel material with potential for drug delivery and exudate absorption while providing pressure protection.
Johann Willers
- P6 Wound Fixation for Pressure Ulcers: A New Therapeutic Concept Based on the Physical Properties of Wounds
Zenzo Isogai
- E7 Development of a low-tech, low-cost gel for pressure padding
Johann Willers
- P8 A Novel Platform for Assessing Muscle Regeneration in Mouse Models
Lisa Tucker-Kellogg
- P9 Complex wound care using a pressure-relieving heel protector
Jean-Marie Declercq
- P10 Soft casting in the prevention and management of heel pressure ulcers in the community setting: a pilot project
Ina Joan
- P11 A clinical and financial trial into the use of powered hybrid pressure relieving equipment
Siobhan McCoulough
- P12 A quality improvement initiative on a geriatric unit in a Hamburg Hospital aimed to prevent and treat IAD
Kerstin Heinemann
- P13 Pressure ulcer in gastroenterology unit in an acute care facility in Korea
Kyuwon 1, RN, CWON. Baek
- P14 An open, non-comparative multi-centre clinical investigation to evaluate the performance and safety of a gelling fibre dressing for the treatment of pressure ulcers
Steven Smet
- P15 A topical haemoglobin spray for oxygenating pressure ulcers: a pilot study
Joy Tickle
- P16 Skin Inspectors Take Your BEST SHOT[®] - Preventing Avoidable Harm and Improving Patient Safety through the Development of an Innovative Skin Assessment Tool for Staff, Patient and Carers
Jivka Dimitrova
- E17 How to best specify the criteria for higher specification foam mattresses?
Esa Soppi
- E18 Patient perceptions of a pressure injury prevention care bundle
Shelley Roberts
- E19 The Role of Systemic Perfusion and Oxygenation in Pressure Ulcer Development in Critical Care
Janet Cuddigan
- P20 Stop the Pressure - Next generation of nurse leaders
Ruth May
- E21 A Novel Assessment Tool for Characterizing Wheelchair Cushions
Kara Kopplin
- E22 Use of infrared thermography in the diagnosis of pressure ulcers. A Literature review
An L.D. Boone
- P23 Effects of necroX-5 on the survival of random pattern skin flap in mice
JUN HO LEE
- P24 ELCOS - Portuguese Wound Society: A New Model of Wound Association
Tania Santos
- P25 Management pressure ulcers from a hemodialysis unit. Case Report
Maria Delgado Sandoval
- P26 Validation of software for risk assessment and follow-up of pressure ulcers
Aglécia Budri
- E27 Smart technology - Is this the way forward in nurse education?
Kumal Rajpaul
- P28 Non-invasive monitoring of pressure ulcer formation
Willeke Traa
- P29 Skin blood perfusion (BP) changes under ischial tuberosity (IT) during gluteal neuromuscular stimulation (GNMS) in spinal cord injury (SCI)
Liang Liu
- P30 Neonates and medical devices: Are we providing adequate care for vulnerable infants?
Hannah Liversedge
- P31 Preterm and neonatal skin care: from the problem to solutions
Francesco Uccelli
- E32 Tracking patients with pressure ulcers in the community setting: a pilot project.
Heidi Sandoz
- P33 Can a dressing prevent pressure ulcers in orthopedic care?
Anna Ekström
- E34 Immobile patients' spontaneous movements - implications for repositioning as intervention
Ulrika Källman
- P35 Reflecting on commercial partnerships and the impact on reducing the number of avoidable grade 3 and 4 pressure ulcers within the community hospital setting
Lorraine Grothier
- P36 The cost-effectiveness of ALLEVYN Life Silicone Adhesive Dressing in preventing Hospital Acquired pressure ulcers
Leo Nherera
- P37 Design and Research on reliability-validity for 3S intraoperative Risk Assessment Scale of pressure Sore
Xinlian GAO
- P38 An Exploration of Newly Qualified Nurses Knowledge and Attitude Towards Pressure Ulcer Prevention
John McRobert
- E39 Training strategy for the implementer group of a Clinical Practice Guideline on prevention and treatment of pressure ulcers in pediatrics.
An L.D. Boone
- E40 Procedure for the practical design of an implementation plan of a clinical practice guideline
An L.D. Boone
- E41 Usage of an electronic support tool by the implementer group of a clinical practice guideline
An L.D. Boone
- P42 Linda Russel's "Grade 0": the right way for a complete prevention?
Sabrina Cassino
- P43 Education of the nurse for operationalization of clinical protocol for pressure ulcer treatment and prevention: professional satisfaction
Elaine Moura
- P44 Reliability and accuracy of wound surface area measurement using mobile technology
Patricia Sigam
- P45 thinking outside the box in the quest for pressure ulcer eradication
Claire Acton
- P46 Exploring the incidence of avoidable pressure ulceration in a U.K. based Health and Social Care Trust
Lorna Semple
- P47 A Retrospective Study Using the Pressure Ulcer Scale for Healing (PUSH) Tool to Examine Factors Affecting Stage II Pressure Ulcer Healing in a Korean Acute Care Hospital
Kyung Hee Park
- E48 Critical review of the role of alternating mattresses in pressure ulcer management
Esa Soppi
- P49 Hybrid mattress evaluation process
Louisa Way
- E50 Changing Shoes can Affect the Protective Efficacy of Wheelchair Cushions
Kara Kopplin

POSTER PRESENTATIONS OVERVIEW

- P51 Re-positioning for pressure Ulcer Prevention
Menno van Etten
- P52 Heel pressure ulcers how do we prevent them and evaluate practice ? an example with an acute care hospital
Claire Acton
- P53 Use of telemedicine in spinal cord injury and pressure ulcers. A pilot project.
Ingebjørg Irgens
- P54 Antiseptic dressings: a comparison in a randomized blind study
Roberto Cassino
- P55 The Midlands & East Region of England Journey - Stop the Pressure Campaign
Ruth May
- P56 Pressure ulcer management at-a-distance, possibilities and challenges in video consultations to the patients' homes
Gunnbjorg Aune
- E57 The pressure ulcer prevalence as quality indicator
Françoise Jourdat
- E58 15 years of pressure ulcer incidence reporting: effectiveness through precise organisational issues
Fabienne Ruffini
- P59 Using RESPECT for the prevention of pressure ulcers
Joanna Swan
- P60 Chasing Zero
Lindsey Bullough
- P61 Team wound management on institute of oncology Ljubljana, Slovenia
Dragica Tomc
- P62 Avoidable or Not Avoidable Pressure Ulcers?: Structural Quality Indicators
Tania Santos

MECHANICAL PROPERTIES AND DAMAGE ETIOLOGY OF HUMAN SKIN RESULTING FROM LARGE AMPLITUDE SHEAR DEFORMATION

Jibbe Soetens¹, Cees Oomens¹, Dan Bader²

¹ Eindhoven University of Technology
² Faculty of Health Sciences, University of Southampton

Introduction:

Pressure ulcers are localized injuries to the skin and/or the underlying tissue as a result of pressure in combination with shear or friction. It has long been established that shear forces working at the interface between skin and supporting surface are an important risk factor in the development of pressure ulcers. From earlier studies it was concluded that, from a mechanical point of view, skin should be considered as a highly dynamic and complex composite rather than a three layered tissue comprising stratum corneum, viable epidermis and dermis [1]. The aim of this study is to quantify the mechanical properties of human skin at large shear deformations and gain insight in the aetiology of resulting skin damage.

Methods:

In-vitro Large Amplitude Oscillatory Shear (LAOS) deformation was measured using full-thickness human skin. Digital image correlation (DIC) and strain field analysis was used to visualize deformation of different skin layers. Additional microscopic techniques such as scanning electron microscopy (SEM), differential interference contrast microscopy (DICM, fig. 1) and bright field microscopy combined with various staining techniques (fig. 2), will be used to analyse the aetiology of skin damage due to shear deformation.

Results:

Skin behaviour at large strains became highly non-linear, by displaying intra-cycle strain stiffening and shear thinning. DIC and strain field analysis revealed that shear moduli at the superficial epidermal layer were higher than in the underlying dermal layer. Preliminary results show the emergence of skin damage from a shear strain of 0.3-0.5.

Discussions:

So far the mechanical properties and damage aetiology of human skin were investigated under shear deformation only. However, the behavior under tensile deformation is also considered relevant and will therefore be examined. Furthermore, the resulting epidermal cell damage upon both shear and tensile deformation will be examined.

Clinical relevance:

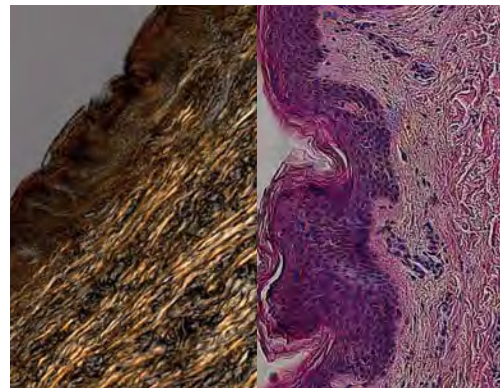
The results of this study are used to prevent pressure ulcer development by optimizing the interaction between skin and its supporting surface, such as prosthetic liners and healthcare devices. Optimizing is done by implementing the gained knowledge of mechanical properties and damage aetiology of human skin under shear and tensile deformation in the development of supporting surfaces. By minimizing the occurrence of skin damage, the development of pressure ulcers can be prevented.

References:

- [1] E. Lamers, T.H.S. van Kempen, F.P.T. Baaijens, G.W.M. Peters, C.W.J. Oomens, Large amplitude oscillatory shear properties of human skin, *J. Mech. Behav. Biomed. Mater.*, 28(2013), pp. 462-470

Figure 1 Differential interference contrast microscopy image of human skin under shear deformation.

Figure 2 Hematoxylin and Eosin (HE) staining of human skin.



PATIENT AND FAMILY/CARER EXPERIENCES OF THE SSKIN CARE BUNDLE

Emma Fleming¹, Zena Moore², Sarah Condell³

¹ Rcsi Msc by Research Student, Nursing & Midwifery Practice Development Unit Dne/Mater Misericordiae University Hospital
² Rcsi, School of Nursing
³ Department of Health

Introduction:

Pressure ulcers (PUs) are common, costly and impact negatively on patients' quality of life. Bearing this in mind, in Ireland, a regional quality improvement collaborative was established within the Health Service Executive entitled 'Pressure Ulcers to Zero', utilizing the SSKIN care bundle. As the involvement of patient and family/carer is a central component of health care delivery, this study set out to explore the patient and family/carer experiences and involvement within the collaborative including use of the SSKIN care bundle.

Methods:

A qualitative descriptive approach was adopted. Since there were 3 main healthcare settings involved in the collaborative (acute/specialist, residential and primary care), one unit from each of these settings was purposively selected to participate. Following ethical approval and written informed consent, data were collected over a 6 week period using semi-structured, one to one interviews with patients, and focus group interviews with family members/carers. Twenty five persons agreed to participate; 16 patients, with varying levels of dependency, and 9 family members/carers.

Results:

Data were analysed using Colaizzi's Framework 3, 5 main themes with corresponding subthemes emerged from the analysis: awareness, patient and family/carer involvement, prevention is better than cure, communication is key' and resources in prevention.

Discussions:

Both patients and family/carer had limited involvement in pressure ulcer prevention within the collaborative. Further, a general lack of awareness of the SSKIN care bundle was identified. Participants expressed the desire to be more involved in PU prevention, henceforth, empowering patients and family/carers through education and communication may increase their level of involvement. This has meaning for future collaborators, where tools, such as acronyms and activities, for example the design and presentation of visual aids pertaining to the collaborative subject, require a patient as well as a professional focus.

Clinical relevance:

Educating patients and families/carers on pressure ulcer prevention through utilization of the SSKIN care bundle may facilitate a greater willingness of the patient and family/carer to participate in pressure ulcer prevention.

References:

1. Gorecki C, Brown J.M., et al. (2009) Impact of Pressure Ulcers on quality of life in older patients: a systematic review. *Journal of the American Geriatrics Society* 57, 1175-1183.
2. Gibbons, W., Shanks, H., et al. 2006. *Eliminating facility-acquired pressure ulcers at Ascension Health*. *Journal of Quality and Patient Safety* 32, 488-96.
3. Colaizzi, P. F. (1978). *Psychological alternatives for psychology* (pp. 48-71). New York: Plenum

P3 AN INNOVATIVE TEXTILE TO SUPPORT THE REDUCTION OF BEDSORE DEVELOPMENT

Anne Timm¹

¹ Schoeller Medical AG

Title:
An innovative textile to support the reduction of bedsore development

Introduction:
Beside pressure, also friction and corresponding shear forces as well as a humid microclimate are associated with the development of bedsore. A new textile consisting of specific synthetic fibers and woven-architecture was developed to reduce friction coefficients (FC) significantly (FC reduced by a factor of up to 5.5 in comparison to a cotton bedsheet). Patients are supported to use their remaining mobility to reposition themselves. Additionally, the textile is capable to transport moisture more efficiently away from skin in comparison to standard textiles ensuring a healthier microclimate.

Methods:
FC between cotton/new bedsheet and other textiles have been determined under laboratory conditions and a mechanical skin model. Finally, the results with the skin model have been confirmed in a forearm-test. Infrared thermal camera and micro-computer tomography have been chosen to study the moisture distribution and transport.

Results:
Dynamic FC between the new bedsheet and other textile materials are by factors of 3.1 to 5.5 lower as with cotton bedsheets. Additionally, the new bedsheet shows similar FC under humid and dry conditions, whereas cotton and other materials demonstrate a significantly higher FC under humid conditions. With artificial skin a similar low FC of 0.15 – 0.2 for all experimental conditions was found. Additionally, in vivo measurements have confirmed, that the new textile shows a lower FC in comparison to standard bedsheets. A concentric water distribution during the friction experiments has been demonstrated.

Discussions:
Most hospital bedsheets consist of cotton or mixtures thereof and show FC of about 0.4 to 0.5, while the new textile showed under dry and humid conditions a much lower FC of only 0.15 to 0.2. As the values for standard bedsheets increase under humid conditions, also shear forces will increase and thus a higher risk of bedsore development occurs. In vivo measurements have confirmed the laboratory results. The concentric water distribution implies the removal of water from the surface thus improving the microclimate between skin and bedsheet. Based on the findings described above, the new textile is expected to result in a lower risk of shear forces/bedsore development.

Clinical relevance:
The laboratory experiments discussed above are expected to show positive effects in respect of reducing the risk of bedsore development. Field studies in hospitals have proven that i.e. patients with reduced mobility are able to change their position in beds more easily on the new textile.

References:
Derler S. et al, Medical textiles with new for decubitus prevention, *Tribology International* 46, (2012) 208-214

P4 A COMPARISON OF THE EFFECTS OF PRESSURE REDISTRIBUTION PROPERTIES IN MATTRESSES WHEN COVERED WITH DIFFERENT TYPES OF POLYURETHANE-COATED FABRIC

Richard Haxby¹

¹ Dartex Coatings Ltd

Introduction:

To date, the attention surrounding mattress performance has focused almost exclusively on the mattress contents, such as the properties of foam, the type of air system utilized, etc. with minimal attention being paid to the cover, except in regards to cleaning and care. Dartex will set out to prove that not all fabrics are the same, and will demonstrate how key properties of the mattress can be influenced when the fabric and core operate together, using the terms set out by NPUAP.

Methods:

Dartex will measure key physical properties by using a range of mattresses and different fabrics to demonstrate how the mattress's pressure redistribution properties are influenced when the fabric selection is altered. These will be measured using ANSI / RESNA S31 Support surface testing standards.

Results:

Dartex will demonstrate that the right fabric over the right mattress core will positively impact the overall performance of the product, and that the wrong fabric will mean that the product will not be able to fulfil its optimum potential as a medical support device.

Discussions:

There is limited research around the benefits of choosing the right medical support surface and the impact that different surfaces can have on patient care when they come into contact with the skin. In the best medical devices, the mattress cover and core work harmoniously for the best patient outcome, and more research is required to demonstrate the positive effects of the mattress and cover working together.

Clinical relevance:

- Pressure redistribution – demonstrating how the mattress cover can have an impact on the redistribution of pressure, depending on the structure of the fabric
- Extent of immersion and envelopment influenced by the properties of fabric – e.g., the stretch properties in conjunction with the mattress core
- Microclimate characteristics – how different material structures perform in regards to maintaining or altering the moisture and temperature of the patient.

References:

- *British Healthcare Trades Association (2012) BHTA guidance on the care, cleaning and inspection of healthcare mattresses* <http://www.bhta.net/sites/default/files/document-upload/Protect%2C%20Rinse%2C%20Dry%20v202.pdf>
- *National Pressure Ulcer Advisory Panel Support Surface Standards (S31) Terms and Definitions ver.01/29/2007* http://www.npuap.org/wp-content/uploads/2012/03/NPUAP_S31_TD.pdf
- *National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention and Treatment of Pressure Ulcers: Quick Reference Guide. Emily Haesler (Ed.). Cambridge Media: Osborne Park, Western Australia; 2014.*
- *ANSI / RESNA / National Pressure Ulcer Advisory Panel Support Surfaces Standards Initiative* <http://www.npuap.org/resources/support-surface-standards/support-surface-standards-initiative/>
- *More Z., Stephen Haynes, J. Callaghan, R. (2014) 'Prevention and management of pressure ulcers: support surfaces' British Journal of Nursing (Tissue Viability Supplement), Vol.23, No.6.*

E5

INTRODUCING A NEW LOW COST GEL MATERIAL WITH POTENTIAL FOR DRUG DELIVERY AND EXUDATE ABSORPTION WHILE PROVIDING PRESSURE PROTECTION.

Johann Willers¹, Gaimluca Colucci²

¹ Worthing Hospital

² Worthing

Introduction:

During the adaptation an biogel developed for ultrasound phantoms for manufacture of pressure relief gelpads it became apparent that this ADAMgel (Aqueous Dietary fibre Antifreeze Mix gel made with psyllium husk gel(PHG), water and mono ethylene glycol(MEG) could be useful in the treatment of pressure ulcers. As a low cost high strength temperature stable aqueous gel easily integratable with fabric dressings and hydrocolloid fluid absorbing granules, ADAMgel has the potential for use as a antimicrobial eluting and/or exudate absorbing pressure relieving dressing/support. We investigated further, substituting propylene glycol(PG) for MEG to eliminate any possible risk of adverse effect on broken skin, the former being an antifreeze/summer coolant, food additive and solvent for medication.

Methods:

Three 150ML specimens ADAMgel were prepared: 4/1 water/PG and 5% psyllium husk. Two were cast in cylinders, one containing 0.01% calomian dye, was placed on the plain sample. It was examined after 6 hours to see the extent dye elution. The remaining specimen was cast in a film 6mm thick. This was placed on 15 ml of a dyed colloid plasma substitute(gelofusin) and covered. After 6hrs the film was removed and the amount of fluid absorbed calculated.

Results:

Figure 1. There was significant dye elution after 6 hrs.

Figure 2. There was 12mls fluid absorbed while maintaining gel strength.

Discussions:

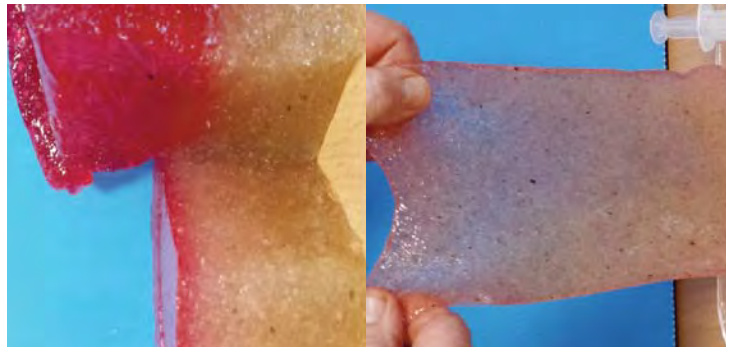
Psyllium husk gel preparation with a antifreeze/summer coolant is possible at a temperature higher than 100°C. This creates a stronger medium either by changing the already known temperature induced gel structure changes, or by liberating gel fractions known to have higher melting points[1]. PG, unlike MEG does not form a polymer with nor dissolves psyllium husk gel, but raises the preparation temperature and acts as preservative and humectant. It might be possible to create as strong a gel without PG using an autoclave. ADAMgel shows potential as a cost effective way of proving targeted antimicrobials and an optimum microclimate while providing pressure relieving support equivalent to silicone gel for pressure ulcers.

Clinical relevance:

Most of the common interventions and treatment strategies employed in the developed world are unaffordable in the developing world. Low cost, low tech alternatives that can be easily locally manufactured could be of great value.

References:

1. Farahnaky et al. The impact of concentration, temperature and pH on dynamic rheology of psyllium gels. *J Food Eng* 100:294–301.



P6

WOUND FIXATION FOR PRESSURE ULCERS: A NEW THERAPEUTIC CONCEPT BASED ON THE PHYSICAL PROPERTIES OF WOUNDS

Kenzo Isogai¹, Fumihiko Mizokami², Katsunori Furuta², Makiko Tanaka³

¹ National Center for Geriatrics and Gerontology

² Department of Pharmacy, National Center for Geriatrics and Gerontology

³ Yamaguchi Prefectural University, Nursing School

Introduction:

Deep pressure ulcers that develop over specific bony prominences often exhibit wound deformity, defined as a change in the 3-dimensional shape of the wound. However, a concept to alleviating wound deformity has yet to be defined and described.

Methods:

To clarify the issue, we propose a new concept called "wound fixation" based on the physical properties of deep pressure ulcers with wound deformity. A retrospective survey of a case series was performed focusing on the wound locations.

Results:

Wound fixation was defined as the alleviation of wound deformity by exogenous materials. The wound fixation methods were classified as traction, anchor, and insertion based on the relation between the wound and action point by the exogenous materials. By our survey, wound fixation was preferentially used for deep pressure ulcers at specific locations such as the sacrum, coccyx, and greater trochanter. Moreover, the methods of wound fixation were dependent on the pressure ulcer location.

Discussions:

Our new concept of wound fixation will be useful for the practical treatment and care of pressure ulcers. Clinical relevance: Further discussion and validation by other experts will be required to establish this concept of wound fixation. Moreover, the material, direction, position, and strength of wound fixation should be discussed based on the proposed concept.

References:

- Mizokami F, Furuta K, Utani A, Isogai Z. Definition of the Physical Properties of Pressure Ulcers and Characterization of their Regional Variance. *Int Wound J* 2013;10(5):606-11.
- Mizokami F, Furuta K, Matsumoto H, Utani A, Isogai Z. Sacral pressure ulcer successfully treated with traction, resulting in a reduction of wound deformity. *Int Wound J* 2014;11(1):106-7.
- Mizokami F, Takahashi Y, Nemoto T, Nagai Y, Tanaka M, Utani A, Furuta K, Isogai Z. Wound Fixation for Pressure Ulcers: A New Therapeutic Concept Based on the Physical Properties of Wounds. *J Tissue Viability* 2015;24(1):35-40.

E7 DEVELOPMENT OF A LOW-TECH, LOW-COST GEL FOR PRESSURE PADDING

Johann Willers¹, Anna Roberts¹, Nick Jarrett¹, Chris Eisey¹, Subhami Vitharanage¹

¹ Worthing Hospital

Introduction:

Silicone gel reactive support surface has been established as one of the effective constant low-pressure devices for preventing pressure sores in operating theatres. Unfortunately the expense of silicone based gels (>€50/litre) limits its use, and is too expensive for the Developing World. We developed a substitute for silicone in ultrasonic simulators: Aqueous Dietary fibre Antifreeze Mix gel (ADAMgel), a stable elastic polymer formed by heating mono ethylene glycol (MEG, antifreeze and polymer substrate), psyllium husk (bulk laxative) and water. As it is affordable (<€2/ litre), recyclable, easily manufactured in any with ordinary kitchen equipment from easily procurable raw materials and resistant to infection and desiccation, we thought this versatile material would be suited to wider use in low-tech constant low-pressure devices in resource poor environments and we decided to explore this.

Methods:

We firstly evaluated the relative elastic properties of ADAMgel and commercial silicone gel by comparing their respective Young's moduli and Poisson's ratio by indentation measurement at 5 pressures from 3-20kPa. This was done with 4 silicone gelpads in routine use in theatre and 12 ADAMgel specimens prepared with varying ratios of ingredients. Viscoelasticity were examined by subjecting the ADAMgel samples to 30kPa pressure for an hour, and deformation and recovery observed. Cost effectiveness, simplicity, versatility and recyclability were evaluated by attempting to manufacture a custom made heel protector, then recycle it into an eye pressure protectors for prone surgery in under 10 minutes for less than €1.

Results:

Compression values of 8 ADAMgel specimens were within the range of the commercial gelpads. Four were more compressible, and showed degrees of deformation after pressure for an hour. The remaining eight bounced back immediately, and all 12 had resumed their original shape after 1 hour. The manufacture challenge was completed within time and budget.

Discussions:

ADAMgel appears to be an effective as well as cost-effective CLP medium. Gel strength can be varied to enable deeper immersion that would be prohibitively expensive with silicone. Further research is needed to determine the presence and/or nature of the polymerization process and the presence and availability of free MEG. Until then the gel would have to be sealed in a plastic film. Safety precautions needed during manufacture is the same as during servicing cars.

Clinical relevance:

In Sub-Saharan Africa 85% of the countries annual health expenditure is less than the cost of one silicone gel operating theatre table cover. ADAMgel has the potential to be a low cost substitute for silicone gel pads where they are currently unaffordable.



Figure 1. Heel to Head

Figure 2. Four 1L ADAMgel pads: <€8 total

P8

A NOVEL PLATFORM FOR ASSESSING MUSCLE REGENERATION IN MOUSE MODELS

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² National University of Singapore

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⁴ MIT

Introduction:

Although muscle regeneration is important for pressure ulcer healing, it is difficult to observe in vivo. Many experimental therapies are tested in animals by observing ulcer size and skin closure, without quantifying whether they improve healing of muscle tissue. The aim of this project is to use 4-color confetti fluorescence microscopy to display spatiotemporal regeneration of muscle in mice.

Methods:

We developed mice with confetti fluorescence in Pax7-expressing satellite cells, which are the stem cells of muscle. Upon tamoxifen induction, the confetti construct [1] expresses red, green, yellow, or cyan fluorescence at random. Each stem cell commits to a single color which is inherited by all its daughter cells. In previous studies of other tissue types, confetti stem cells had generated patches of uniform color, indicating how much tissue is generated from each stem cell [1]. We induced injury in the Tibialis Anterior and Panniculus Carnosus of mice and imaged tissue sections using confocal microscopy. We also developed image analysis tools for automated segmentation and unbiased measurement of regenerated myofibers.

Results:

Prior to injury, fluorescence levels were low. At 2 days post injury, fluorescence was visible in isolated cells and in recently divided cells, consistent with activation of satellite cells from a dormant state. At 4 days, fluorescence indicated thin, newly-regenerated myofibers with centrally located nuclei. At 8 days and 16 days, myofibers fused and nuclei migrated to the periphery. Myoblasts with the same color of fluorescence were sometimes seen in a row, suggesting they had migrated collectively, parallel to the myotubes. Most myotubes contained only a single color of fluorescence. Sometimes a myofiber showed multiple colors, indicating that at least 2 satellite cells contributed to its formation. Adjacent myotubes often had different colors, indicating that they regenerated from different satellite cells.

Discussions:

This technology provides selective fluorescence to light up newly regenerated tissue. It also allows us to map regenerative "territories" by showing which regions were produced by different stem cells. Clinical relevance: We conclude that this mouse model provides excellent visualization of regeneration, suitable for future studies of muscle injury, and for quantification of regenerative therapies.

References:

[1] Snippet HJ et al. (2010) Intestinal crypt homeostasis results from neutral competition between symmetrically dividing Lgr5 stem cells. Cell 143(1): 134.

P9 COMPLEX WOUND CARE USING A PRESSURE-RELIEVING HEEL PROTECTOR

Jean-Marie Declercq¹

¹ Glorieuxlaan 55

Introduction:

Complex wound care using a pressure-relieving heel protector.

An 87-year-old patient is admitted with ischemic rest pain and trophic lesions, with a cyanotic and cold lower leg and necrotic tissue (Hallux valgus) on the right side, necrosis of the calcaneus and tissue damage to the Achilles tendon.

The patient is immobile. The angiography shows diffuse arteriopathy of the lower leg. A – successful – dilatation of the right femoral, fibular and anterior tibial arteries is performed. To prevent further damage, the patient is placed on an alternating mattress (ESRI®). A heel cushion and a support for the equinus feet are fitted. A Rebecare® boot is applied to relieve pressure on the Achilles tendon and the heel.

Methods:

The wound is cleaned 1x per day for 15 minutes with compresses soaked in Prontosan® and then blotted dry and covered with a hydrophobic dressing (Cutimed Sorbact®) containing alginate (Flaminal Forte®) to hydrate the tendon. Everything is fixed in place with Stelalene® and then bandaged. The Rebecare® boot is fitted. A few days later the wound edges start granulating and granulation tissue appears on the cleaned Achilles tendon. The Hallux valgus is debrided with honey gel (L-Mesitran soft®). Due to the disappearance of necrosis, the bone is exposed and the joint capsule is released, which creates a risk of osteomyelitis. For this reason, the podiatrist applies an orthosis. Iso-Betadine® compresses are used to delineate the heel pressure ulcers and the necrotic crust is later removed by the vascular surgeon by means of sharp debridement. An Achilles tendon rupture develops during mobilization, causing severe bleeding.

Results:

The Rebecare® boot is strengthened with a hard sole to support the tendon and negative pressure wound therapy (Haromed®) is initiated for the Achilles tendon and heel. The wound bed grows (moderately moist and granulation with slightly fibrinous deposit). After intense multidisciplinary cooperation with the geriatrician, vascular surgeon, wound care nurse, nursing staff, occupational therapists and physiotherapists, social services staff, dieticians and home care services, the patient is able to go home after 2.5 months. The wound care team at the geriatric day hospital ensures follow-up.

The same wound care, as initiated at the hospital, is continued at home. In the meantime, the patient is walking with support.

Conclusion:

The healing process of these complex wounds could be optimized and mobilization could be promoted by relieving pressure on the right heel and the Achilles tendon using the Rebecare® boot. The main advantage of the whole procedure is that it was possible to avoid amputation.

Jean-Marie Declercq

P10 SOFT CASTING IN THE PREVENTION AND MANAGEMENT OF HEEL PRESSURE ULCERS IN THE COMMUNITY SETTING: A PILOT PROJECT

Ina Joan¹, Heidi Sandaz²

¹ Accelerate Cic

² Accelerate Cic; Wound Care

Introduction:

The management and prevention of heel pressure ulcers within the community setting presents special challenges for clinicians, patients and their carers/families. A 6-month pilot project within a UK inner city population to evaluate the use of soft casting in the community patient with or at risk of heel pressure ulcers will be described. The first 4 months of the project will be described here.

Methods:

All patients with or at risk of developing heel pressure ulcers will be risk assessed for their suitability for soft casting application by a podiatrist. Close collaboration with community nursing, social carers and family will be undertaken to ensure good awareness about the use of this technique. Data will be collated with regard to healing and prevention rates.

Results:

This poster will present the implementation of a 6 month pilot project. Results will not be available at the time of presentation however data will be collected on the prevalence and incidence of heel pressure damage. In addition data will be collected regarding

- Pain associated with pressure damage
- Healing rates of ulcers
- The impact on mobility and gait
- Any negative outcomes or risks
- Hospital admission and discharge rates.

Discussions:

Little is known about the special difficulties associated with preventing and managing heel pressure ulcers in the community setting. The challenges associated with mobility and the provision and safe use of heel protection equipment will be explored. Local healthcare commissioners have commissioned this pilot project, set within an extremely tight timeframe, to demonstrate improved clinical outcomes. The project will be running alongside a 6 month enhanced education programme and a project tracking all patients with a pressure ulcer. It is expected that soft casting will be a viable alternative to current heel protection devices. Risk assessments required to ensure safe application will be developed.

Clinical relevance:

Finding safe and effective methods to protect heels from pressure can be challenging in the community setting. People at home want to be mobile, they may live alone much of the time and pain associated with heel damage may impact on their quality of life. Economic evaluations will be undertaken within this community population. Soft casting has been shown to reduce costs in the acute and out patient setting (Craig et al., 2013) but there is little evidence regarding the use in the home setting.

References:

Craig J, Shenton R, Smith A. Economic analysis of soft-heel casting for diabetic foot ulcer: prevention and treatment. *Journal of Wound Care* 2013; 22(1): 44-48

P11 A CLINICAL AND FINANCIAL TRIAL INTO THE USE OF POWERED HYBRID PRESSURE RELIEVING EQUIPMENT

Siobhan McCoulough¹

¹ Hounslow & Richmond Community Healthcare NHS Trust; Pressure Ulcer Prevention Project Lead

Introduction:

Hounslow & Richmond Community Health (HRCH) has committed to NHS England's 'Sign up to safety campaign' with a particular focus on reducing the number of avoidable pressure ulcers.

A strategic approach was taken to address the number of pressure ulcers acquired by patients in the care of HRCH which included a review of equipment, delivery of education across multi-disciplinary teams and thorough analysis of pressure ulcer report findings.

A review into the inpatient services at our local community hospital was also undertaken to establish the most cost effective method of managing pressure redistributing equipment with patients safety/experience the primary driver.

Methods:

A scoping exercise identified that a powered hybrid mattresses* would be an beneficial piece of equipment for use due to the inclusion of high specification foam in the mattress in the event of a power failure/user error and step up/step down function providing an earlier intervention against pressure ulcers. The system was thought to have equally useful properties for inpatient services. To confirm this a collection of case studies were collated to prove its clinical efficacy. Following on from this a business case was presented to demonstrate the financial benefits of using powered hybrids.

Results:

The patient case studies demonstrate that the system can be safely used with patients suffering with pressure ulcers (up to and including Gr4) and it will be now be used widely as a preventative measure for those deemed high-very high risk as well as those with existing pressure damage in the community. The use of the powered hybrid mattresses has also proved cost effective by reducing spend by up to 40-70% in comparison to usual dynamic mattress replacements used.

HRCH's community hospital will now also benefit from the provision of 100% dynamic mattress capability and in turn generate a 5 year cost saving of £123,459.

Discussion and Clinical relevance:

Clinical outcomes such as reducing hospital admissions/readmissions, enhanced rehabilitation and cost savings through reduced PU development, are significant to the local Clinical Commissioning Groups

The relevance of this study to NHS Trusts is quite significant. It is estimated that for Community NHS Trusts 35% of spend on Complex Aids for Daily Living is spent on pressure redistributing equipment. Therefore the need to establish cost effective solutions that significantly contribute to improving patient outcomes is essential.

This study shows that the innovation in support surfaces demonstrated with the powered hybrid contributes to improving clinical outcomes through earlier intervention whilst demonstrating a clear cost efficiency against traditionally used methods.

*The Dynaform Mercury Advance, Direct Healthcare.

P12 A QUALITY IMPROVEMENT INITIATIVE ON A GERIATRIC UNIT IN A HAMBURG HOSPITAL AIMED TO PREVENT AND TREAT IAD

Kerstin Heinemann¹

¹ Marien Krakenhaus

Introduction:

Incontinence-Associated Dermatitis (IAD) is defined as "an inflammation of the skin that occurs when urine or stool comes into contact with perineal or perigenital skin."¹ Despite efforts to reduce the incidence of IAD, studies indicate that incidence rates range from 3.4% to 25%.¹ A 976-patient study found 20.3% of patients were incontinent.^{2,3} IAD prevalence for incontinent patients was 54% at three hospitals, affecting 11% of the general patient population.^{2,3} The objective of this quality improvement initiative was to evaluate the effectiveness of a simplified evidence based IAD prevention and treatment process.

Methods:

The incontinence cleansing protocol was standardized to include the use of an all-in-one, disposable, dimethicone-infused barrier cloth with each episode of incontinence. Staff education was provided regarding best practices for IAD and pressure ulcer prevention. A pre and post IAD point prevalence assessment was conducted using a computerized IAD assessment tool.

Results:

Pre-implementation, the baseline IAD rate was 50%. Following implementation of a standardized incontinence protocol the IAD rate was 21.4%. This represents an IAD reduction of 57%.

Discussions:

The initiation of a standardized, evidence based incontinence cleansing protocol, including bedside availability, results in enhanced prevention and treatment for IAD.

Clinical relevance:

Providing the correct tools along with the proper education is critically important in helping the bedside nurse become more compliant to our incontinence care protocol.

References:

1. Gray M, et al., *Wound Ostomy Continence Nurs.* 2007 Jan-Feb;34(1):45-54.
2. Junkin J, Moore-Lisi G, Lerner-Selekof J, *What we don't know can hurt us: pilot prevalence survey of incontinence and related perineal skin injury in acute care.* Poster presented at the Clinical Symposium on Advances in Skin and Wound Care (ASWC), Las Vegas, NV, 2005 Oct.
3. Lyder CH, et al., *OST Wound Mgmt* Apr 2002;48(4):52-62.

P13 PRESSURE ULCER IN GASTROENTEROLOGY UNIT IN AN ACUTE CARE FACILITY IN KOREA

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Introduction:

We sought to determine the factors affecting pressure ulcer occurring in Gastroenterology unit in an acute care facility in Korea. So we checked on pressure ulcer in Gastroenterology unit. And we tried to improve to the root causes by increased pressure ulcers occur.

Methods:

We analyzed with pressure ulcer data that occurred between January 1, 2014, and October 31, 2014, regarding PU status and risk factors to influence pressure ulcer occurring. Development of the algorithm for the unit focused prevention. Applied to prevention care at Blanching erythema state with preventive foam dressing. Educate to nurses about pressure ulcer high risk and preventive care for pre pressure ulcer state

Results:

1. Clinical outcome: 1) January 2014 to October 2014 bedsores incidence: 18cases, November, 2014 to April, 2015 pressure ulcer incidence: 2cases. 2) In the case of pressure ulcer mean an average size: 0.13 cm. 3) The improvement period was 4.5 days. 2. Functional outcome: 1) Nurses were aware of the criteria for high-risk patients with pressure ulcers were changed. 2) Nurses have improved awareness of pressure ulcer occurrence reporting

Discussions:

Nurses are aware not only high-risk patients, is based on EPUAP & NPUA guideline, but also the high-risk patients of gastroenterology wards in ward suitable for the characteristics. It reduces the PU occurrence by more active intervention on the prevention of PU. It became an important factor

Clinical relevance:

By analyzing the root causes of pressure ulcers occur, we expanded high-risk group with characteristics of the Gastroenterology unit. Prevention and management of pressure ulcers are founded decrease of incidence and early healing rate. In addition, the improved recognition of nurses affects the pressure ulcer prevention activities.

References:

- EPUAP & NPUAP guideline. 2014: *Prevention and Treatment of Pressure ulcer: Quick Reference guide. Wound management to see the picture.* 2010. Park Kyung-Hee.
 Development of the algorithm for the preventing and managing of pressure ulcer. 2010. Kim Jin-mi.
 Korea society for quality in healthcare. 2009. *Process pressure ulcer development and management through applied pressure sores caused decreased activity.* Kang JI-sook.
 Journal of Soonchunhyang Medical Science, Vol.7 No.1. 2001: Anemia and Serum Protein Alteration in Patient with Pressure Ulcer. Oh Sh
 Vanderbilt University. 2013. Risk factor for pressure ulcer development in critically ill patients. Benoit, Richard A, Jr.

P14 AN OPEN, NON-COMPARATIVE MULTI-CENTRE CLINICAL INVESTIGATION TO EVALUATE THE PERFORMANCE AND SAFETY OF A GELLING FIBRE DRESSING FOR THE TREATMENT OF PRESSURE ULCERS

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Introduction:

Wounds, e.g. pressure ulcers, may be associated with high levels of exudate that contain inflammatory mediators and proteases which can lead to breakdown of extracellular matrix in the wound and damage to peri-wound skin.¹⁻² The challenge for clinicians is to select dressings that can absorb and retain excess exudate, yet maintain moist wound environments for optimal healing. On this basis, an open, non-comparative, multi-centre clinical investigation was undertaken to evaluate the performance and safety of a highly absorbent, gelling fibre dressing* in the management of pressure ulcers (stages II to IV).

Methods:

The primary objective was to assess change from baseline in condition of peri-wound skin. Secondary outcome measures included pain levels at dressing changes, wound size / condition, technical performance of the dressing, and adverse events / adverse device effects. The gelling fibre dressing was applied to the wound and secondary dressings were applied as appropriate. Subjects were evaluated over a maximum treatment period of six weeks (scheduled assessments at baseline and at weeks 1, 2, 4 and 6).

Results:

There was a general trend in improvement of the peri-wound skin condition, reduction in wound size and improvement in wound bed condition from baseline to final assessment. The ability of the dressing to absorb and retain exudate / blood was generally rated as either 'good' or 'very good' by the investigators. The investigators also rated the dressing highly in terms of ease of removal, ability to stay in place and conformability. No residues were left in the wound on removal of the dressing. The study subjects also rated the dressing highly in terms of comfort and ease of movement during wear. Low pain severity scores were recorded before, during and after dressing changes throughout the treatment period. The dressing was well-tolerated by the subjects.

Discussions:

The results support the use of the gelling fibre dressing for the treatment of moderately-to-highly exuding wounds. The observed improvements in the condition of the wounds and surrounding skin are strong indicators of the dressing's ability to manage excess exudate. The dressing also addresses important patient-related considerations such as the promotion of comfort during wear and minimization of pain on removal.

Clinical relevance:

Based on the results presented, clinicians can be confident in the ability of the gelling fibre dressing to effectively manage exuding wounds such as pressure ulcers.

References:

1. Yager DR et al (1996) *J Invest Dermatol* 107:442-52.; 3. Gibson D et al (2009) *MMMPs Made Easy. Wounds International* 1(1).

* Exufiber® (Molnlycke Health Care)

P15 A TOPICAL HAEMOGLOBIN SPRAY FOR OXYGENATING PRESSURE ULCERS: A PILOT STUDY

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Introduction:

Oxygen is required for almost every step of the healing process (Schreml et al, 2010). This pilot study aims to evaluate the use of Granulox in the management of pressure ulcers. Two randomised, controlled trials have been reported on Granulox. In a first study (n=28), Arenberger et al (2011) showed 93% healing at 6 months with Granulox and 7% without in chronic lower-limb wounds. In a second study over 13 weeks by Arenbergerova et al (2013) it found a 53% size reduction with Granulox versus 21% worsening in the standard care group. No studies have yet been published into pressure ulcers in this area.

Methods:

A multicentre evaluation was undertaken. Inclusion criteria were patients of 18 years or over with a grade 2, 3 or 4 pressure ulcer based on the EPUAP grading system. Exclusion criteria were grade 1 pressure ulcers, pressure ulcers with clinical signs of infection, pregnant or lactating women. Patients who met the inclusion criteria were treated with Granulox for 4-weeks, also receiving the same standard care as before the inclusion of Granulox, including the use of foam adhesive dressings, alginate and hydrofibre dressings and the use of hydrogels.

Results:

19 patients were recruited in to the study. One patient did not complete the 4 week treatment period. The sample was composed of 7 males and 11 females, with a total of 18 wounds and a mean age of 65 years. 17 of the 18 wounds showed reduction in size. All 18 wounds showed reduction in sloughy tissue, decreasing from average of 56% to 11%. The percentage of granulation tissue prior to the use of Granulox was 46%, and increasing to 66%. Exudate levels decreased in all 18 wounds. All patients reported an improvement in their pain score during the evaluation, from an average of 6.2 to 2.5 (10 point scale). Wound dressing regimens and type of pressure-relieving devices did not change prior to or during the use of Granulox. Therefore, the results of this pilot study cannot be related to changes in wound regimen or pressure-relieving device.

Discussions:

This small study utilising a haemoglobin spray to facilitate the diffusion of oxygen into the wound bed of pressure ulcers identified positive results. The results in this study confirm other European studies into the positive effect on wounds of donation of topical oxygen using haemoglobin (Babbadagi-Hardt et al, 2014; Norris 2014).

Clinical relevance:

The evidence indicates that it is simple to use, easily accessible and, most importantly, an effective method of topical oxygen delivery to the wound bed.

P16

SKIN INSPECTORS TAKE YOUR BEST SHOT[®] - PREVENTING AVOIDABLE HARM AND IMPROVING PATIENT SAFETY THROUGH THE DEVELOPMENT OF AN INNOVATIVE SKIN ASSESSMENT TOOL FOR STAFF, PATIENT AND CARERS

Jivka Dimitrova¹

¹ University Hospitals of Leicester NHS Trust

Introduction:

The need for this innovative skin inspection tool was identified at the author's trust through the process of Root Cause Analysis investigation of Hospital Acquired Pressure Ulcers. Very often pressure damage as severe as category 3 / 4 was missed alongside the opportunity to prevent the deterioration of a red, non-blanching area (category 1) into a category 2 and above as the staff were failing to check all vulnerable pressure areas. Additionally, the staff were finding it difficult to describe the skin changes they observed as the pressure damage developed.

Methods:

The nursing team on one of the wards came up with 'BASH', a mnemonic for Buttocks, Ankles, Sacrum and Heels. This inspired the development of the BEST SHOT acronym. The 'catch phrase' was that everyone should 'Take their BEST SHOT' at monitoring all vulnerable pressure areas. The purpose of the tool was to be used by the clinical staff who undertake daily pressure area checks but also to raise patient/carer awareness of the most vulnerable pressure areas and the first signs of pressure damage. The PDSA cycle (Ill, 2013) was utilised to ensure successful implementation of the tool.

Results and Discussion:

Positive impact of the BEST SHOT tool:

- considerable improvement in monitoring of the most vulnerable pressure areas;
- early signs of pressure damage recognised in a timely manner
- standardised approach to pressure area checks, all clinical areas are using the same tool
- easy, user friendly, self explanatory tool
- increased staffs knowledge, skills and compliance with what was considered before boring, ritualistic nursing intervention
- whole team approach, everyone involved and knows what this is about
- makes documentation easier, considerable improvement in record keeping and communication;
- it meets the standard for one of the elements of the SSKIN bundle i.e. good skin inspection
- patients admitted with pressure ulcers identified promptly

Clinical relevance:

The implementation of the BEST SHOT tool has been incorporated in the trust's Pressure Ulcer prevention strategy since its first introduction 5 years ago and is currently used by 95% of the wards / clinical areas. The innovative features are: the unique acronym 'BEST SHOT[®]' and the use of a catch phrase 'Skin Inspectors take your BEST SHOT' in order to engage staff, making the tool more memorable and interesting for the staff and the patients.

References:

NHS Midlands and East (2012) - 'Guidelines to support pressure ulcer bundle'
Institute for Innovation and Improvement (2013) - 'Quality and service Improvement Tools / the PDSA cycle'

E17 HOW TO BEST SPECIFY THE CRITERIA FOR HIGHER SPECIFICATION FOAM MATTRESSES?

Esa Soppi¹, Juha Lehtiö², Hannu Saarinen³

¹ Eira Hospital

² Medimattress Ltd.

³ Carital Ltd

Introduction:

A new guideline (NPUAP, EPUAP & PPIA 2014) aims at defining the properties of a higher specification foam mattress (HSFM). Since there is a lack of robust trials on different foam mattresses, nurses, clinicians, scientists and manufacturers need to agree the specifications for of different foam mattresses.

Methods:

We incorporate nearly 100 years of combined experience on polyurethane foam production, of research on mattress development, of mattress manufacturing and of research on pressure ulcer development. In addition, we have made an extensive review of the literature (Soppi et al 2015).

Results/Discussion:

A HSFM needs to fulfill these three essential user specifications: 1) it must have good pressure relieving properties, 2) the patient must be able to change position when on the HSFM, and 3) it must be easy for the nursing staff to change the patient's position or move the patient. Thus, to prevent high pressure peaks and strain on the patient's tissues, the HSFM needs to have optimal immersion and envelopment control. Currently, all of these properties cannot be achieved by using only one type of polyurethane foam. On the other hand, a foam mattress with multiple layers is not automatically HSFM. Based on the properties of different foams, the current literature and long experience we propose defined criteria for what constitutes a higher specification foam mattress. The bottom layer is made of high resiliency (HR) foam and the top layer of a viscoelastic foam. The essential characteristics of both foam types are foam density, steel ball rebound capacity, foam hardness (CLD hardness), progressive hardness (SAG index), tensile strength, elongation at break and production tolerance. It needs to be recognized that the mattress cover has an important impact on the functionality of the mattress.

Clinical relevance:

It is possible to define the characteristics which are essential for a standard foam mattress and for a HSFM, but further research is needed based on this observation. We hope that our findings specify clearly which essential requirements are to be met by mattresses used for patient care globally.

References:

Soppi E, Lehtiö J, Saarinen H. An overview of polyurethane foams in higher specification foam mattresses. *Ostomy Wound Management* 61(2):38-46, 2015.

E18 PATIENT PERCEPTIONS OF A PRESSURE INJURY PREVENTION CARE BUNDLE

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⁵ School of Nursing and Midwifery; Deakin University and Alfred Health

Introduction:

Pressure injuries (PI) are often hospital-acquired and are largely preventable [1]. Our team developed an evidence-based pressure injury prevention (PIP) care bundle, targeting at-risk patients and focusing on patient participation in care, which was tested in the INTACT trial (INTroducing A Care bundle To prevent pressure injury). As part of the process evaluation for INTACT, this study explored patients' perceptions of and response to the intervention.

Methods:

INTACT was a multi-site, parallel group cluster-randomized trial assessing the effectiveness of a PIP care bundle in at-risk patients. Eight Australian hospitals were randomized to the intervention or control. The bundle contained three messages for PIP: 1) keep moving; 2) eat a healthy diet; and 3) look after your skin. Four to five patients from each intervention site were purposively sampled to participate in a semi-structured interview after receiving the intervention. Patients were questioned on their perceptions of and response to the intervention. Interviews were audiotaped and transcribed and analyzed using content analysis.

Results:

Nineteen patients were interviewed across the four intervention sites (n=9 female (60%), mean age 68.5±18.1 (range 31-96) years). Patients had mixed responses to the intervention, reflected in three categories. 1) Actively contributing to PIP: patients expressed how the intervention reinforced their existing knowledge and instincts; and empowered and motivated them to enact PIP strategies through improved awareness and understanding. 2) Limiting engagement in PIP: patients described how lacking perceived importance of PI, failing to acknowledge one's own PI risk and taking a passive approach to PIP inhibited their participation in the intervention and in PIP cares. 3) Responding to intervention components: patients described mixed responses to the intervention materials (educational brochure, poster and DVD) but many highlighted the importance of face-to-face education in reinforcing key messages.

Discussions:

Patients described a range of enabling and inhibiting factors that affected their participation in and response to the intervention. Capturing patients' perspectives of the intervention is an important and unique aspect of INTACT's process evaluation. How patients perceived, engaged with and responded to the intervention will be considered when interpreting results of the INTACT study and planning future implementation.

Clinical relevance:

Patients may be more likely to engage in an intervention that builds on their existing knowledge, incorporates human interaction and enables participation in their care. However, participation may depend on the patient's perceived importance of the topic and relevance to themselves.

References:

1. Lyder CH, Wang Y, Metersky M, et al. Hospital-acquired pressure ulcers: results from the National Medicare Patient Safety Monitoring System Study. *J Am Geriatr Soc* 2012;60(9):1603-8.

E19 THE ROLE OF SYSTEMIC PERFUSION AND OXYGENATION IN PRESSURE ULCER DEVELOPMENT IN CRITICAL CARE

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Introduction:

The 2014 International Guideline recommends clinicians consider perfusion and oxygenation in pressure ulcer risk assessments. The guideline summarizes a variety of significant clinical indicators related to perfusion and a few related to oxygenation. This study explores the role of several novel measures of systemic oxygenation and perfusion in pressure ulcer development in critically ill patients.

Methods:

The medical records of 444 consecutive adult patients were reviewed for inclusion criteria: pressure ulcer free on admission; pulmonary artery (PA) and arterial catheters for > 48 hours; and hospital stay > 7 days. Of 163 patients meeting criteria, 18 developed > Category II pressure ulcers and 18 were selected as diagnosis/age matched controls. Indices of perfusion and oxygenation were investigated as potential risk factors (i.e. vital sign and PA readings every 4 hours for 72 hours before skin breakdown; arterial [ABG] and mixed venous blood gases [MVBG]).

Results:

There were no significant differences between groups in the three days prior to skin breakdown for lowest systolic (SBP), diastolic (DBP) and mean arterial blood pressure (MAP) and cardiac index (CI), or highest systemic vascular resistance (SVR) and preload (CVP & PAWP). Time-series MANOVA analysis of readings taken every 4 hours in the 72 hours before skin breakdown found subjects developing pressure ulcers had patterns of significantly lower SBP ($F = 2.77, p = .019$), DBP ($F = 2.75, p = .020$), MAP ($F = 3.71, p = .004$) & CI ($F = 3.68, p = .004$) and higher CVP ($F = 6.70, p = .000$) & SVR ($F = 15.36, p = .000$). There were no significant difference between groups for ABG parameters. Patients with pressure ulcers required more aggressive oxygen delivery systems (e.g., nasal cannula to ventilator) the day before breakdown ($p = .020$). Of the subjects who had simultaneous ABG and MVBG analysis, those developing pressure ulcers had significantly lower partial pressure ($p = .047$) and saturation ($p = .018$) of oxygen in venous blood. Calculations identified significantly lower venous oxygen content ($p = .014$) and higher oxygen extraction ratios ($p = .024$).

Discussions:

Measuring extremes in perfusion have yielded mixed results in studies of pressure ulcer risk; a time-series approach may be more useful. ABGs are not indicative of risk. MVBG analysis revealed high oxygen extraction ratios from tissues in a state of oxygen debt.

Clinical relevance:

Computerized analysis of perfusion parameters over time may help refine risk analysis. Increasing oxygen supplementation level is a simple clinical measure. The role of tissue oxygen debt warrants further investigation.

P20 STOP THE PRESSURE - NEXT GENERATION OF NURSE LEADERS

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Introduction:

In April 2013 a student nurse tweeted the Regional Chief Nurse about the limited knowledge and training for student nurses around pressure ulcer prevention. What started as a tweet culminated in a 500 strong conference which was the launchpad of the forthcoming student nurse conferences across the Country.

Methods:

The conferences are student led from the initial concept to execution. Through the students creating discussion on social media sites like Twitter, they began to challenge NHS leaders to do more to address pressure ulcer prevention and work towards achieving zero avoidable pressure ulcers. They built a momentum and kick started a series of student led events.

A group of students adapted the SSKIN tool to reflect a version for student nurses. This was one area where a number of simple steps could make a difference to improving safety, quality and experience of care.

Results:

The inaugural conference at Lincoln University saw 500 attendees and was accompanied by a strong social media presence resulting in a twitter reach of 330,000 and over 2 million timeline deliveries. Four further conferences followed across the Country which combined have reached over 2,000 students with two more conferences scheduled this year. This has resulted in over 2,000 students familiar with SSKIN and resources to care for patients in a way that reduces the risk of pressure ulcers. Each event mirrored the goals of the first event, to focus on raising awareness of the stop the pressure campaign and spread the important learning.

Discussions:

Students who led the conferences and developed student SSKIN have been champions and role models to other students. They have done this in an extremely positive way, but have provoked reflection and influenced change in the values and behaviours demonstrated by many health professionals. It has been incredible to see such an impact on patient safety and inspiring to see student nurses take a lead in sharing this important information with their peers.

The development of www.stopthepressure.co.uk now provides a hub of helpful materials, tools and resources. A resource guide is being developed for Universities to access via the website if they are looking to host a conference. The social media campaign has mobilised students to start their own interventions to improve pressure ulcer awareness. Student events are a success story through the engagement with the predominantly young workforce of our emerging future leaders.

Clinical relevance:

The students found the most difficult aspect challenging experienced nurses, although what was evident was their increase in confidence as their knowledge developed.

References:

www.stopthepressure.co.uk

E21

A NOVEL ASSESSMENT TOOL FOR CHARACTERIZING WHEELCHAIR CUSHIONS

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Introduction:

A family of wheelchair cushions may provide a clinician with a wide array of properties, functionality, and efficacy. A method of characterizing the specific design characteristics and their functional effects was developed through this project, allowing for the ranking and ordering of cushions by these properties and the resulting clinical benefits they provide the individual.

Methods:

A multidisciplinary team of clinicians, engineers, and public policy experts first identified the typical "intended uses" of cushions: skin/tissue protection, and positioning/stability, while then analyzing the specific properties of the cushions that provide these benefits to the individual.

Results:

Design characteristics that contributed to these patient benefits were determined to include, among others: adjustability (to body shape, weight, changes over time, positioning changes throughout the day), which has been demonstrated to be a key characteristic of effective wheelchair cushion design [1,2], available immersion depth and, load distribution method, both of which contribute to envelopment, an additional key property of effective cushions [1,2], design accommodation for correction of asymmetry, and ability to align lower limbs. The presence or absence of clinical evidence for each cushion was considered as well. Corresponding measurements, or assessments of meets/does not meet for each criterion were determined. Based on these results, the cushions were mapped on a chart using a coordinate system of "skin/tissue protection" on the X-axis and "positioning/stability" on the Y-axis.

Discussion:

This novel method of analyzing cushion properties and assigning values to characteristics resulted in a chart to help clinicians compare cushion options and to aid in the selection process. Positions are not to a defined specific scale, but do offer approximate relative functional comparisons of benefits, characteristics, and tradeoffs. This analysis does not preclude the need for clinical or scientific evaluations, or analysis of historical clinical outcomes. As additional evidence is acquired, the chart will be further refined.

Clinical relevance:

This resulting tool gives the clinician an easy, visual assessment of benefits and trade-offs of various cushion models within a product family, to more confidently prescribe the appropriate cushion to meet the unique needs of the individual.

References:

1. Gefen A. Tissue changes in patients following spinal cord injury and implications for wheelchair cushions and tissue loading: a literature review. *Ostomy Wound Manage.* 2014 Feb;60(2):34-45.
2. Levy A, Kopplin K, Gefen A. An air-cell-based cushion for pressure ulcer protection remarkably reduces tissue stresses in the seated buttocks with respect to foams: finite element studies. *J Tissue Viability.* 2014 Feb;23(1):13-23.



E22

USE OF INFRARED THERMOGRAPHY IN THE DIAGNOSIS OF PRESSURE ULCERS. A LITERATURE REVIEW

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Introduction:

Based on the definition of Category I Pressure Ulcers named "Non-blanchable redness of intact skin", useful diagnostic tools for early identification of pressure ulcers have been searched for. The best known clinical methods to assess capillary refill are the transparent pressure plate or finger pressure method. The objective of this study is to evaluate the use of infrared thermography as an auxiliary diagnostic method.

Methods:

A literature search was carried out in Medline, Web of Science, Scopus and Embase with the following search terms: Pressure ulcer, Thermography and Diagnostic test.

Results:

Of all studies obtained, only one was found that compares the diagnostic accuracy of the transparent pressure plate method and the finger pressure method. Sensitivity was similar for both methods (0.75 vs 0.73) and specificity was equal (0.95). There is no mention of confidence intervals (CI) nor of the kind of training received by the implicated staff. Regarding the interobserver reliability of both tools, a kappa index of 0.69 and 0.72 was calculated for the finger pressure and transparent plate method respectively.

Several studies have been conducted on infrared thermal imaging to identify and diagnose pressure ulcers proving it to be a moderate to good tool. The findings of one study that evaluates the usefulness of thermography to the diagnosis of deep tissue injury, indicate that an area of non-blanchable erythema cooler than the area around it, is a good predictor (adjusted OR: 3.18; 95% CI 3.8 to 263.1).

Discussions:

The special category "suspected deep tissue injury" of the International Classification of Pressure Ulcers by NPUAP/EPUAP shares some key elements with both category I and II, questioning its correct diagnosis and treatment, as the treatment of choice differs substantially between categories. Infrared thermography may be a helpful tool. By measuring the infrared radiation of the skin, it is capable of detecting local temperature variations, as occur in pressure ulcers due to alterations in the vascular pattern.

Clinical relevance:

Infrared thermography could be a good additional diagnostic tool for concealed deep tissue damage in category I pressure ulcers, despite of its limitations.

References:

- Farid KJ, Winkelman C, Rizkala A, Jones K. Using temperature of pressure-related intact discolored areas of skin to detect deep tissue injury: an observational, retrospective, correlational study. *Ostomy Wound Manage (Internet).* 2012 (citado 5 Dic 2013); 58(8):20-31. Disponible en <http://www.o.wm.com>

EFFECTS OF NECROX-5 ON THE SURVIVAL OF RANDOM PATTERN SKIN FLAP IN MICE

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Introduction:

NecroX-5 is one of the derivatives of NecroX series compounds. It has cytoprotective effects against ischemia, ischemia-reperfusion injury through free radical scavenging and mitochondrial membrane stabilization effects. The purpose of this study was to evaluate the effect of NecroX-5 on the viability of random pattern dorsal skin flaps in mice.

Methods:

30 BALB/c mice were distributed randomly into three groups. Group I was administered NecroX-5 10 mg/kg in distilled water intraperitoneally from 1 day before surgery until postoperative 7 days, daily, while group II received NecroX-5 in higher concentration (30 mg/kg in distilled water). The control group was administered same amount of distilled water instead of NecroX-5.

Results:

The mean percentages of flap surviving area was 11.21 ± 5.16 percent in the control group, 24.24 ± 10.23 percent in the group I and 27.44 ± 8.73 percent in the group II. Statistically significant increase in the flap surviving area was observed in the group I and II compared to the control group.

Discussions:

The result of this study demonstrates the flap protective capacity of NecroX-5 and might suggest that the anti-apoptotic and mitochondrial membrane stabilization effects are the main mechanism for the larger surviving area. Considering the cell protective effects of NecroX compounds against ischemia-reperfusion injury, other experimental models for graft surgeries such as skin and fat graft and organ transplantations are also good candidates for further studies.

Clinical relevance:

The results of this study shows NecroX compounds can increase the flap surviving area. Local flaps are one of the basic methods to reconstruct defects of decubitus ulcers. Unfortunately, many cases needs secondary surgery to overcome partial flap necrosis after the surgery. NecroX-5 can be a helpful to reduce the flap necrosis.

References:

- Ruser B, Yuksel K, Kadri O, Ruka G, Cem IH, Arzu K, Ugur K, Gokhan K, Hesna MA. The effect of microneedling with a roller device on the viability of random skin flaps in rats. *Plast Reconstr Surg.* 2013;131:717.
- Thu VT, Kim HK, Long LT, Lee SL, Hanh TM, Ko TH, Heo HJ, Kim N, Kim SH, Ko KS, Rhee BD, Han J. NecroX-5 prevents hypoxia/reoxygenation injury by inhibiting the mitochondrial calcium uniporter. *Cardiovas Res.* 2013;94:342-350.

ELCOS - PORTUGUESE WOUND SOCIETY: A NEW MODEL OF WOUND ASSOCIATION

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¹ Elcos - Portuguese Wound Society

Introduction:

ELCOS is a scientific society that brings together professionals from different areas (health, education and research) which have in common an interest of promoting discussion, training and research in tissue viability and wound care.

Methods:

We intend to know in each region the existing nosology in terms of chronic wounds, the incidence and prevalence, human resources, and knowledge to develop a action plan which allows sustained work developed in partnership with institutions in order to respond in a directed way the specific problems of each region. In this task to eradicate the disease we follow the words of the General Director of WHO (1983): "Everyone is on and has the power to change things: citizens of the villages and cities, families and communities and all sorts of political and social groups, such as education and research institutions, non-governmental organizations and professional associations. But also health experts and those responsible for the community, such as civil and religious leaders, teachers, judges, workers of social security.

Without the deep involvement of the entire population health for all will always be a mirage."

Results:

Ambitious but conscious and policy outlined in its limits, ELCOS Board and its departments and regional councils, are professionals inserted at various levels, in the scientific community. All have in common the interest to promote and /or support educational, technical, scientific, ethical and research initiatives in the prevention and treatment of wounds, covering thus the clinical practice, teaching and scientific research.

Therefore, the human capital of ELCOS consists of

The board members and regional councils, consists of a knowledge of cast, which ensures a sustained activity both in terms of training as research, with representation at the level of the EPUAP, EWMA and WHO. To fulfil this goal ELCOS organized geographically in regional councils, aiming to address the regional nosology in terms of chronic wounds through the involvement of interested professionals in each, in partnership with health and education institutions at a local level.

Discussions:

Clinical relevance: We believe that although Portugal is a small country there was the need to bring out a new model of association in order to change and promote a better quality of care for all.

P25 MANAGEMENT PRESSURE ULCERS FROM A HEMODIALYSIS UNIT. CASE REPORT

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Introduction:

In hemodialysis units pluripathologies patients being served. They are chronic patients. Nursing provides integral care makes prevention and treatment of pressure ulcers.

The objective of treatment is to promote ulcer healing physiological mechanisms. This requires action on the aggravating factors delaying the process as the bacterial load and infection.

Methods:

Case report of pressure ulcers in the hemodialysis unit.

Subject:

A 67-year-old male, diabetic with Kidney Failure, hemodialysis treatment, Norton 8, third grade pressure ulcer on the right heel. Necrotic plaque with erythema and edema. Weak pedal pulse is palpable;

Treatment:

Following the steps of the TIME framework: effective control of the non-viable tissue; inflammation or infection, wound exudate and stimulation of epithelial edges.

Collagenase and hydrogel to debride and applied as one secondary dressing is applied polyurethane foam.

Two weeks necrotic plate is loosened but signs of infection continue.

The following week is isolated pseudomonas, systemic antibiotic is applied for 10 days and the specific local treatment is changed to the UPP infected but improvement is slow. It presents slough is exudative.

After 4 weeks of slow evolution of wound healing, treatment is modified and a solution and gel 0.1% and 0.1% betaine Undeclenamidopropil polyhexanide is applied for cleaning and treatment of the wound and covered with a dressing polyurethane foam

A week after the ulcer is not devitalized tissue, it has granulation tissue.

After two weeks of implementing this practically polihexanide epitelizado ulcer.

Discussions:

The healing process of pressure ulcers is always done and when the wound is clean of all dead tissue that prevents the correct development of the new tissue growing and it is therefore essential to prevent and adequately treat infection is a serious drawback in positive evolution of the process of healing of the ulcer.

Clinical relevance:

The infection control plays a key role in the local treatment of ulcers.

P26 VALIDATION OF SOFTWARE FOR RISK ASSESSMENT AND FOLLOW-UP OF PRESSURE ULCERS

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Introduction:

Risk assessment tools have been recommended by NPUAP/EPUAP/PPPIA (2014) guideline. However, it is a challenge to use them in daily health care routine once they are very time consuming and many nursing staff is unaware of most of scales available. In order to solve this issue, the Braden Scale was computerized in a software format and a daily system of evaluation and wound follow-up were set up for those patients who developed pressure ulcer. Therefore, the software provides the historical of Braden scores and for those who developed pressure ulcers it is possible to monitor the wounds evolution. Besides, nurses can prescribe daily wound care and prevention's actions for each patient individually.

Methods:

It is a field study, prospective cross-sectional quantitative approach to appraise the quality of the software "Aplicativo Indicador de Úlcera por Pressão". Following ethical approval and consent, 15 nurses of intensive care unit of a Brazilian public hospital were trained to use the software and after one month they answered a questionnaire. The questionnaire contained 16 multiple-choice questions and it was divided in sections functionality, reliability, usability and efficiency according to ISO 9126. Later, the answers were categorized into positive and negative evaluations.

Results:

The results showed that 80% (12 nurses) answered all 5 multiple-choice questions positively for functionality. In reliability section, 40% (6 nurses) answered all 3 multiple-choice questions positively. The quality characteristics usability had 27% (4 nurses) answering all 6 multiple-choice questions positively and in efficiency section, 53% (8 nurses) answered 2 multiple-choice questions positively.

Discussions:

The software usability and efficiency were highly well evaluated. However, the ability to avoid failures (reliability) and the comprehension of the software itself (usability) need improvement.

Clinical relevance:

The main objective of assess the quality of this software was to certify the acceptance by professionals since the identified faults were corrected. Furthermore, the nurses reported that the software streamlined and systematized the patient/wound's evaluation and the database generated facilitated the management of pressure ulcers in the unit.

References:

- 1 Webster, J., Coleman, K., Mudge, A., Marquart, L., Gardner, G., Stankiewicz, M., Kirby, J., Vellacott, C., Horton-Breshears, M., McClymont, A. (2011) *Pressure ulcers: effectiveness of risk assessment tools. A randomised controlled trial (the ULCER trial)*. *BMJ Quality & Safety Online First*. Available at <http://quality.safety.bmj.com> [Assessed 15 January 2015].
- 2 Moore, Z., Johansen, E. & Van Etten, M. 2013. *A review of PU risk assessment and prevention in Scandinavia, Iceland and Ireland (part II)*. *Journal of Wound Care*, 22, 423-4, 426-8, 430-1.

E27 SMART TECHNOLOGY - IS THIS THE WAY FORWARD IN NURSE EDUCATION?

Kumal Rajpaul¹

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Introduction:

Smart technology - Is this the way forward in nurse education?

This poster is part two of initial work undertaken following the development of a mobile training app in pressure ulcer prevention and management for clinical staff across acute and community services. The poster reviews the qualitative and quantitative data post implementation of the app, taking into account the key outcomes that have impacted on this method of delivering education and lastly how this is perceived by clinical staff and on patient care.

Methods:

Pre-launch data identified that there was a high uptake in the app being downloaded due to ease of access and use. Following the launch of the app, clinical staff were asked to complete a questionnaire outlining their current training needs and how these were met in terms of pressure ulcer prevention, management and treatment within the workplace. This was reviewed following the completion of the 5 bite size modules available on the app. Qualitative data included how their knowledge and skills had improved and what impact this will have on patient care. Various clinical staff groups were identified to give verbal feedback on how they felt the app had helped with their understanding of pressure ulcer prevention and application in clinical practice.

Results:

The quantitative data identified improved awareness in early identification and prevention of pressure damage. Staff reported improved confidence in delivering preventative interventions before skin damage occurred. The qualitative outcomes identified that staff felt better equipped to deliver care to patients at risk of or with pressure damage. This app helped directly with prevention and management of pressure ulcers occurrence and was used as a reference point should staff require it.

Discussions:

The healthcare environment is very busy and a demanding environment where expectations on clinical staff are ever increasing. There is a need for alternative ways to deliver education and training. It is important to evaluate the service and clinical needs being faced by healthcare professionals and organizations needs to adapt to ensure educational training is tailor-made and bespoke to practitioners. The mobile training app is responding to the changing needs of healthcare practitioners in delivering training. The app allows staff to return to it as and when the information was required as well as being an interactive tool in clinical practice.

Clinical relevance:

The need to deliver innovative education in pressure ulcer prevention and management to maintain clinical relevance and interest is paramount in the changing healthcare environment.

P28

NON-INVASIVE MONITORING OF PRESSURE ULCER FORMATION

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Introduction:

Monitoring biomarkers in urine of spinal cord injured (SCI) individuals may be a tool for early detection or prediction of pressure ulcers (PUs)¹. Detecting PU formation in an early stage enables early treatment, preventing soft-tissue degeneration up to a category II or IV wound.

A study has been designed to investigate the applicability of skin and muscle degradation markers as monitoring agents. It has been divided into an exploratory part and an extended part to answer the following questions:

1. What are the baseline levels of the biomarkers in individuals with SCI?
2. What is the biological variation of the markers?
3. Do the marker concentrations markedly change before a PU becomes visible?

Methods and objectives:

Exploratory part: The index of individuality (II) is determined by taking daily urine samples for 8 weeks. The II depicts whether population-based reference intervals or patient specific serial testing should be used to determine abnormal changes². The effect of obtaining a spinal cord injury on biomarker levels is investigated by comparing data from recent SCI (<1 year), chronic SCI (>1 year) and healthy individuals groups.

Extended part: To determine whether marker concentration changes severely before PUs are visible, 4 weekly urine samples are obtained from chronic SCI subjects. Individuals participating free of a PU for 2 years or those obtaining a PU, excluding category 1, represent endpoints of this study (Figure 1). Daily urine samples are collected for a week after detection of a PU. For participants presenting with unexplainable fevers, which can be a precursor of deep tissue injury, daily urine sampling is undertaken. If the subject subsequently develops a PU, sampling is continued for a week after diagnosis. If not, the subject returns to their normal sampling schedule after the fever has resolved.

Discussion:

In this study systemic monitoring of SCI for PU ulcer formation is performed, to provide a first indication of PU formation. However, further diagnostics are needed to determine the location and the extent of the damage. Therefore, the study is associated with animal studies investigating both marker kinetics and the use of MRI as a second diagnostic stage.

Clinical relevance:

If successful, the results of this research will lead to a non-invasive monitoring method for PU in SCI. Even if the markers prove not to be applicable, a method has been developed which can be used to investigate other potential biomarkers.

References:

- [1] Loeckcker 2012, *J Rehabil Res Dev* 49(3)
- [2] Wu, 2013, *Curr Heart Fail Rep*, 10(4)

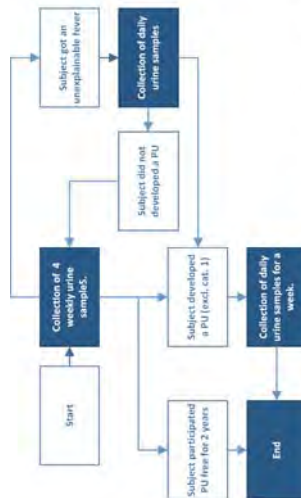


Figure 1: schematic overview of urine collection and endpoints in the extended study

P29 SKIN BLOOD PERFUSION (BP) CHANGES UNDER ISCHIAL TUBEROSITY (IT) DURING GLUTEAL NEUROMUSCULAR STIMULATION (GNMS) IN SPINAL CORD INJURY (SCI)

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Introduction:

The IT is one of the most vulnerable site for pressure ulcer (PrU) development in SCI who use wheelchairs [1]. Previous studies suggest that decreased volume of blood in the tissues below the injury in SCI contributes to their susceptibility to PrU [2,3]. Electrical stimulation (ES) was reported to increase tissue blood flow in SCI [4,5]. Various techniques are available to measure tissue/skin blood parameters, yet most of them utilise rigid probes, which could potentially cause local tissue damage. Therefore we aimed to assess gluteal skin blood perfusion changes using a thin flexible optical probe during GNMS in seated SCI.

Methods:

A total of 18 adults with suprasacral complete SCI were included. GNMS was delivered via sacral nerve root stimulation (SNRS) or surface ES. Skin BP was measured using a tissue reflectance spectrometer (TRS) to measure index of hemoglobin (IHB) and oxygenation (IOX) under the ITs. We used a two-tailed paired t-test to compare IHB and IOX before and during stimulations.

Results:

The IHB and IOX during stimulation were significantly higher than baseline in 6 participants who had SNRS using magnetic stimulator (IHB 1.05 ± 0.01 before vs. 1.08 ± 0.01 during stimulation, $P=0.03$; IOX 0.18 ± 0.08 before vs. 0.46 ± 0.12 , $P=0.01$ during stimulation). Similarly, the significant difference in IHB and IOX were obtained in 6 participants who had SNRS via a SARS implant (IHB 1.01 ± 0.01 before vs. 1.07 ± 0.01 during stimulation, $P=0.004$), IOX $(0.79 \pm 0.3$ before vs. 2.2 ± 0.5 during stimulation, $P=0.03$).

Although IHB and IOX increased in those 6 participants who had surface ES, the difference of both indices were not significant between baseline and during FES (IHB 1.05 ± 0.003 before vs. 1.06 ± 0.01 during stimulation, $P=0.07$, and oxygenation (IOX 0.59 ± 0.19 before stimulation vs. 0.93 ± 0.24 during stimulation, $P=0.12$).

Conclusion:

SNRS or surface FES of gluteal muscles can induce sufficient gluteus maximus contraction and significantly increase skin blood perfusion.

Clinical relevance:

Using such thin flexible probe has advantages of avoiding local tissue damage. Moreover, the SNRS via a SARS implant may be more convenient and efficient for frequently activating the gluteus maximus in SCI population for PrU prevention.

Reference

1. Ash D. *J Clin Nurs* 2002;11(4):470-8.
2. Marin J et al. *Spinal Cord* 2013;51(7):522-7.
3. Mawson AR et al. *Arch Phys Med Rehabil*. 1993;74(7):745-51.
4. Smit CAJ et al. *Spinal Cord* 2013;51(9):694-9.
5. Wu GA et al. *PM R* 2013;5(8):688-96.

P30 NEONATES AND MEDICAL DEVICES: ARE WE PROVIDING ADEQUATE CARE FOR VULNERABLE INFANTS?

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Introduction:

It is established that hospitalised neonates with immature skin structure and function are at risk of skin breakdown, leading to pressure ulcer (PU) development. 1. Indeed PU prevalence of 23% has been reported, with up to 34% of skin damage classed as 'preventable'. 2. One major cause for this high prevalence is the use of medical devices, implicated in more than 50% of PU cases affecting in neonates. 3. However, little is known about the strategies adopted by neonatal nurses to minimise damage, or to what extent staff are aware of the problem.

Methods:

A 19-part questionnaire was designed, comprising multiple-choice, ranking, and open-ended questions. It was distributed to nursing staff in neonatal intensive care and high dependency hospital wards across a UK region. Institutional ethics was granted for the study.

Results:

56 responses were returned, 64% of which were from staff with over 10 years' clinical experience. The incidence of skin damage was perceived to be high, with 26% of participants stating that they encountered damage daily. The medical devices reported to cause skin damage included continuous positive airway pressure (CPAP) masks, medical tape and venous cannulas. Although staff were aware of methods to minimise damage, some reported that device design e.g. size, were inappropriate for use with neonates. Education emerged as a key theme in promoting skin health. However, only 10% of participants had received formal skin care training.

Discussion:

The results confirm previous reports that immature skin in neonates is vulnerable to device-related damage. The survey revealed that nurses struggle to protect skin health in neonates due to constraints in training and availability of appropriate prophylactic resources. Future work will include point prevalence and incidence studies, which will provide insight on risk factors specific to the management of neonates, as well as contribute to the evidence surrounding medical device-related pressure ulcers.

Clinical relevance:

This study has demonstrated a clear problem with medical device related ulcers in premature neonates and confirmed the vulnerability of immature skin. It has also highlighted the need to enhance nurse staff education. Acknowledgements

Financial support for this research is provided by Portsmouth Hospitals NHS trust

References:

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PRETERM AND NEONATAL SKIN CARE: FROM THE PROBLEM TO SOLUTIONS

P31

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Introduction:

Patients in neonatal intensive care unit (ICU) need much more attention than other patients, especially for skin problems. In this group of patients pressure lesions depend particularly from the incomplete development of the skin layers and much more from the use of medical devices, such as monitoring system, vascular and respiratory devices in the intensive care unit.

Methods:

An initial 4 weeks monitoring period of ICU patients looking at injuries caused by pressure due to the application of devices allowed us to highlight the most critical ones, from patients already present (2 cases) and those from other hospitals (1 case). The Wound Care Team (WCT) - after a careful search for the best scientific evidence in national and international literature, and after evaluating the principles of the nursing best practices - have improved the attention of the entire nursing staff for prevention and treatment of pressure lesions through training courses. At the end of the training courses and in collaboration with some motivated nurses, the WCT has created different tools (protocols, screening tool, posters and informative brochures for nurses and for parents) in order to evaluate, to prevent and to treat pressure lesions in preterm and neonatal patients.

Results:

At the end of the project, a better knowledge of the problem has been verified - especially for lesions due to the use of medical devices - and so a proper compilation of nurse's diary, as well as a better prevention and treatment of pressure lesions. A new monitoring period of one month will be scheduled in December to assess the implications of this study in clinical practice.

Discussions:

Training courses and the use of shared protocols and tools have shown to improve a higher nursing attention to prevention and treatment of pressure lesions in neonatal intensive care unit and allow a significative reduction of pressure lesions on young patients.

Clinical relevance:

the adoption of methods of care planning aimed at identifying neonatal patients at risk and implement the correct assessments and preventive treatment has reduced considerably the problem in patients hospitalized in NICU.

References:

Colleen T, Butler, *Pediatric skin care: Guidelines for assessment, prevention and treatment. Dermatology Nursing*, 2009
Schindler CA, Mikhailov TA, Kuhn EM, Christopher J, Conway P. *Protecting fragile skin: Nursing interventions to decrease development of pressure ulcers in pediatric care. AM J Crit Care*, 2011

TRACKING PATIENTS WITH PRESSURE ULCERS IN THE COMMUNITY SETTING: A PILOT PROJECT.

E32

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Introduction:

There is a paucity of information regarding the prevalence of and risks associated with the development of pressure ulcers in the community setting. A project within a UK inner city population has been commenced to track and monitor patients with pressure ulcers. It is expected that an understanding of any special causative factors for the community patient will be determined. The project will be running alongside an increased delivery of education regarding pressure ulcer prevention. This poster will introduce the first 4 months of the project.
Methods: The prevalence and incidence of pressure ulcers will be monitored. Associated risk factors will be explored. Data will be collated, analysed and compared with incumbent local and national pressure ulcer prevalence data. The healing rates of pressure ulcers will be measured. A reduction in the incidence and prevalence of pressure ulcers is expected.

Results:

This poster will describe the initial introductory stages of this pilot project. This will include processes initiated for the implementation of the project and methods used to engage with the local health and social care population. As well as prevalence and incidence data, data will be collected with regard to

- Incidence in relation to end of life within one year
- Risk factors in the community setting
- Healing rates within a focused management, education and monitoring programme
- Hospital admission and discharge rates
- Wounds and skin damage misdiagnosed and reported as pressure ulcer
- Avoidable and unavoidable rates

Discussions:

Local healthcare commissioners have commissioned this pilot project, set within an extremely tight timeframe, to demonstrate improved clinical outcomes. The project will be running alongside a 6 month enhanced education programme and a project utilising the application of softcasting for heel pressure ulcer prevention and management. Outcome results will not be available at the time of poster presentation, however the implementation of the project will be described. It is expected that this project will explore issues pertinent to the patient and their carers/family within the community setting with regard to risk factors and avoidable rates. This information is well published for the hospital setting.

Clinical relevance:

Less is understood about the development of pressure ulcers within the community setting compared to the acute setting. Understanding themes behind the root causes of pressure ulcers will enhance opportunity to prevent their development. The prevention of pressure ulcers in the community setting requires collaborative working between health and social care as well as families - how these relationships can develop to improve outcomes will be explored.

P33 CAN A DRESSING PREVENT PRESSURE ULCERS IN ORTHOPEDIC CARE?

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Introduction:

The orthopedic ward in Växjö, Sweden, has a long tradition of pressure ulcer prevention (PUP). Measurements regarding PU prevalence are made monthly. Despite an active prevention program, the prevalence was around 15%. A recent study by Santamaria(1) show that the use of a five layer polyurethane foam dressing (Mepilex Border Sacrum) can prevent PUs in ICUs. Therefore the orthopedic ward in Växjö decided to evaluate if the same dressing prevention regime also is applicable in the orthopedic setting.

Methods:

The evaluation was divided into two groups, including 100 patients (>65 years) in each group. Exclusion criteria were discharge or when a PU was developed. Group one consisted of the ward's usual routines (risk assessment, several preventive actions). Additionally, the patient's skin was inspected daily and documented on a special protocol. Group two had the same structure but was supplemented by applying the preventive dressing at admission. The skin was inspected daily by lifting the dressing and reapplying it again, and documented in the protocol.

Results:

The result showed that the PU rate was 15% in group one and 7% in group two, which is a 50% reduction. Also, the PUs in group two were only of category one. The result has made the use of the Mepilex Border Sacrum a part of the ward's standard PU prevention program.

Discussions:

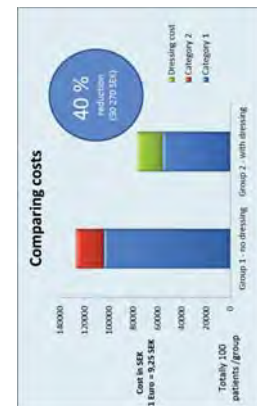
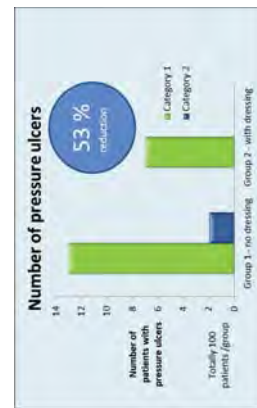
The evaluation is completed, with good results and the use of a prophylactic dressing is now implemented in our routines. The prevention of PUs is a continuous process which is prioritized. The monthly measurements are still carried out and the results are close to zero in sacral pressure ulcers. The goal ahead is to keep a low incidence but also make the skin inspection and prevention actions as important as checking vital signs.

Clinical relevance:

There are several published studies (done in ICUs) showing positive effects of adding a dressing to already established preventive actions, in order to prevent pressure ulcers. This evaluation shows that the method also can be applied, with good results, in orthopedic wards.

References:

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E34

IMMOBILE PATIENTS' SPONTANEOUS MOVEMENTS - IMPLICATIONS FOR REPOSITIONING AS INTERVENTION

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Introduction:

To reduce the risk for pressure ulcers, repositioning of immobile patients is an important standard nursing practice. However, knowledge on how this intervention is carried out among elderly immobile patients is limited. Furthermore, to what extent patients perform minor movements between nursing staff-induced repositionings is largely unknown, but these movements might have implications for the repositioning intervention. The aim of the study (1) was to investigate nursing staff-induced repositionings (REP) and elderly patients' spontaneous movements (MOV) during the day and night and identify factors associated with the REP and MOV frequency. Methods: The patients' movements (n = 52, mean age 85 ± 7 years) were registered over the course of three days using a monitoring system. During the same period, the nursing staff documented each occasion they helped the patient change position. Movements registered by the monitoring system were compared with the nursing staff notes and were coded to be either spontaneous or caused by nursing staff.

Results:

The patients moved spontaneously a median of 16 times (IQR 45) during the day and 10 times (IQR 29) during the night. The patients were repositioned by the nursing staff a median of five times (IQR 2) during the day and two times (IQR 1) during the night. High risk patients were repositioned by the nursing staff more often than patients with lower risk, but the MOV frequency was not associated to the risk score. Analgesics were positively related to the MOV frequency and psycholeptics negatively related.

Discussions:

Although elderly and immobilized, some patients frequently reposition themselves. These movements, although minor, are important to increase blood flow supply and reduce strain stress (2). The MOV frequency was not associated with the risk assessment score, which implies that some immobile patients assessed as low risk might need to be repositioned as often as patients assessed as high risk. Patients prescribed psycholeptics seems to need to be repositioned more frequently than others. It seems also important to treat the patient's pain to increase their ability to perform minor movements on their own.

Clinical relevance:

The patients who cannot make minor movements are important to identify because they very likely need more intensive repositioning interventions. A monitoring system might be useful in decision-making with regard to planning repositioning frequency and positions used in the prevention of pressure ulcers among elderly immobile patients.

References:

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¹ MovinSense, Kinematix Company, Portugal

REFLECTING ON COMMERCIAL PARTNERSHIPS AND THE IMPACT ON REDUCING THE NUMBER OF AVOIDABLE GRADE 3 AND 4 PRESSURE ULCERS WITHIN THE COMMUNITY HOSPITAL SETTING

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Introduction:

A study by Downie (2013) suggests that 43% of grade 3 and 4 hospital acquired pressure ulcers were avoidable. This higher than expected prevalence, is possibly due to the ageing population and multiple comorbidities. Therefore a proactive approach is necessary for preventing avoidable harm for people in our care. These findings inspired a product evaluation of a new dynamic mattress system within a community hospital setting. Whilst the clinical outcomes were favourable, it was felt that one year on we should reflect on whether these positive outcomes had been maintained.

Methods:

The original evaluation of 98 patients using a dynamic mattress replacement system demonstrated multiple benefits including, effective prevention, engagement of nursing staff, positive patient feedback and excellent customer service from the commercial partner (Grothier & Bradley, 2014). During the evaluation patient's deemed to be at increased risk of developing pressure damage was commenced on the product (14% of all admissions). The organisation monitored all pressure damage however grades 3 and 4 were of particular interest, as these are often associated with extensive tissue loss, infection and morbidity. Throughout the evaluation there were no reports of grade 3 or 4 pressure damage. Hence the key questions were:

- Had this zero incidence been maintained?
- Had the excellent service from the commercial partner remained consistent?

Results:

Since the evaluation concluded in March 2014, The mattresses continue to be utilised across the three community wards.

- Grade 3 and 4 pressure ulcer incidence: There have been no reported incidence in the last 12 months, considering the complex needs of the patient population; this is considered an outstanding achievement.
- Service level from Shelden Healthcare Ltd: The supplier has ensured products have met varying demands. Ongoing comprehensive staff training has ensured familiarity and appropriate utilisation of the mattress system. A newly implemented electronic asset management system has further enhanced the effective management of resources and budgetary control.

Discussions:

Although it is acknowledged excellent nursing care has been consistently maintained for community hospital inpatients. Partnering with an appropriate commercial company has facilitated standardisation in practice and supported the effective management of those at increased risk which has contributed to the zero incidence of grade 3 and 4 pressure damage

References:

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 Grothier L, Bradley D (2014) Evaluation of a dynamic mattress replacement system within a community setting. *J Community Nurs* 28(5): suppl 1-8
 Grothier, L. and Bradley, D. (2014)

THE COST-EFFECTIVENESS OF ALLEVYN LIFE SILICONE ADHESIVE DRESSING IN PREVENTING HOSPITAL ACQUIRED PRESSURE ULCERS

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¹ Awm; Smith & Nephew

Introduction:

Hospital-acquired pressure ulcers (HAPUs) are costly and largely preventable. The prevalence of HAPU in Europe is 18.1% and varies by country ranging from 8.3% in Italy to 21.9% in the UK and about 15% in the US. PU cost the US healthcare system an estimated \$9.1-\$11.6bn/year while in the Netherlands PU account for 1% of the healthcare budget and in the UK between £1.760 million and £2.640 million each year. Recent studies have found that PU prevention is cost saving in particular the prophylactic use of foam dressings^{2,3}. This article aims to evaluate the cost-effectiveness of using ALLEVYN Life foam dressings in the prevention of HAPU from a payer's perspective.

Methods:

A decision model was developed to compare ALLEVYN Life (AL) foam dressing (Smith & Nephew, Inc, St. Petersburg, FL), as an adjunct to standard care (SC) compared with SC in patients admitted to hospital. SC includes adhering to international guidelines on PU prevention¹. Data on the occurrence of HAPU was taken from an observational study which showed a 69% reduction in HAPU in patients admitted to intensive care unit⁴. Baseline data was taken from published studies including the baseline incidence of 11%^{1,5}. Cost data was obtained from a published UK study⁶ and the total costs were assessed at 3 weeks in accordance with other PU prevention models²

Results:

Using a hypothetical cohort of 1000 patients, a total of 110 patients will develop HAPU when managed with SC alone at a mean cost of £603/patient compared to 34 patients managed with ALLEVYN Life + SC at a mean cost of £283/patient. Using AL + SC is therefore cost-effective, saving £321/patient and resulting in 76 fewer HAPU per 1000 admitted patients.

Discussion:

The use of ALLEVYN Life foam dressings in the prevention of HAPU is cost saving as demonstrated by this study. The findings are in agreement with previously published studies which demonstrated that foam dressings are cost saving^{2,3}. Policy makers should encourage the use of foam dressings to prevent the occurrence of costly HAPU.

Clinical relevance:

Given the need to reduce costs and provide improved quality of care to patients, the use of foam dressings to prevent HAPU should be encouraged as they have been shown to be cost saving.

References:

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P36

P35

P37 DESIGN AND RESEARCH ON RELIABILITY-VALIDITY FOR 3S INTRAOPERATIVE RISK ASSESSMENT SCALE OF PRESSURE SORE

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Introduction:

To investigate the reliability and validity of risk assessment scale (RAS) of pressure sore during 3S surgery.

Methods:

RAS of pressure sore was designed independently during 3S surgery. Five operating room nursing experts were selected to consult and detect face validity; sampling of 707 samples were conducted; Cronbachs reliability coefficient was used to measure content reliability and evaluate the internal consistency of RAS; the structural reliability was investigated by exploratory factor analysis method.

Results:

The content validity was 0.92; Cronbachs coefficient of content reliability was 0.71. Structural validity was detected by Bartlett sphericity test, statistical significance was found; KMO value was 0.729; the accumulative variance contribution ratio of common factor was 64.63%. The exploratory factor analysis showed the factor load of every clause was larger than 0.596.

Discussions:

Reliability and validity of assessment scale is good. By using the 3S intraoperative RAS of pressure sore, it can make quantitative score and apply special prevention for high-risk patient and implement early intervention so as to avoid the occurrence of intraoperative acute pressure sores; therefore the assessment scale is worth to be popularized.

Clinical relevance:

It has better validity and reliability, the occurrence rate of pressure sores of high-risk patients can reduce obviously.

References:

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- [11] Ma Qiong, Gao Xinglian, Liu Juan et al. Study on 3S assessment scale applied in front-feedback control of intraoperative pressure sores. 2014, 28 (5B) 1722-1723.

P38 AN EXPLORATION OF NEWLY QUALIFIED NURSES KNOWLEDGE AND ATTITUDE TOWARDS PRESSURE ULCER PREVENTION

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Introduction:

The prevention and treatment of pressure ulcer cost the NHS over £2 billion a year. Pressure ulcers in NHS Hospital Trusts are now used as a care quality indicator. Pressure ulcers cause significant pain, discomfort and distress to patients under the care of the NHS, as well as potentially increasing patients' length of stay in Hospital. It is therefore crucial that nursing staff not only possess good knowledge of Pressure ulcer prevention, they also need to demonstrate a positive attitude. This study aimed to examine knowledge of and attitude towards pressure ulcer prevention and to explore the correlation between knowledge and attitude.

Methods:

Pre-validated questionnaires designed to measure knowledge and attitude towards pressure ulcer prevention were used to examine a purposive sample of newly qualified nurses (n=56) All nurses were qualified < 18 months and worked in an acute NHS Trust

Results:

The overall knowledge of respondents was found to be good with 48% (n=25) achieving 62% or above. Overall attitude was found to be positive with 90% of respondents (n=47) achieving an attitude score of 3.6 (75%) or above. A moderately positive correlation was found between respondents knowledge and attitude (r=37). 52% of respondents had no previous pre-training experience (n=27). Compared with 48% that had (n=25). A mean knowledge score of 14.67 and 14.76 respectively was achieved. Mean attitude Scores achieved were 40.52 and 40.40 respectively. Knowledge scores increased with increased experience. Nurses qualified 0-6 months achieved mean score of 11.85, SD=2.304. Nurses qualified 6-12 months achieved a mean score of 14.88, SD=1.716. Those qualified 12-18 months achieved a mean score 17.07, SD=1.774.

Discussions:

Respondents in this study demonstrate acceptable knowledge and display a positive attitude towards pressure ulcer prevention. Pre training Auxiliary experience appears not to have any influence on levels of knowledge or attitude. Knowledge appears to increase with experience. The positive correlation found between knowledge and attitude suggests there may be a connection between what nurses know about pressure ulcer prevention and their attitude towards preventing them.

Clinical relevance:

The study demonstrates a positive correlation between knowledge and attitude towards pressure ulcers. There is also a suggestion that working in health care may not necessarily improve knowledge and attitude post training. The results do show however that knowledge of pressure ulcer prevention does improve from as the newly qualified nurses' progress in their career.

E39

TRAINING STRATEGY FOR THE IMPLEMENTER GROUP OF A CLINICAL PRACTICE GUIDELINE ON PREVENTION AND TREATMENT OF PRESSURE ULCERS IN PEDIATRICS.

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Introduction:

In Spain, the first CPG with a specific chapter on the prevention and treatment of pressure ulcers in the pediatric population was published in 2012. In the process of disseminating and implementing the CPG, there was a specific refresher cascade training strategy designed for the implementer group and other stakeholders in the Valencian Community, through theoretical instruction and practical workshop training. The objective of this study is to evaluate the training program comparing the knowledge before and after the intervention.

Methods:

The instrument used was an ad hoc self-administered multiple choice questionnaire about evidence-based recommendations regarding interventions on assessment and prevention of pressure ulcers. The same test was conducted before and after the training. Of the four possible answers for each question, only one was correct. Sociodemographic data about the participants were also collected. By means of descriptive statistics and a Chi-square test, the data were analyzed.

Results:

A total of 125 professionals participated in the pre-training test with an average age of 48.6 [± 8.9] years, 87.2% were women and 92% were nurses. The average working experience was 25.0 [± 8.9] years. 49.6% worked in pediatric care units. The questions with the highest percentage of error were about postural changes (74.4% answered incorrectly), on prevention effectiveness (71.2%) and on the etiology of pressure ulcers (63.2%). 17 professionals did not take part in the post-training test. The success rate of all questions had increased after the training. Nevertheless, only two of the questions showed statistically significant differences: knowledge about skin assessment (p = 0.04) and preventive measures in neonates (p = 0.016). The specific knowledge of pressure ulcers in the pediatric population is, in general, limited and usually derived from knowledge of the problem in adults.

Discussions:

By means of the training program, professionals have increased their knowledge of pressure ulcers in the pediatric population, especially in matters concerning skin evaluation and prevention in neonatal care.

On the contrary, a study conducted by Quesada & García revealed that professionals are usually more familiar with preventive measures than with treatment options.

Clinical relevance:

The results of this study enabled the Ministry of Health of the Valencian Community to design a new workshop program focusing specifically on the shortcomings displayed, therefore making training activities more efficient. This way, children at risk of pressure ulcers can be offered the best evidence-based care.

References:

Quesada C, García R. Evaluation of the grade of knowledge of the recommendations for the prevention and care of pressure sores in Critical Units. *Enferm Intensiva*. 2008;19(1):23-34. doi: 10.1016/S1130-2399(08)72740-8

E40

PROCEDURE FOR THE PRACTICAL DESIGN OF AN IMPLEMENTATION PLAN OF A CLINICAL PRACTICE GUIDELINE

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Introduction:

The effort and resources invested in the development of clinical practice guidelines (CPG) are often not reflected in their use. A process that facilitates the use and application of the recommendations in daily practice is required. Recently, in the fields of healthcare science, policy and management, lines of work have been promoted to assess the factors that determine the use of guidelines.

The aim of this study is to develop a simplified procedure to adjust the implementation plan of the "Clinical Practice Guidelines for the care of people with pressure ulcers or at risk of suffering them".

Methods:

By means of teamwork and consensus techniques, the implementer group developed a simple and systematized procedure to implement the recommendations and facilitate evaluation.

Results:

The common procedure for all implementer groups of the Valencian Community is:

1. To set in order all the recommendations of the CPG.
2. To select those recommendations that are to be implemented within the next four years.
3. To prioritize the selected recommendations into the following categories:
 - Short term priorities. These recommendations are already implemented, or they need little time to put into practice and they don't require any extra resources or action.
 - Medium term priorities. Some time is needed to acquire the necessary resources or training.
 - Long term priorities.
4. To answer the following questions to plan the implementation: Where, When, Who and How?
5. The answers to these questions will lead to strategies and actions such as:
 - Cooperation and coordination between different disciplines.
 - Specific training strategies.
 - Development or adaptation of general protocols and standard operating procedures.
 - The use of all available resources to work with patients and caregivers.
 - Coordination with nursing homes and patient associations.

Discussions:

The development of guidelines must be accompanied by a simultaneous process that helps and facilitates the health professionals to use and implement the recommendations. Special attention must be paid to the institutional and social context, the barriers and facilitators for the change and the evaluation of the intervention strategies. The developed procedure is intended as a tool to meet the criteria established in the literature.

Clinical relevance:

The use of the procedure helps the professionals to implement the recommendations of the Guide.

References:

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E41

USAGE OF AN ELECTRONIC SUPPORT TOOL BY THE IMPLEMENTER GROUP OF A CLINICAL PRACTICE GUIDELINE

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Introduction:

For the evaluation and adjustment at local level of the "Clinical Practice Guidelines (CPG) for the care of people with pressure ulcers or at risk of suffering them", implementer groups were created by regulation for each of the health departments and public hospitals for chronic care in the Valencian Community. To support these implementer groups an electronic online tool was created with the objectives to share resources and experiences and to monitor and evaluate the implementation plan.

Methods:

The website is named ColaborarUPP, which refers to the collaboration and commitment to the prevention and care for pressure ulcers. It is an interactive website to facilitate teamwork within the implementer group. It offers a unified framework with wide opportunities to share information and allows easy access to virtually any device. The platform is easy to use and has a wide variety of functionalities. The ones that are most used are the Document Library, an Advertisement System, a common Calendar, a Group Discussion tool, a Task tool and Links.

Results:

The tool is used on a regular basis by more than 500 health professionals. There are different user profiles depending on the responsibility of each user. The document library contains over 340 documents and 38 images or videos. 3 subjects have been entered in the group discussion forum, there are already 40 useful links available and 26 new flashes have been shared. The platform has been functioning for over 2 years now and it is considered an excellent working tool by its users.

Discussions:

The majority of successful pressure ulcer prevention programs reported in the literature included interventions implemented at an organizational level to support professional level initiatives. Given the specific characteristics of the implementation process it is necessary to count on a multidisciplinary group with sufficient credibility and acceptance in the healthcare environment. The development of an implementation plan requires a big organizational effort and the management of a large amount of information. For these reasons, the implementer group needs the assistance of support tools that facilitate its work.

Clinical relevance:

The website is useful to share experiences and resources, and it ensures the cost-effectiveness of effort. Furthermore, it facilitates the development of strategies to implement the recommendations in the clinical practice.

References:

Pagliari C., Grimshaw J. Impact of group structure and process on multidisciplinary evidence-based guideline development: an observational study. *J Eval Clin Pract.* 2002;8(2):145-53

P42

LINDA RUSSELL'S "GRADE 0": THE RIGHT WAY FOR A COMPLETE PREVENTION?

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Introduction:

If we really want to prevent pressure ulcers, maybe we need to consider that in the NPUAP/EPUAP classification there is something more to introduce: the grade 0! Prevent means to follow a program to avoid the development of pressure sores; but, if we know that stage 1 is a deep ischemia already present, so we need to act when the erythema is "blanchable" and not after. Aim of this work is to demonstrate that Linda Russell's grade 0 is the expression of a new concept of prevention that we can call: "metaprevention".

Methods:

We involved some elder patients with Norton Score ≤ 12 and with both type of erythema, "blanchable" and "not blanchable". All of them had the same mattress (a first level antidecubitus "Slow Memory Foam" mattress), the same prevention program (position change every two hours) and the same local treatment (barrier cream). We followed them for two weeks; the targets were the erythema disappearance or the development of a second grade pressure ulcer. We excluded patients with chronic oxygen therapy, immunosuppression, neoplasm and at terminal stage. Results: Although the small number of patients involved (15), the results have statistical significance. All the 7 patients with a "blanchable erythema" got a complete healing within the first week; no one developed a "not blanchable erythema" or more. Among the patients with "not blanchable erythema" 2 out of 8 developed a second grade pressure ulcer, 3 had no change, in 2 of them the erythema disappeared within the second week and in 1 within the first week.

Discussions:

The results we achieved prove that it's possible to do a prevention "before the prevention" if we manage all patients using "Individual Protection Devices" because we had to consider them potentially infected, why can't we consider also the "potential risk" to develop pressure ulcers but only the "effective risk"? If we consider the "blanchable erythema" as the beginning of the problem, now we do prevention before prevention itself: the "metaprevention". Clinical relevance: We think that this work can highlight the importance of the timing of intervention. Maybe we can achieve a better prevention changing the parameters of the prevention itself. Maybe we can consider the idea to add a new stage to pressure ulcers classification.

References:

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P43 EDUCATION OF THE NURSE FOR OPERATIONALIZATION OF CLINICAL PROTOCOL FOR PRESSURE ULCER TREATMENT AND PREVENTION: PROFESSIONAL SATISFACTION

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Introduction:

Permanent education is an instructional process that incorporates teaching and learning to the daily lives of organizations and social and labor practices. Quality control measures have been implemented to act on reducing variability of care practice, in particular through assistance protocols. This study aimed to identify the level of satisfaction of nurses in attend to training for pressure ulcers' clinical protocol operationalization.

Methods:

Descriptive exploratory study with a quantitative approach, performed in a philanthropic hospital of Piauí, northeast Brazil. The sample included 21 nurses that participated in extension courses to operationalize pressure ulcers' prevention and treatment clinical protocol. The study was approved by the Ethics Committee. T Student test for a sample was performed in the analysis of parametric data of 17 items that composed the instrument.

Results:

Among the 21 nurses, the average age was 26.9 years, 18 (85.7%) were female, 18 (85.7%) had up to 5 years of experience in the profession and 12 (57.1%) had post-graduation. The results showed percentages of dissatisfaction related to the local of the course's execution 1 (4.8%), trust in spreading knowledge about treatment 1 (4.8%) and motivation to spread the algorithms 2 (9.5%), which added to the percentage of nurses who reported being dissatisfied or neither satisfied correspond to 4 (19.0%), 5 (23.8%) and 7 (33.3%), respectively. All items showed statistically significant results for satisfaction ($p < 0.01$) and the overall satisfaction level with the action was 84.3%.

Discussions:

The prevalence of young nurses, age which presents more strongly the desire to learn and gain experiences may be related to satisfaction levels analyzed. Understanding algorithms provides certainty to the implementation of prevention and treatment recommendations present in protocols, issue that requires attention. The level of satisfaction of nurses with identified actions of permanent education suggests that education at work and for work enables the operationalization of clinical protocol, since clarified the conceptual basis of the evidence based practice that supports protocols.

Clinical relevance:

The approach of nurses to reliable research results enhances job satisfaction in the operation of protocols and favors an assistance praxis with quality to patients with or at risk for pressure ulcers.

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Falkenberg MB, Mendes TPL, Moraes EP, Souza EM. Educação em saúde e educação na saúde: conceitos e implicações para a saúde coletiva. *Ciênc saúde coletiva*. 2014 Mar; 19(3):847-852. Carrillo-García C, Solano-Ruiz MC, Martínez-Roche ME, Gómez-García CI. Influência do gênero e da idade: satisfação no trabalho de profissionais da saúde. *Rev Latino-Am Enfermagem*. 2013 Nov-Dez; 21(6):1314-1320.

P44 RELIABILITY AND ACCURACY OF WOUND SURFACE AREA MEASUREMENT USING MOBILE TECHNOLOGY

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Introduction:

A mobile application that takes reproducible and reliable wound surface area measurements would help obtain useful indications on the prognosis and effectiveness of applied treatment. This also enables faster detection of complications and reduces healing time

Methods:

An experimental comparative non-randomized study

Results:

The intra-rater correlation was good with an ICC (Intraclass Correlation Coefficient) at 0.99. Inter-rater correlation was also good with an ICC at 0.98. The Pearson correlation coefficient (r) was 0.99 ($p < 0.001$). Compared to the reference measurement, +WoundDesk measurements represent an average overestimation of 13% of the surface.

Discussions:

Under the study conditions, the use of the mobile Health application +WoundDesk[®] for wound surface area measurement was reliable and reproducible. With an intra- and inter-rater reliability values > 0.98 , the technique used by the application is equivalent to other methods for which an intra- and inter-rater reliability > 0.96 is usually considered to be excellent. With a Pearson coefficient of 0.99, the linear correlation is also good.

Clinical relevance:

According to the Wound Healing Society's guidelines, "if ulcer does not reduce by 40% or more after 4 weeks of therapy, re-evaluate and consider other treatments. Indeed, as described by Sheehan et al, the percentage of wound surface reduction to 4 weeks is a strong predictor of healing at 12 weeks. The retrospective study by van Rijswijk et al. shows that the reduction of ulcer surface by 40% or more during the first 4 weeks is a positive predictor for healing. It's accepted that a 50% decrease in size after 6 weeks is a sensitive predictor (93% sensitivity) to complete healing at 12 weeks. As the consecutive measurements are compiled in the application and available as a graphic, the mobile solution gives the care provider some critical information about wound healing evolution and prognosis. The wound surface measurements performed with the mobile phone application +WoundDesk are reliable, repeatable and reproducible. The accuracy is good for small irregular wounds, but decreases for large rectangular wounds. Further studies with real wounds are needed to confirm the first conclusion.

References:

- [1] Little C, McDonald J, Jenkins MG, McCarron P. An overview of techniques used to measure wound area and volume. *J Wound Care*, 2009, vol. 18, pp 250–253
- [2] Gethin G, Cowman S. Wound measurement comparing the use of acetate tracings and Visitrak digital planimetry, *J Clin Nurs*, 2006, vol. 15, pp 422–427
- [3] Flanagan M. Wound measurement: can it help us to monitor progression to healing? *J Wound Care*, 2003, vol. 12, pp 189–194

P45 THINKING OUTSIDE THE BOX IN THE QUEST FOR PRESSURE ULCER ERADICATION

Claire Acton¹

¹ Guys and St Thomas NHS Foundation Trust

Introduction:

Pressure ulcers remain a challenge to the healthcare economy, mainly those patients that remain outside the usual healthcare resources. One acute community trust identified the need to review the development of pressure damage within these areas and working in partnership with our commissioners for patient outcomes based on leadership within diverse areas and that one size does not fit all when it comes to pressure ulcers prevention. Out of this was born the Zero pressure campaign which has successfully reduced pressure ulcers within the previously unreachable areas

Methods:

Review of current healthcare provision, by working with the local areas and review of the impact of services currently and how this could be influenced to benefit direct patient care within the community environment. It required developing a zero pressure campaign that was far outreaching to care agencies, nursing and residential homes; carers and patients themselves and involved moving into the public health messaging that pressure ulcer prevention is everyone's business in different ways for different reasons

Results:

We have successfully achieved reduction of pressure ulcers within the nursing homes within these areas achieving 6 homes with 365 days pressure ulcer free. The campaign has been far reaching and awareness has shown a decrease in the numbers of admitted pressure ulcers into acute care.

Discussions:

There needs to be a shift in the way we look at pressure ulcer prevention towards public health reaching out with a more lateral view to delivering the messages of early identification of skin damage. This requires resources and an understanding of the local health economy and those delivering the message be prepared to change strategies to fit the required target groups wherever that may be. There needs to be review ongoing and after the full cycle of intervention and care and the impacts of service delivery on the whole system

Clinical relevance:

Reducing pressure ulcers and avoidable harm to all patients across our healthcare economy

P46 EXPLORING THE INCIDENCE OF AVOIDABLE PRESSURE ULCERATION IN A U.K. BASED HEALTH AND SOCIAL CARE TRUST

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Introduction:

The widely held belief that '95% of pressure ulcers are preventable' was first coined in 1988¹. Few studies report whether pressure damage was avoidable and therefore little evidence exists to refute this statement. The aim of this study was to retrospectively examine all reported incidents of hospital acquired pressure ulcers graded 2 and above (HAPU2+) over a two year period (April 2012 - March 2014) in a U.K. based Health and Social Care Trust with a view to establishing the proportion of HAPU2+ deemed avoidable.

Methods:

Appropriate permissions were granted, data collected and entered into a statistical software package for analysis. All incidents were cross-referenced with tissue viability records, where available. Data was anonymised at source and a unique identifier applied to each incident.

Results:

Year 1 showed 265 HAPU2+, the majority of which were grade 2 (67.2%; n=178). Full thickness pressure damage accounted for 21.5% (n=57) and in 11.3% (n=30) of cases the grade was unclear. In year 2, 342 HAPU2+ were reported with grade 2 accounting for 70.2% (n=240), full thickness damage, 21.6% (n=74) and 8.2% (n=28) of cases were unclear. Pressure ulceration was deemed avoidable in 64% (n=169) of HAPU2+ in year 1 and 73% (n=249) in year 2. When considering full thickness pressure damage, 56% (n=32) were avoidable in Year 1 and 66% (n=49) in year 2. A root cause analysis (RCA) was completed for 34% (n=89) of HAPU2+ in year 1 and 51% (n=174) in year 2. Discussions: The findings of this study support recently published work, where 43% of pressure ulcers grade 3-4 were deemed avoidable², decreasing to 34% when grade 2 were included³. While results in this current study are notably higher, in this study, incidents without a corresponding RCA were deemed avoidable. This could account for the higher proportion of avoidable HAPU2+.

Clinical relevance:

Unavoidable pressure ulcers do occur and the goal of any quality improvement initiative should be a reduction in avoidable pressure ulcers. A better understanding is therefore needed of how organisations are reporting avoidable and unavoidable damage so that realistic benchmarks can be established.

References:

1. Hibbs, P. (1998) *The past politics of pressure sores. Journal of Tissue Viability*, 8 (4) 14-15.
2. F. Guy, H. Gilroy, P. Royall, D. and Davies, S. (2013) *Are 95% of hospital-acquired pressure ulcers avoidable?* *Wounds UK*, 9 (3): 16-22.
3. Downie, F., Sandoz, H., Gilroy, P., Royall, D., Davies, S., Brett, D. and Bates, J. (2014) *Avoidable pressure ulcer rates in six acute UK Trusts. Wounds UK*, 10 (3): 48-5.

P47

A RETROSPECTIVE STUDY USING THE PRESSURE ULCER SCALE FOR HEALING (PUSH) TOOL TO EXAMINE FACTORS AFFECTING STAGE II PRESSURE ULCER HEALING IN A KOREAN ACUTE CARE HOSPITAL

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¹ Samsung Medical Center, Director of Woc Department

² Samsung Medical Center, Nursing Department

Introduction:

Pressure ulcers (PUs) continue to occur despite improved understanding, and improvements in technologies available for PU prevention. Therefore the treatment of PUs remains as important an issue as the prevention of PUs. Stage II PUs accounted for the largest share (69%) of PUs in acute care hospitals [1] and they should be managed promptly and appropriately to prevent from progressing to Stage III or IV PUs. Thus we need to identify the factors affecting Stage II PUs healing.

Methods:

The electronic medical records of patients with a Stage II PU in a hospital were examined. Patient and ulcer characteristics were retrieved. The effect of all variables on healing status and change in Pressure Ulcer Scale for Healing (PUSH) scores for healing rate were compared.

Results:

Records of 309 Stage II PUs from 155 patients were analyzed. Of those, 221 healed and 88 were documented as not healed. The variables that were significantly different between patients with PUs that did and did not heal were: major diagnosis (P = 0.001), peripheral arterial disease (P = 0.007), smoking (P = 0.048), serum albumin (<2.5 g/dL) (P = 0.002), antidepressant use (P = 0.035), vitamin use (P = 0.006), history of surgery (P <0.001), PU size (P = 0.003), Malnutrition Universal Screening Tool score (P = 0.020), Braden scale score (P = 0.003), and mean arterial pressure (MAP, mm Hg) (P = 0.026). The Cox proportional hazard model showed a significant positive difference in PUSH score change when support surfaces were used (P <0.001, HR = 2.317), PU size was small (≤3.0 cm², P = 0.006, HR = 1.670), MAP (within a range of 52–112 mm Hg) was higher (P = 0.010, HR = 1.016), and patients were provided multivitamins (P = 0.037, HR = 1.431) (Table 1).

Discussions:

The study showed that small ulcer size (≤3.0 cm²), higher MAP, and providing a support surface and multivitamins positively affected healing of Stage II PUs in an acute care setting. A Stage II PU has limited tissue damage and heals in a pattern similar to an acute wound, so it is possible for these wounds to heal quickly and predictably. Clinical relevance: We suggests strategies for Stage II PU healing in acute care setting should include expedient recognition of lower stage PUs and prevention of PU progression to higher stage; use of a support surface; maintaining higher MAP; and providing multivitamins.

References:

[1] Gardner SE, et al., *J Gerontol A Biol Sci Med Sci*. 60(1):93–97, 2005.

E48

CRITICAL REVIEW OF THE ROLE OF ALTERNATING MATTRESSES IN PRESSURE ULCER MANAGEMENT

Esa Soppi¹

¹ Eira Hospital

Introduction:

Alternating mattresses are considered crucial for pressure ulcer (PU) prevention in high risk patients (NPUAP, EPUAP & PPPIA 2014). We asked the question whether this assumption is based on belief or robust data. The available data is reviewed and discussed.

Methods:

We analyzed the four systematic reviews (Vanderwee et al 2008, McInnes et al 2011, Chou 2013, McInnes et al 2013) available on the effectiveness of alternating mattresses for prevention and treatment of PUs, the current guidelines (NPUAP, EPUAP & PPPIA 2014, NICE clinical guideline 179, 2014) and the 3 large studies on which these guidelines largely rest.

Results:

Based on the 4 systematic reviews, alternating mattresses may be more effective than standard mattresses in the prevention of PUs, but no data support their effectiveness in the treatment of PUs. These conclusions are in line with the summaries presented in the current guidelines (NPUAP, EPUAP & PPPIA 2014, NICE clinical guideline 179, 2014). The results of the large studies (Vanderwee et al 2005, Nixon et al 2006, Demarré et al 2012) included in the NPUAP, EPUAP & PPPIA 2014 guideline lack significance (p>0.75). The largest study (Nixon et al 2006) ever published notes that more than 10% of the patients develop new stage II PUs while on alternating mattresses.

Discussions:

Systematic reviews and guidelines fail to present data in support of the view that alternating mattresses are beneficial for the prevention of PUs in high risk patients. Alternating mattresses may be more effective than standard mattresses for low risk patients. Possibly, the prototype of a higher specification foam mattress (composed of two layers of different foams) may be better for prevention of PUs than alternating mattresses. This assumption may hold true especially if clearly defined higher specification foam mattresses are compared with alternating mattresses (Soppi et al 2015). Before a claim of the functionality of a specific alternating mattress can be accepted, all clinical data should be available and presented as instructed in the Clinical Evaluation Report (MEDDEV 2009), which is a mandating document for any marketed medical device, as specified in directive 2007/47/EC on medical devices.

Clinical relevance:

The role of alternating mattresses in the prevention and treatment of PUs needs to be stringently re-evaluated to ensure that PU management follows proper procedures and guarantees patient safety.

References:

Guidelines on medical devices. *Clinical evaluation: A guide for manufacturers and notified bodies*. MEDDEV.2.7.1 Rev. 3, December 2009

Table 1. Influence factors of Healing on Stage II Pressure Ulcer using Multiple Cox regression (N=309)

Variables	P	HR	95% CI
Pressure redistribution surface	< .001	2.317	1.560-3.444
Wound size ≤ 3.0 cm ²	.006	1.670	1.161-2.402
Vitamins	.037	1.431	1.022-2.003
Mean arterial pressure (mmHg)	.010	1.016	1.004-1.028
MUST score*	.088		
Surgery	.130		
Anti-depressants	.294		
Serum hemoglobin ≥12 g/dL	.589		
Serum albumin ≥ 2.5 g/dL	.589		
Peripheral arterial disease	.731		
Major diagnosis	.560		

HR = hazard ratio; 95% CI = confidence interval
* = Malnutrition Universal Screening Tool score.

HYBRID MATTRESS EVALUATION PROCESS

Louisa Way¹

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Introduction:

All patients are potentially at risk of developing a pressure ulcer (PU) (NICE 2014) however with appropriate risk assessment and preventative care the majority of PU are preventable. (Department of Health 2014) Due to a high incidence of patients being both admitted with and developing PU a review of practice was carried out which identified a more proactive approach to equipment provision equipment was required.

The equipment review revealed that although the trust owned both replacement and overlay mattresses there were inadequate surfaces available and additional units were rented.

This process:

- was not financially sustainable longer term
- caused a delay in the patient being placed on the appropriate surface
- created a storage issue for static mattresses when mattress replacements were used meant that decontamination costs were high

Methods:

A scoping exercise identified that 'hybrid mattresses' would meet the gap in the portfolio. 3 mattresses were identified for the evaluation and a business case based on the previous 6 months rentals was written and approved.

Two 'high risk' wards were identified for the trial – Elderly Care and Vascular which was over 2 weeks.

All staff received training from each company and a standard evaluation form was completed by all patients and staff groups.

Results:

Clinical evaluations were collated, analyzed and ranked and two companies were taken forward to the commercial process.

Direct Healthcare Services won the tender and 243 Dyna-Form Mercury Advance mattresses were ordered.

Discussions:

The prevention of hospital acquired PU remains a challenge. The evaluation process clearly indicates that it is possible to reduce the time taken to put a patient on the correct surface and this improves their experience and outcomes. The most desirable healthcare interventions are those that increase the quality of care and lower costs. This project clearly demonstrates a reduction in cost of rentals, static mattress replacement program and decontamination costs.

Clinical relevance:

The clinical relevance of this work is the demonstration that the use of the hybrid mattress improves patient experience and outcomes whilst helping to prevent hospital acquired pressure ulcers.

References:

DoH: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/256456/NHS_outcomes.pdf (accessed 15 April 2015)
 NICE (2014) *Pressure ulcers: prevention and management of pressure ulcers*
 Jones, L (2014) 'Do you really know how soon your patient is on an alternating mattress in a hospital setting?'

E50 CHANGING SHOES CAN AFFECT THE PROTECTIVE EFFICACY OF WHEELCHAIR CUSHIONS

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³ Tel Aviv University

Introduction:

Research by Gefen, et al. (JTV 2014) has demonstrated that a critical characteristic of an effective wheelchair cushion is its ability to adjust to the body to provide adequate immersion and envelopment, which can greatly reduce tissue deformation and internal stresses and strains that can cause cell death and deep tissue injury. Twenty years of research, as commented upon by Gefen (OWM 2014), reveals significant physiological changes that occur to the seated body over time, especially post-spinal cord injury, further illustrating the need for on-going adjustability of the cushion. This study evaluated a third characteristic; the ability to adapt to the changes in positioning, and even wardrobe, that occur as people live their daily lives.

Methods:

Our study involved two different technologies, classified as "adjustable, skin protection cushions" in the U.S. Medicare system. Cushion adjustments were optimized to the able-bodied subject with an X-Sensor pressure mapping system, to maximize contact area and minimize peak pressures. Pressure maps were recorded in a Tilt-in-Space Chair at 0°, then at 30° and 45°, without further adjustment to the cushion. The subject was wearing tennis shoes.

The trial was repeated at the same angles, with no cushion adjustments. However, the tennis shoes were replaced with 10cm high heels.

Results:

The abilities of the cushions to minimize peak pressures and maximize contact areas in the 0° position were dramatically different, and disparity increased at greater angles. Even more interesting were the results from merely changing shoes, which revealed dramatically higher peak pressures and lower contact areas in some cushions, yet had little effect on the other cushion technology.

Discussions:

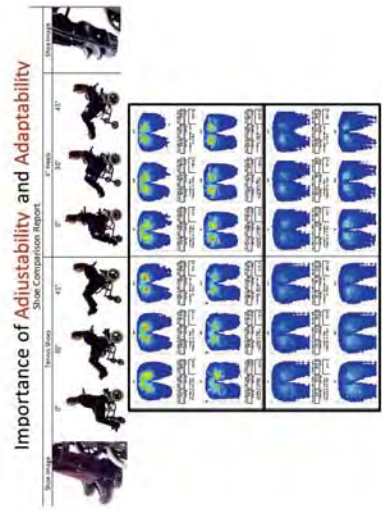
The protective efficacy of a wheelchair cushion must be evaluated by the way it is used, in its ability to adjust to the individual, to adjust to body changes over time, and equally important, to adapt to the changes in the individual's position, and even footwear choices, throughout the day.

Clinical relevance:

Clinical assessments of wheelchair cushions are often made in a snapshot of time, looking at a single pressure map, in a static, upright sitting position. The clinician should evaluate the adjustability of a cushion to have confidence it will conform to the patients as they change over time. Interface pressures should also be evaluated during positioning changes, and even changes in footwear, to assess the adaptability of the cushion to the patient's daily activities.

References:

Levy, A., Koppin, K., Gefen, A. *Journal of tissue viability* 23:1(2014):13-23.
 Gefen, A. *Ostomy/wound management* 60:2(2014):34-45.



RE-POSITIONING FOR PRESSURE ULCER PREVENTION

Menno van Etten¹

¹ Menno van Etten Fysiotherapeut

Introduction:

Pressure and shear are the main factors that cause pressure ulcers and immobility is the main risk factor that exposes an individual to pressure and shear, therefore, re-positioning patients is one of the pre requisites to prevent pressure ulcers. The EPUAP guidelines recommend repositioning at risk individuals regularly, and also recommend using the 30 degrees tilted side-lying position, since in this position no bony prominences are exposed directly to pressure. Nurses and carer's re-position their patients often, but mostly into the 90 degrees side-lying position, which exposes bony prominences to pressure ulcer risk.

Methods:

When positioning a person there are three main considerations, you need to ensure stability, provide comfort and make the person feel secure in the chosen position. A person, dependent on others to re-position, will seek to stabilize their body structures while lying on a mattress, in other words they aim to become one with the mattress. In the absence of this, the body will start to deform, tension will build up and the person will become uncomfortable, increasing the risk of pressure and shear. Therefore, as carers we need to consider, not only the importance of re-positioning, but also the importance of patient stability when undertaking repositioning.

Clinical relevance:

This lecture / workshop will teach the attendees how to re-position their patients adding stability and thus comfort and thus security. The role that positioning cushions play in stabilizing patients, in enabling the off-loading of specific body parts and in helping to control the micro-climate will also be discussed.

P52

HEEL PRESSURE ULCERS HOW DO WE PREVENT THEM AND EVALUATE PRACTICE? AN EXAMPLE WITH AN ACUTE CARE HOSPITAL

Claire Acton¹

¹ Guys and St Thomas NHS Foundation Trust

Introduction:

Review of the incidence of heel pressure ulcers within an acute hospital setting over a 4 year period and compare the prevention strategies employed to reduce the incidence of heel ulcers

Methods:

retrospective review of audit data from Etrace database (2010-2015) used to record pressure ulcers in an acute hospital setting and compared incidence of heel pressure ulcers identified stage 2 and above with the prevention strategies implemented which included use of relevant equipment, education and robust skin review practices.

Results:

there was an increase in the use of pressure relieving equipment in line with increased reporting of heel pressure ulcers following changes in practice and extensive education programme however over the 5 year period this has reached a plateau and reflects that increase acuity within the acute trust inline with the reduced severity of pressure damage has resulted in quality patient outcomes and cost efficient care

Discussions:

This shows that ongoing review and audit of pressure ulcers and interventions over a period of time enables constant re assessment of effective practice and either validates success or review of current practice to change and align to reflection of care interventions

Clinical relevance:

Pressure ulcer prevention and management within acute care setting and audit practices

References:

Coats-Bennett U, Critical Care Nursing Quarterly, May 2002; 25 (1):22-32

P51

USE OF TELEMEDICINE IN SPINAL CORD INJURY AND PRESSURE ULCERS. A PILOT PROJECT.

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Introduction:

Norway is a country with scattered settlements. Thus, use of telemedicine could potentially replace travelling over long distances to receive good healthcare support, and Sunnaas Rehabilitation Hospital has focused on implementation of telemedicine as a way to communicate with patients, colleagues and partners, named "The Sunnaas model". This presentation will focus on this model, and also on the results from a pilot project using telemedicine in the form of video conferencing, in the treatment and follow-up of patients with spinal cord injury and pressure ulcers.

Methods:

During 2012, seven patients were involved in the project. All 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.

Results:

The results from this pilot project were very promising, both in terms of healing of the pressure ulcers, improved cooperation with primary health care, and positive socioeconomic health savings. Thus, the programme from the pilot project became implemented in the ordinary outpatient activity at Sunnaas Rehabilitation Hospital, even if the income to the hospital for this activity is low.

Discussions:

We wanted to offer equal treatment to all patients, regardless of residence and geographical obstacles. We wanted to clarify if it was 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 treat them as in-patients in our hospital. In addition, we wanted to improve the interaction with the homecare nursing staff, by offering organized training in the care of pressure ulcers, and also by inviting the caretakers to call or send messages when they needed assistance in order to implement "the right treatment to the right patient at the right location, at the right time", aiming the patients to go back to habitual activity and participation in home, work and society.

Clinical relevance:

The use of telemedicine as a communication channel to replace long travelling, travel expenses and time could be the future within rehabilitation for long term follow-ups.

References:

Will be presented at the presentation.

ANTISEPTIC DRESSINGS: A COMPARISON IN A RANDOMIZED BLIND STUDY

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¹ Iccs "Città Studi" Clinical Institute

Introduction:

Silver is now considered the gold standard in the local treatment of infection; povidiodine gauzes is the best-selling dressing in Italy; so we decided to compare a new technological antiseptic dressing with a good silver dressing and with povidiodine gauze in infectious pressure ulcers.

Methods:

This was a randomized blind study. We enrolled 15 patients with infectious pressure ulcers (Cutting & Harding criteria) divided into three groups: 1) Povidiodine gauzes, 2) Activated Charcoal with Silver, 3) Silicon Dioxide with Ionic Silver and Chlorhexidine spray powder (moist gauzes as secondary dressing). We evaluated the reductions of area (using Visitrak[™] system) and of infection signs. The investigator recruited the patient; an operator opened the randomization envelope and, not seen, executed the dressing; at the control visit the operator removed the medication in the absence of the investigator who, called after, performed the evaluation; then he moved away, allowing the operator to change dressing. All assessment data have been held by the investigator; the medications data have been kept by the operator. All these data have been made visible at the end of the case, after the last evaluation. The observation time was three weeks.

Results:

The groups that used silver dressings had the complete resolution of infections in 90%; only one wound (group 2) had signs of infection at the end of the study. The wound area increased in 80% in the povidiodine group and 60% were still infectious. Group 3 showed no infection signs at the end of the study and an area reduction of more than 25%, versus 3.5% of group 2.

Discussions:

The poor efficacy of Povidiodine is known: very often maceration, persistence of infection signs and increasing of the wound area. The lesions treated with silver dressings have defeated the infection within the observation time; the highlighted difference between the two groups is mainly in terms of quickness, which means reduced healing time, costs saving and improvement of the quality of life of the patients.

Clinical relevance:

We think that is very important to give data about the best choice in the treatment of infectious pressure ulcers because an effective treatment can help us to achieve the complete healing in a very few time, allowing a better quality of life to the patients.

References:

1. *International Consensus. Appropriate use of silver dressings in wounds. An expert working group consensus. London: Wounds International; 2012*
2. *Ferrari M, Bignozzi CA, Dissette V. Antibacterial powders based on anionic silicon or titanium dioxide absorbed with pharmaceutically active cations. PCT/IB 2013/054647*

P54

P53

P55 THE MIDLANDS & EAST REGION OF ENGLAND JOURNEY - STOP THE PRESSURE CAMPAIGN

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¹ NHS England Midlands & East, 2-4 Victoria House,

² NHS England, Midlands & East Region

Introduction:

In 2012 NHS Midlands & East launched a high profile campaign to raise awareness and support elimination of avoidable pressure ulcers in all care settings.

Engagement with all Trusts (Acute Mental Health and Community) across the region began with data collection on new pressure ulcers. Through this we could then start to measure the impact of the campaign.

Methods:

The Safety Thermometer tool was launched across all Trusts in England through the national contracts. The tool measures 4 aspects of patient harm: Pressure Ulcer, Venous Thromboembolism, Falls and Catheter-Associated Urinary Tract Infection.

A website was developed (www.stopthepressure.co.uk) and social media outlets (@stopthepressure and @STPressure) were created to develop a network of people who could support each other in their improvement work. In addition 'Stop the Pressure' game was also developed.

Results:

The Stop the Pressure campaign realised a 50% reduction in the prevalence of new pressure ulcers across the Midlands & East region. This was largely delivered by raising awareness and the measurement and prevention via an extensive communications strategy.

Over a targeted 6 month campaign period Twitter achieved a reach of almost 175,000 people a week and people continue to use #stopthepressure to promote their work and to support each other in reducing pressure ulcers. In the past 12 months the website has seen 3,171 users with 48% of those being new.

'Stop the Pressure' was named as one of the Top 10 best NHS Campaigns for NHS Change Day 2015 in the Guardian newspaper.

Discussions:

Achieving lasting results relies on sharing of experiences beyond the NHS into social care and the private care providers to ensure no matter where someone is receiving their care, the same high standards of quality will be applied. A national nursing collaborative has been established with representation from a number of major NHS and independent stakeholder organisations. Together work is underway to shape the strategy and determine the most effective ways to embed this practice in all caring organisations.

The Stop the Pressure campaign has become a vehicle of change and through the newly established Academic Health Science Networks this is an opportunity to sustain pressure ulcer prevention and achieve long term harm reduction for patients in our care.

Clinical relevance:

The website and resources have been developed in partnership with the Midlands & East Tissue Viability Nurse specialists as part of an Expert Working Group. This group report to the Programme Board and lead 3 work streams ensuring that practice is clinically driven and evidence based.

References:

www.stopthepressure.co.uk

P56 PRESSURE ULCER MANAGEMENT AT-A-DISTANCE, POSSIBILITIES AND CHALLENGES IN VIDEO CONSULTATIONS TO THE PATIENTS' HOMES

Gunnbjorg Aune¹

¹ Sunnaas Rehabilitation Hospital

Introduction:

This qualitative study followed the "Telemedicine pressure ulcer project" at Sunnaas rehabilitation hospital where specialists, patient and the municipal nurses regularly met in computer-based video consultations with webcam in patients' homes. This follow-up study focused on possibilities and challenges in using teleconsultations in patients' homes. The patients accept to expose themselves and their ulcers on a screen far away from their whereabouts. By doing so they trust the health professionals to take care of their confidentiality, vulnerability and dignity.

Methods:

Observations in video consultations at the hospital and in the home and informal interviews were conducted
Theoretical framework: studies of technology and society (STS) in a health context

Results:

Several people were present in both rooms and the consultations were structured into 3 sequences to create trust and to achieve shared conclusions:

1. Introduction/presentation of the participants
2. Ulcer evaluation
3. Completing/closing

To ensure patients confidentiality the district nurses covered the area around the ulcer, or directed the camera appropriately. The hands-on tasks were delegated to the home and the nurses had to describe the appearance and the smell of the ulcer, and to measure its size.

Patients' interest were less on medical aspects, but often related to the consequences for every day life. Quotation: "May I sit in my wheelchair and eat Christmas dinner with my family?"

Discussions:

Video consultations to the patients' homes change ulcer care from specialist prescription for treatment to mutual online discussions with respect for the participants' different perspective. Also the patients and their carers' voices are brought in. It allows more frequent contact from specialist healthcare services, but a need to meet the patients in the same space may be the result of a video consultation. Ethical considerations are necessary when a patient is exposed on a screen far away from his whereabouts and where many persons interact. Standards should be developed.

Clinical relevance:

Video consultations potentially link the patients' homes to the hospital, and open a new area for collaboration. The "Telemedicine pressure ulcer project" was successful and is integrated as an out-patient service at Sunnaas Rehabilitation Hospital. However, putting webcams into patients' homes could be controversial and touches discourses on surveillance of inhabitants. In order to meet such discussions one needs to explain carefully how the chosen or wanted technologies can contribute to solutions in specific contexts.

References:

Pols, J. (2011): *Wonderful Webcams: About Active Gazes and Invisible Technologies. Science Technology Human Values* 2011: 36.

E57

THE PRESSURE ULCER PREVALENCE AS QUALITY INDICATOR

Joudart Françoise¹

¹ Chu Brugmann

Introduction:

Brugmann University Hospital realizes since 1995 bedsores audits and are adapted for pressure ulcer prevention protocols according to Belgian and international recommendations.

The pressure ulcer prevalence is stable, but the goal "zero pressure ulcers acquired" is not yet achieved.

Methods:

The management of pressure ulcer prevention has become a priority for all caregivers and all nursing staff. Besides the financial implications, the quality of management has become an important indicator for managers. The hospital is preparing for accreditation. We build indicators that show the results of this proactive management. The electronic medical record has become our source of information on the quality care process and we can trace the daily events.

Results:

We meets all the criteria required by the Ministry of Health, the CFQAI for the quality of nursing activities, and for extractions of DI-Rhm data. The prevalence of pressure sores Brugmann does not exceed the 12.1% recorded in 2008.

More importantly, the measures put in place to meet evidence-based criteria recommended in the recent studies of the EPUAP and PuMap.

- Automatic daily extractions of data DI-Rhm/CFQAI
- Protocols available on the intranet
- 60 wound nurses trained and graduated "relay wounds"
- Prevention equipment
- Field audits once or twice a year in peer review
- Awareness campaigns to prevent bedsores
- A patient education plan
- Information leaflets available on the website

And above all, institutional and interdisciplinary politic

Discussions:

Belgium is difficult to compare to other countries because all prevalence measures are taken under different conditions. Service types are not always recorded to demonstrate the predominant risk patients.

Since 1995, the Brugmann organized audits "decubitus", which are all made in different ways and have enabled benchmarking as transversely between all the hospitals that participated in the study and not in time. Only CFQAI introduced a qualitative approach on nursing activities including resources, processes and results. But the results are not disseminated.

When will an international registration based on the same concepts?

Clinical relevance: Bedsores prevention is one of the most important quality criteria for nursing activities identified by the CFQAI with restraint, falls, pain.

All these quality indicators can be prevented with good management of resources. The nursing staff is trained to provide quality care and to prevent incidents caused detriment to health and patient safety. The responsibility of managers is to treat the appearance of pressure ulcers as an adverse event and measure the costs that this generates to the hospital for the patient and for society.

References:

www.kce.fgov.be; www.decubitus.be; www.ebnursing.be; www.epuap.org

E58

15 YEARS OF PRESSURE ULCER INCIDENCE REPORTING: EFFECTIVENESS THROUGH PRECISE ORGANISATIONAL ISSUES

Fabienne Ruffini¹

¹ Hôpital Kirchberg-Hrs

15 years of pressure ulcer incidence reporting: effectiveness through precise organisational issues

Introduction:

The ZithaKlinik, Hôpitaux Robert Schuman, is an acute care hospital with 256 beds. Pressure ulcer incidence reporting was introduced in 1998. The major aim was then to be factual and precise about responsibility issues.

Methods:

The reporting was first done on paper. Around 2005, the switch to computerized reporting via Lotus Notes was taking place. The content of the reporting was formative. Management was involved as the workflow of every report was nurse – head nurse – nursing director with feedback top down if required. A photo had to be joined. Results: The procedure of reporting pressure ulcer incidents became a well-accepted routine. The photos allowed a detailed analysis, so that we could precisely adapt our action plans to improve the quality of care.

From 2005 to 2007, we changed all the foam mattresses for viscoelasticity mattresses. Alternating mattresses were in a controlled way available for therapeutic needs or for patients with a very high risk. Evaluation of professional practice became a standard over four years. Results could be declined into every unit (medicine, surgical, intensive care...).

During 2008 and 2010 some pressure ulcer incidents happened due to medical devices, so the device was replaced and practice of care adapted.

The incidence report 2010 to 2012 pointed clearly to incontinence associated dermatitis pressure ulcers and shear forces.

From 2012 to 2014, we discussed incontinence related nursing practices and reviewed them fundamentally: dermatitis prevention, treatment and incontinence material. Theoretical and practical nursing trainings regarding the handling of incontinence were performed at a large scale.

Since 2012, investments were made to optimize mobilization concepts, e.g. passive mobilization, mobilization by sheets.

Over 2014, we widely promoted a two hour nursing education course "Evidence-based nursing and best practice standards: in relation with pressure ulcers".

In 2014, a number of iatrogenic pressure ulcers were revealed in one ward. A precise review of these incidents was made by order and in presence of the nursing director, aiming to prevent further harm to our patients.

Discussion:

The computerized incidence reporting, especially the supplied photo, permitted to state and resolve problems as well as optimize systemically the quality of care. Cost-effective care was a welcome side benefit over the years.

Clinical relevance:

When analyzing pressure ulcer incidence reporting during the last 15 years, the focus remained mainly on clinical relevance and much less on becoming a "statistical quantitative quality indicator".

References:

Gunar Jamros, Nursing Director; Fabienne Ruffini, Clinical Nurse; ZithaKlinik, Hôpitaux Robert Schuman, Luxembourg

P59 USING RESPECT FOR THE PREVENTION OF PRESSURE ULCERS

Joanna Swan¹, Rommel Orig¹, Alison Aldridge², Cheri Pearce², Joseph Singleton³

¹ Queen Elizabeth Hospital Birmingham NHS Trust

² Qehb NHS Trust

³ Queen Elizabeth Hospital Birmingham; Tissue Viability Service, Office 1, West Block

Introduction:

The authors Trust a large acute Trust with over 1200 beds. Prevention of avoidable pressure ulcers is a priority and educating all staff is challenging, requiring a variety of strategies to address the learning needs of staff. Nurses of all grades face daily time constraints, attending formal teaching away from ward areas can be difficult to achieve. Moreover, providing timely and easy to remember education is essential to engage staff and aid in retention of key messages delivered. Therefore a strategy was developed to provide ward based education in the prevention of pressure ulcers.

Methods:

A strategy called RESPECT was developed. This was used as an acronym to highlight key messages and the dignity element of skin care around pressure ulcer prevention. The acronym stood for:-

R= Risk Assessment

E = Equipment

S = Skin inspection

P = Protection

E = Education (patient and carer)

C = Continence

T = Turn chart

A number of visual resources were developed and displayed on a portable board to allow easy mobility around the hospital. Wards were made aware in advance when the Tissue Viability Team (TVT) would be visiting. Ward managers were asked to release staff for 10 minutes to receive education. Initially this was a 6 month programme across targeted wards with high incidence of avoidable pressure damage.

Results: The TVT was well received in all areas, the resources and interactive nature of the sessions evaluated well. Below are the incidence rates of the targeted wards in the month prior and the month following implementation of the strategy.

Category 2	Category 3	Category 4	Total
Sept 2013	11	3	3 17
April 2014	5	2	0 7

Discussions:

Whilst the TVT were well received on occasion staff attendance was compromised due to clinical demands. However, when too few staff were available return visits were arranged. Due to the positive patient outcomes and the need to sustain the reduction in the incidence of pressure ulcers the strategy has continued and was rolled out to all inpatient areas within the Trust. Incidence rates across all categories have continued to fall and there have been no category 4 avoidable hospital acquired ulcers since October 2014.

Clinical relevance:

The RESPECT campaign promoted patient safety and the dignity element of skin care for the reduction of patient harm in Trust. A simple educational strategy using a memorable acronym can be very effective in delivering key messages in clinical areas. The time spent delivering the sessions was well spent given the positive patient outcomes gained.

CHASING ZERO

Lindsey Bullough¹

¹ Wigan, Wightington and Leigh NHS Foundation Trust; Wigan, Wightington and Leigh NHS Foundation Trust

Introduction:

Around 412,000 people in the UK are likely to develop a pressure ulcer annually. The large number of patients affected, and the high cost associated with Pressure Ulcers (PU's) means that they have become a key quality issue for the NHS. Zero tolerance to avoidable PU's is being implemented. The Waterlow screening tool is used, however recent work has identified weaknesses in the tool.

Our challenge was to improve patient safety outcomes whilst managing cost and potential litigation. The trust embraced a new technology to reduce the risk of patients incurring PU's.

Methods:

We initiated a clinical evaluation of the SEM Scanner within the orthopaedic trauma units.

The SEM scanner scans the skin to assess the sub-epidermal moisture. Each patient is scanned daily. Measurements for the patient are recorded and the deviation noted. A deviation of less than 0.5 is normal, greater than 0.6 shows tissue damage due to either to high a level of moisture or too little. The scanner allows the practitioner to identify damage before it can be visibly seen! It also accurately assesses darker skin tones. We initiated training with the link nurses and with senior management. Scanning was done on heels and sacrum, at admission, daily and prior to discharge.

Results:

62 patients were scanned over 45 days. No PU's were recorded. The SEM scanner proved to be invaluable in determining potential pressure damage.

Discussions:

The implementation was simple and effective. We were the first trust in the UK to implement this technology. Although the pressure ulcer incidence rate was low prior to the evaluation, due to good clinical practice, the rate was, on average, 2 per month. Since the commencement of the evaluation the rate of PU detection over and above the normal skin assessment was around 25%. No hospital acquired incidents have occurred since the study commencement.

We found a potential financial saving in the 1st month of over £28,000 by avoiding two PU's. However, the data shows a potential of five incidents avoided. Furthermore, by detecting deep tissue injury, we are able to transfer this assessment to community staff on discharge thereby allowing staff to put pressure relieving aids in place.

Clinical relevance:

PU's represent a serious health problem to patients and represent a significant financial burden. The results of the study indicate that the SEM scanner demonstrates high reliability, indicative of an excellent quality assessment tool that provides reproducible results.

P61 AVOIDABLE OR NOT AVOIDABLE PRESSURE ULCERS?: STRUCTURAL QUALITY INDICATORS

Tania Santos¹, Katia Furrado¹

¹Elcos - Portuguese Wound Society

Introduction:

Pressure ulcers remain problematic through health care settings, with prevalence and incidence still high. Although external pressure is viewed as the leading factor in the development of pressure ulcers (PU), considerable research has focused on pressure relief. Since relief of external pressure is possible, and would hypothetically eliminate all PU. The development of a PU is often regarded as a failure of the care system. This logic expresses the notion that relieving pressure should be enough to avoid PU and disregards additional factors in the pathogenesis of PU intrinsic to the patient. Patient-specific factors leading to imbalance in tissue perfusion lead to the development of a PU, despite the provision of common prevention measures that include pressure reduction. Identifying risk factors and studying quality of care indicators may lead to more effective interventions.

Methods:

A systematic bibliographical review was conducted.

Results:

There are a number of recent studies referring a decreasing figure of avoidable PU.

Discussions:

Measuring basic care problems such as PU, provides insight into their occurrence and include structural quality of care indicators gives institutions the possibility of improving their care regarding these care problems.

Clinical relevance:

Basic care problems such as PU, malnutrition and falls, occur frequently in health organizations.

References:

Gunningberg, L. S. (2008). *Tracking quality over time: what do pressure ulcer data show?* *International Journal for Quality in Health Care*, 246-253.
Ruud J.G, Halifens, e. a. (2013). *International prevalence measurement of care problems: results.* *Journal of Advanced Nursing*, e5-e17.

P62 TEAM WOUND MANAGEMENT ON INSTITUTE OF ONCOLOGY LJUBLJANA, SLOVENIA

Dragica Tomc¹

¹ Institute of Oncology Ljubljana

Introduction:

In our institute we are dealing with oncology patients and are following up all chronic wounds, especially with patients that have multiple coexisting systemic pathologies. We wanted to have standardized wound management. Nurses interested in wound care from every ward, joined the "wound group" which is held by enterostomal therapist. We made an agreement on improvement of wound management program.

Methods:

"Wound group" has regular meetings once a month to get knowledge, they are listening to the lectures, presenting case reports, having discussions on properties of modern dressings and materials using for wound treatment. Members of the group present problems they meet during their work on the ward. In most cases lack of authority and poor cooperation of other nurses on the ward was the exposed issue. We need meetings on the wards, the cooperation of head nurses and leaders to make it work. Enterostomal therapist is visiting every nurse from the group once a week on the ward, to see how nurses follow wound management and pressure ulcer prevention program. Twice a year we record state of pressure ulcers in institute to compare numbers with last year's.

Results:

Enterostomal therapist is a leader of the wound group with 14 members. Every week she goes to every member and takes closer look to situation on ward, puts down number and kind of chronic wounds, their management and used dressings. She looks at the most problematic ones to make a change of management plan if needed. All together that is approximately 532 visits and 300 dressing changes per year. Finally she puts down findings, conclusions and gives advice to health personnel on form, to follow differences between wards and help they need.

Discussions:

With new approach we got qualified wound care nurses and higher level of care on all wards using special documentation, regular patient assessment with Waterlow scale and follow standards from pressure ulcer prevention programme.

Clinical relevance:

We update skills of nursing personnel, make standardization of procedures and put them into practice, gain the use of standardized documentation and spread knowledge of wound management.

References:

Greatrex-White S., Moxey H. *Wound assessment tools and nurses needs: an evaluation study, International wound Journal* 2014;
Eskes A.M., Maaskant J.M., Holloway S., et al. *Competencies of specialised wound care nurses: a European Delphi study. International wound journal* 2013; 11: 665-674.

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7th Joint Meeting of the European Tissue Repair Society (ETRS) & the Wound Healing Society (WHS)



From Bed to Bench

With the theme “From Bed to Bench” the Copenhagen 2015 ETRS/WHS joint meeting aims to create a forum to facilitate the translation from the clinical to the experimental side of wound healing. Register for the meeting at www.etrswhs2015.org

21-23 October 2015

Copenhagen, Denmark

www.etrswhs2015.org



Venue: Culture and Conference Centre Het Pand

Ghent University, Onderbergen 1, 9000 Ghent, Belgium

EPUAP 2015 Conference Secretariat

Tel: +420 731 555 750

office@epuap.org

CONFERENCE HOURS

Tuesday 15 September

16:00 – 18:00 Pre-registration at the conference venue
Possibility to upload oral presentations.
More information will be available at the registration desk.

Wednesday 16 September

07:30 – 17:15 Registration
09:00 – 10:15 Opening ceremony
10:15 – 17:15 Scientific sessions
09:00 – 17:00 Commercial exhibition
18:30 – 19:30 Welcome reception at the Ghent City Hall

Thursday 17 September

08:00 – 17:15 Registration
08:00 – 17:15 Scientific sessions
09:00 – 17:00 Dutch Symposium Registration, Scientific sessions
(Zaal Rector Blancquaert & Priorzaal)
09:00 – 17:00 French Symposium Registration, Scientific sessions
(Zaal Oude Infirmerie)
08:30 – 17:00 Commercial exhibition
19:30 – 23:00 Boat trip and conference dinner at restaurant "Oude Vismijn"

Friday 18 September

08:00 – 12:45 Registration
09:00 – 12:45 Scientific sessions
08:30 – 12:00 Commercial exhibition

TAXI

More information about taxi services in Ghent (including contact telephone numbers) will be available at the registration desk.

CERTIFICATES OF ATTENDANCE

All participants will receive their certificate of attendance by email after the conference.

CME – CONTINUED MEDICAL EDUCATION

The 18th EPUAP Annual Meeting has been accredited by the European Accreditation Council for Continuing Medical Education (EACCME). The 18th 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 16 September at the Ghent City Hall

Dutch Symposium:

- Admission to Dutch Symposium (17 September 2015), coffee breaks and lunch for one day.

French Symposium:

- Admission to French Symposium (17 September 2015), coffee breaks and lunch for one day.

1-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. Please follow the signs. The cloakroom is unattended.

LUNCH AND COFFEE BREAKS

Lunch and coffee breaks will be served in the exhibition areas Courtyard & Kappitelzaal, located on the ground floor.

INFORMATION FOR SPEAKERS

All presentations will be uploaded to the conference laptop on the day of the conference. In each meeting room there will be an assistant who will help you to upload your presentation. Please make sure you upload your presentations during the coffee or lunch break, latest 2 hours prior to the session.

Presentations taking place in the morning sessions can be uploaded on the day before. Presentations taking place on 16 September in the morning can also be submitted on 15 September between 16:00 – 18:00 at the Het Pand. Please ask the personnel at the registration desk.

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.

MEETING ROOMS

Ground floor

Refter Hall (main auditorium) is located on the ground floor. The key lectures, free paper presentations and industry sessions will take place here.

Library – Speakers' Room is located on the first floor/mezzanine.

1st floor

Priorzaal is located on the first floor. Free paper sessions, the Dutch language symposium (17 September) will be held there.

2nd floor

Zaal Rector Vermeylen is located on the second floor. The industry symposia and workshops, as well as free paper presentations will be held here.

Oude Infirmerie is located on the second floor. The French symposium will take place there.

3rd floor

Zaal Rector Blancquaert is located on the third floor. Free paper sessions, industry workshop and the Dutch symposium (17 September) will take place there.

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.

The exhibition is located on the ground floor in the Courtyard and Kappitelzaal.

LANGUAGE

English

INTERNET AND WIFI

Free WiFi is available all through the venue. Access to WiFi /log in details will be available at the registration desk.

POSTER/E-POSTER AREA

The poster and e-poster area is located in the Zuidergang, on the ground floor. Please follow the signage or ask the personnel at the registration desk for more information.

The posters should be set up on 16 September 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.

The presentation schedule will be available on the web site and at the registration desk.

The conference secretariat takes no responsibility for damaged or left posters.

EPUAP INVESTIGATOR AWARDS 2015

The EPUAP Experienced and Novice Investigator Awards will be awarded by the President of EPUAP at the conference dinner held on 17th September at Oude Vismijn Restaurant.

BEST POSTER AND BEST ORAL PRESENTATION will be awarded by the EPUAP Scientific Committee. 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.

EPUAP AND SAGE PRODUCTS: PARTNERS IN PREVENTION

17 SEPTEMBER 2015

12:30 AWARD CEREMONY

IN THE POSTER AREA ZUIDERGANG

17 SEPTEMBER 2015

16:00 – 17:30

IN ZAAL RECTOR VERMEYLEN

The award winners will have a brief introduction of their projects as part of the e-posters session.

- Pressure Ulcers to Zero Campaign: A Pilot Study in one Dublin Teaching Hospital,
Julie Jordan O'Brien, Ireland
- Pressure ulcer preventive strategies at national level - not just effort, but productive activity,
Andrea Pokorná, Czech Republic
- Reducing Hospital Acquired Pressure Ulcers within the Intensive Care Department using a multidisciplinary team approach and the Plan, Do, Check, Act quality improvement process,
Emma Cullen Gill, United Arab Emirates
- Preventing pressure ulcers in the community setting. Implementing an adapted SSKIN bundle and prevention project using a PDSA model; incorporating a visual aid for carers and relatives of early stage grade 1 pressure ulcer,
Siobhan McCouloug, United Kingdom
- Implementing a Pressure Monitoring Program for Proper Patient Repositioning and Individual Support Surface Selection to Aide in the Prevention of Hospital-Acquired Pressure Ulcers,
Debbie Coleman, United States

The abstracts of quality improvement projects can be found at pages 34 - 38

EPUAP – Sage Products Session 'Preventing Skin Breakdown Projects: Tips and Tricks from 5 Quality Improvement Stories'

Chairs: *Prof. Dimitri Beeckman, Prof. Lena Gunningberg.*

- Introduction by Dimitri Beeckman
- Award winners presentations
- Conclusion & discussion

Main discussion points:

- How do you sustain the outcome of these projects in your organisations?
- How did you manage to involve nurses and other healthcare professionals in the project?
- Further ideas and steps



ABOUT GHENT



Located in the Flemish region of Belgium, the beautiful medieval city of Ghent is not only a city of history, but also a romantic place to visit. The city is full of hidden historical, cultural and culinary gems that you can easily discover. National Geographic Traveller Magazine places Ghent third in its global ranking of authentic destinations!

Ghent is a very compact city, everything is within walking distance (the hotels, congress venue, cultural attractions and restaurants). Ghent is also famous for its impressive historical buildings. No other city in Belgium has as many listed monuments as Ghent. As a university city of international reputation, Ghent is a place where many top key scientists have chosen to live and study.



Airports close to Ghent

Brussels International Airport is located 55 km from Ghent. There are direct trains from the Brussels airport to Ghent. The price for a single fare (Brussels Airport Ghent-St-Pieters) is €11,25.

Brussels South Charleroi Airport is located 110 km from Ghent. There is regular shuttle service from Charleroi airport to Ghent 9 times per day. The price for a single ticket starts from €9 per single journey.








For more information please check the conference website www.epuap2015.org

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Application Guide - Incontinence Associated Dermatitis (IAD)

Applicable for faecal and/or urinary incontinence.

	Solution	3M™ Cavilon™ Continence Care Wipe	3M™ Cavilon™ Durable Barrier Cream	3M™ Cavilon™ No String Barrier Film
Skin Condition				
No IAD Intact skin with no redness		Wipe after every episode of incontinence		
Mild IAD Slight erythema present but no broken areas of skin		Wipe after every episode of incontinence		
Moderate to Severe IAD Erythema present and 'pin prick' pattern on skin evident		Wipe after every episode of incontinence	Twice per day (AM and PM)	
Severe IAD Excoriated weeping skin, 'island lesion' may be visible		Wipe after every episode of incontinence		24 to 48 hours

We would like to invite you to visit our Satellite symposium

Thursday, Sept. 17, 2015

08:00 - 09:30 | Refter (Main Auditorium)



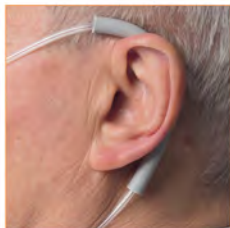
'Skin prevalence audits revealed annual increases in incidence of pressure ulcers of the ear.' *

*Incidence, Correlates, And Interventions Used For Pressure Ulcers of the Ear. Mary Ann Turjanica, Lynn Clark, Christine Martini, Pauline Miller, Barbra L. Turner, and Susan Jones
Medsurg Nursing. September-October 2011 • Vol. 20/No. 5
P241-246

Reduce the pressure

Intersurgical offers two new products to reduce the occurrence of pressure ulcers on the ear

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Photo: Demeester / wikimedia.org

WELCOME RECEPTION

The welcome reception will be hosted by the Ghent City Hall. Entrance is free but it is necessary to confirm participation in time. Ghent's town hall is a building with many faces. The flamboyant Gothic style of the façade in Hoogpoort contrasts sharply with the rather sober Renaissance style of the Botermarkt side. Drinks and snacks will be served during the reception.

Date: 16 September 2015
Time: 18:30
Venue: Ghent City Hall, Pacificatiezaal
Address: Stad Gent, Botermarkt 1, 9000 Gent

CONFERENCE DINNER

The conference dinner will be held at the Oude Vismijn (Old Fishmarket), located in the historical centre by the water. The venue is located within walking distance from the conference venue and most of the hotels.











The dinner will start with a boat trip that will last approximately 20 minutes and will end at Oude Vismijn. During the dinner there will be live music but also a DJ for those who want to dance. You will also have the opportunity to take a picture in the EPUAP photo booth.

Date: 17 September 2015
Time: 19:30
Venue: Oude Vismijn, Sint-Veerleplein 5, 9000 Gent
Live music & DJ



Photo: Marc Byckaert / wikimedia.org

GOLD SPONSORS

 <p>3M www.3M.com [Courtyard - 14]</p>	 <p>Mölnlycke www.molnlycke.com [Kappitelzaal - 4]</p>
 <p>Care of Sweden www.careofsweden.se [Courtyard - 16]</p>	 <p>Sage Products www.sageproducts.com [Courtyard - 22]</p>
 <p>Coloplast www.coloplast.com [Courtyard - 23]</p>	 <p>Schoeller Med www.schoeller-textiles.com [Courtyard - 10]</p>
 <p>Hill-Rom www.hill-rom.com</p>	 <p>Smith&Nephew www.smith-nephew.com [Courtyard - 13]</p>
 <p>Linet www.linet.com [Courtyard - 12]</p>	 <p>Stryker www.stryker.com [Courtyard - 19]</p>

SILVER SPONSORS

 <p>ArjoHuntleigh www.ArjoHuntleigh.com [Courtyard - 20]</p>	 <p>Joerns www.joerns.nl [Kappitelzaal - 7]</p>
 <p>EHOB www.ehob.com [Kappitelzaal - 1]</p>	



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WEDNESDAY | 6. 09. 2015

15:45 - 17:15 ROHO SYMPOSIUM

Meeting room: Main Auditorium Refter (ground floor)

Theme: **Improving Patient Outcomes: Bridging the Gap Between Science and Efficacy**

Speakers: *Prof. Dan Bader, Ph.D., University of Southampton*

Prof. Cees Oomens, Ph.D., Eindhoven University of Technology

Darren Hammond, MPT, CWS, Sr. Director of the ROHO Institute (presenting the clinical work of Professor Joyce Black, Ph.D., University of Nebraska)

Prof. Dave Brienza, Ph.D., University of Pittsburgh

Prof. Amit Gefen, Ph.D., Tel Aviv University



THURSDAY | 7. 09. 2015

08:00 - 09:30 3M BREAKFAST SYMPOSIUM

Meeting room: Main Auditorium Refter (ground floor)

Theme: **IAD: Moving Prevention Forward Presenting the Proceedings of the Global IAD Expert Panel**

Chair: *Prof. Dimitri Beeckman, Ghent University, Chair of the EPUAP Scientific Committee*

Speakers: *Dr. Med. Meaume Sylvie, Head of geriatric department Hôpital Rothschild France*

Prof. Schoonhoven Lisette, University Southampton. President EPUAP

Dr. Kottner Jan, Charité University Berlin

Prof. Dimitri Beeckman, Ghent University. Scientific Committee EPUAP



09:00 - 10:00 COMPLIANTH CONCEPT AG Workshop

Meeting room: Zaal Rector Blancquaert (3rd level)

Theme: **Innovations in Pressure Ulcer Prevention Mobility Monitor at Odense University Hospital Active Mobilization System (AMS) by compliant concept**

Speakers: *Aase Fremmelevholm: Project leader and Decubitus Nurse Specialist on prevention of decubitus, University Hospital Odense, Denmark*

Karin Christensen: Assistant Nursing head of Unit, Geriatric department, University Hospital Odense, Denmark

Viktoria Reynard: Area Sales Manager, compliant concept AG, Switzerland



11:00 - 12:30 MÖLNLYCKE HEALTHCARE SYMPOSIUM

Meeting room: Zaal Rector Vermeylen

Theme: **Pressure Ulcer Prevention Pathway Symposium: A focus on heels**

Chair: *Jacqui Fletcher, (RGN, MSc Wound Healing and Tissue Repair, BSc (Hons) Healthcare Studies (Nursing), P.G.Cert (Education), FHEA, Clinical Strategy; Director, Welsh Wound Innovation Centre)*

Speakers: **New Clinical Evidence - The clinical effectiveness of multi-layer silicone heel dressings;**

Nick Santamaria, (RN, RPN, B.App.Sc, Grad Dip Health ED, M.ED. St, PhD University of Melbourne & Royal Melbourne Hospital, Australia)

New Scientific Evidence - The biomechanical efficacy of dressings in preventing heel ulcer

Amit Gefen (B.Sc., M.Sc., Ph.D. Tel Aviv University, Tel Aviv, Israel)

Translating evidence into practice – Building a pressure ulcer prevention program

Jacqui Fletcher (RGN, MSc Wound Healing and Tissue Repair, BSc (Hons) Healthcare Studies (Nursing), P.G.Cert (Education), FHEA, Clinical Strategy; Director, Welsh Wound Innovation Centre)



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Living with a leg ulcer

Make every day count with superior absorption

Biatain® Silicone combines superior absorption with gentle and secure fit

In the uncertain process of healing wounds, we all want to know we make every day count. At Coloplast Wound Care, we listen and respond to what you experience when caring for wounds. That is why we designed Biatain Silicone in collaboration with Health Care Professionals.¹

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- Superior absorption with soft
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References: 1. Data on file, 2012. 2. Data on file, 2013. 3. Chadwick P et al. Biatain Silicone Dressings: A case series evaluation, Wounds International 2014;5(1)
4. Marburger M, Andersen MB. In vitro test of eight wound dressings with silicone adhesive: Fluid handling capacity and absorption under compression, Presented at Wounds UK 2013
5. Klode J et al. Investigation of adhesion of modern wound dressings: a comparative analysis of 56 different wound dressings. J Eur Acad Dermatol Venereol. (2011) 25(8):933-9. 6. Data on file, 2013.

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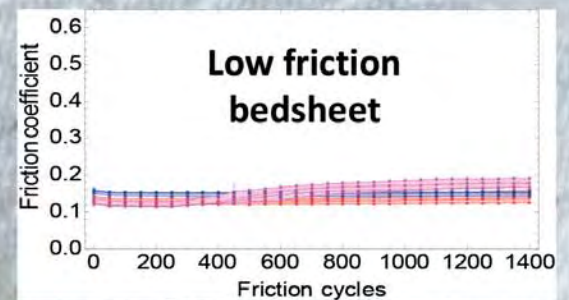
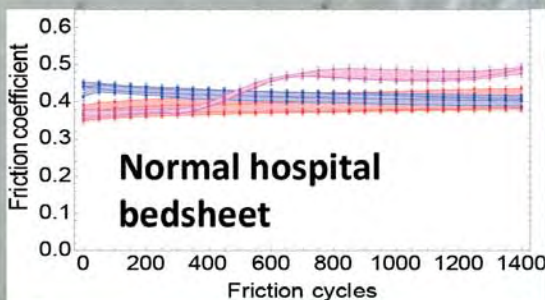
Low friction



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Improved comfort



Friction of normal
bedsheets up to a factor
of 5 higher



For patients with reduced mobility



For patients with sensitive skin



For nurses to ease care-giving



3M
www.3M.com
[Courtyard - 14]

3M captures the spark of new ideas and transforms them into ingenious products. Our culture of creative collaboration inspires a stream of powerful technologies that make life better. 3M is the innovation company that never stops inventing.



Compliant Concept
www.compliant-concept.ch
[Courtyard - 15]

Compliant Concept is a Swiss technology company providing innovative solutions for nursing care. Its assessment tool ("Mobility Monitor") and its new active mobilisation system ("AMS") allow for efficient risk assessment, prevention and treatment of pressure ulcers.



Abigo
www.abigo.com
[Courtyard - 17]

Sorbact® is a registered trademark of ABIGO Medical AB and suitable for a wide variety of wounds. Sorbact® can be used during all stages of wound healing to reduce bioburden and in management of bacterial and fungal infections. A Swedish innovation!



Crawford Healthcare
www.crawfordhealthcare.com
[Kappittelzaal - 5]

Crawford Healthcare is a rapidly-growing international company dedicated to developing innovative treatments and effective woundcare. We provide market leading brands such as KerraMax Care, KerraPro, KerraFoam in order to provide effective wound care solutions.



APEX
www.apexmedicalcorp.com
[Hall ground level - 27]



EHOB
www.ehob.com
[Kappittelzaal - 1]

EHOB's WAFFLE © Brand products creates support surface solutions for simple comfort, early intervention, and fast wound and pressure ulcer healing.



ArjoHuntleigh
www.ArjoHuntleigh.com
[Courtyard - 20]

ArjoHuntleigh products and solutions reduce unnecessary costs by preventing adverse events in care environments. We believe promoting mobility can substantially improve patients' quality of life as well as reduce work-related injuries amongst caregivers. Everything we do is with people in mind.



EPUAP
www.epuap.org
[Hall ground level - 31]

The European Pressure Ulcer Advisory Panel works to provide the relief of those suffering from or at risk of pressure ulcers through research, education and influencing pressure ulcer policy in Europe.



Bruin Biometrics
www.bruinbiometrics.com
[Courtyard - 18]

The SEM Scanner from BBI LLC is a revolutionary, portable device for early detection of early-stage pressure ulcers / DTIs and assessment of real-time tissue health. With up to 91% true positive and 86% true negative values, the SEM Scanner is "Making Pressure Ulcer Prevention Possible".



ESRI
www.esri.be
[Courtyard - 9]

ESRI your European partner in care offers you a range of high quality alternating pressure systems, allowing for an optimal prevention and providing an effective aid to the pressure ulcer



Care of Sweden
www.careofsweden.se
[Courtyard - 16]

Care of Sweden is one of the Nordic region's largest developers and manufacturers of pressure relief mattress systems. Combining our vast experience in pressure care with innovation and modern design we aim to our mission: Together with caregivers, eliminate pressure ulcers.



EWMA
www.ewma.org
[Hall ground level - 25]

EWMA 2016 will take place 11 – 13 May in Bremen, Germany and the main theme of the conference will be PATIENTS. WOUNDS. RIGHTS. For more information, check the conference website www.ewma2016.org



Carital Oy / Medimattress
www.carital.com
[Courtyard - 8]

The Finnish Carital Group manufactures and markets powered minimum pressure mattresses, higher specification foam mattresses and related products & services for health care. The company sells its products through direct sales and internationally through distributors.

Frontier
www.frontier-group.co.uk
[Courtyard - 11]

Repose® a world leading brand in pressure area care offers a range of re-usable PAC devices for use in the treatment and prevention of pressure sores. Clinically proven simple to use & highly cost effective, with more than 3 million users since 1997.



Coloplast
www.coloplast.com
[Courtyard - 23]

Coloplast develops products and services that make life easier for people with very personal and private medical conditions. Working closely with the people who use our products, we create solutions that are sensitive to their special needs. We call this intimate healthcare.



Hill-Rom
www.hill-rom.com
[No stand]

Through science, innovation, and the latest advancements in surface design and testing, Hill-Rom is committed to helping caregivers reduce facility-acquired pressure ulcers. Our unique, evidence-based surface technologies may help you reach a better outcome for patients in your care.

EXHIBITORS EPUAP 2015



Joerns
www.joerns.nl
[Kappittelzaal - 7]

Revolutionizing Care. We're proud to stand at the forefront of healthcare innovation, providing full-service solutions that continue to redefine how care is delivered. Focused on improving patient and caregiver experiences, we place their well-being at the center of everything we do.



Smith&Nephew
www.smith-nephew.com
[Courtyard - 13]

Smith & Nephew is a diversified advanced medical technology business that supports healthcare professionals in more than 100 countries to improve the quality of life for their patients. We have leadership positions in Orthopaedic Reconstruction, Advanced Wound Management, Sports Medicine and Trauma.



Journal of Woundcare
www.journalofwoundcare.com
[Hall ground level - 26]

JWC is the leading monthly academically published journal on wound care. With a global subscriber base and impact factor of 1.91 it's the official voice on research & innovation



Stryker
www.stryker.com
[Courtyard - 19]

Stryker is supporting the Major European wound care societies: EPUAP and EWMA.



Linet
www.linet.com
[Courtyard - 12]

LINET Group is Europe's largest producer of innovative, high-quality healthcare beds, antidecubitus mattresses, furniture, and comprehensive solutions for hospitals and nursing care facilities. LINET Group is active in the global market through subsidiaries in Europe, USA, and Latin America.



Taxisense
www.taxisense.com
[Hall ground level - 24]

Taxisense specializes in Finite Element biomechanical modeling of the body. The models are controlled by a proprietary pressure sensing smart textile. Focused at pressure ulcer prevention, Taxisense has recently extended its activity to other medical fields such as computer assisted surgery.



Mölnlycke
www.molnlycke.com
[Kappittelzaal - 4]

Mölnlycke Health Care is a world-leading provider of single-use surgical and wound care products. We develop and bring to market innovative wound care and surgical products along the entire continuum of care – from prevention to post-acute settings.



Tissue of Viability Society
www.tvs.org.uk
[Hall ground level - 27]

The TVS is probably the world's oldest society dedicated to all tissue viability issues. Formed in 1981 we are a UK registered charity. The Society attracts members from all health care professions involved with tissue viability.



Nutricia
www.nutricia.com
[Kappittelzaal - 6]

Nutricia seeks to establish Advanced Nutrition as an integral part of healthcare, with products and services that help people to live healthier and longer lives



WinnCare
www.woundsinternational.com
[Kappittelzaal - 3]

The WINNCARE Group, French manufacturer, designs and produces medical devices for the prevention and the treatment of pressure ulcers (by ASKLE SANTE), medical beds, transfer and standing devices, mobility aid devices, furniture (by MEDICATLANTIC and VIRMEDIC).



Roho
www.roho.com
[Kappittelzaal - 2]

ROHO is the worldwide leader of seating solutions that prevent and treat pressure ulcers. ROHO's technology provides skin protection and positioning in a variety of applications: from wheelchair cushions, to therapeutic mattresses, to wheelchair backs and more.



Woundsgroup
www.woundsinternational.com
[Hall ground level - 29]

Wounds Group comprising Wounds International, Wounds UK and Wounds Middle East, provides independent medical education, reaching over 560,000 practitioners each year using multiple platforms, including online, in print and in person.



Sage Products
www.sageproducts.com
[Courtyard - 22]

Sage Products develops innovative, disposable healthcare products trusted by leading healthcare facilities worldwide. Our goal is to help healthcare facilities improve patient safety and outcomes by preventing healthcare-associated infections, skin breakdown and other adverse nosocomial events.



WUWHS
www.wuwhs2016.com
[Hall ground level - 28]

WUWHS 2016 will take place between 25 – 29 September 2016 in Florence, Italy. The theme of the conference is: "One Vision, One Mission". More information are available on the conference website www.wuwhs2016.com



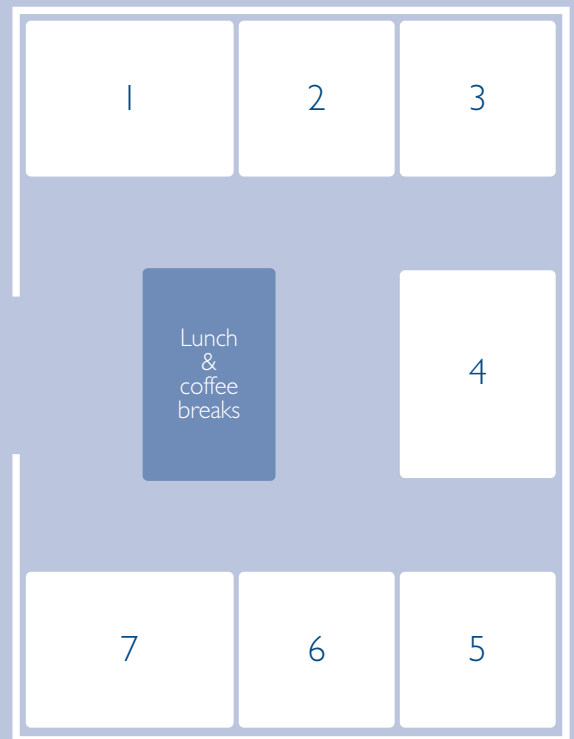
Schoeller Med Switzerland
www.schoeller-textiles.com
[Courtyard - 10]

Schoeller is a Swiss based international textile company, specialized in the development and manufacturing of innovative fabrics and smart textile technologies. Schoeller textiles are leading in a number of niche markets worldwide (sports, work, lifestyle, fashion and medical).

EXHIBITION PLANS

KAPPITELZAAL

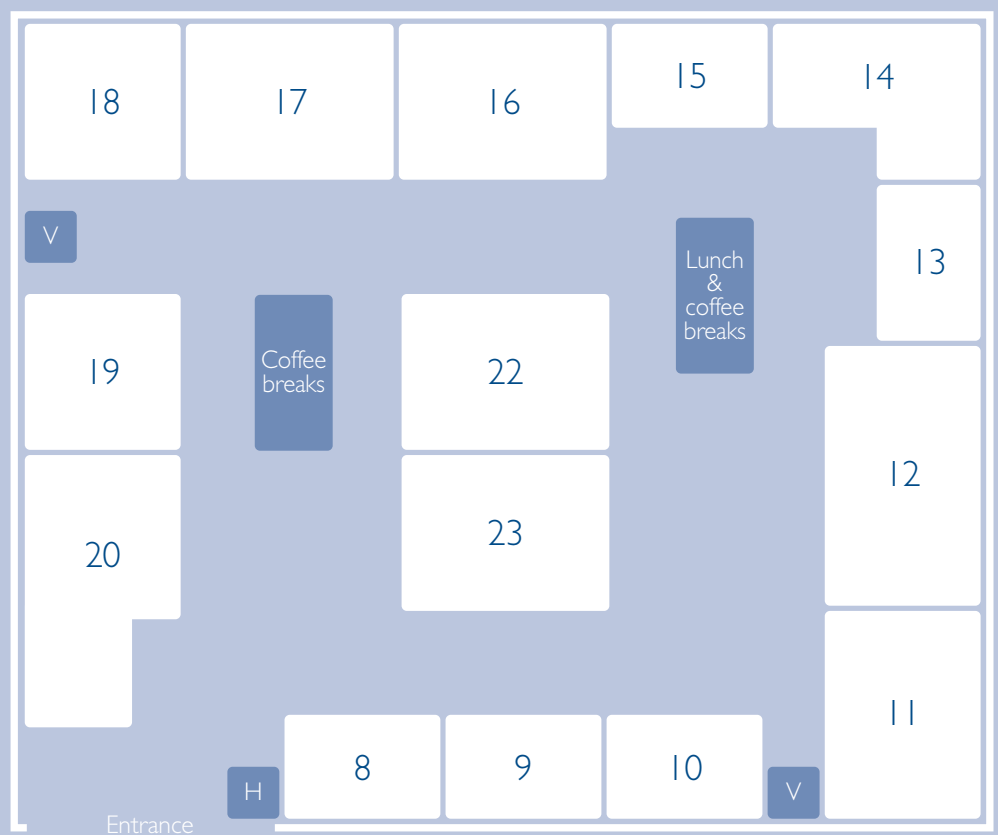
Crawford	5
EHOB	1
Joerns	7
Molnlycke	4
Nutricia	6
Roho	2
Winnicare	3



COURTYARD

H = heating
V = ventilation

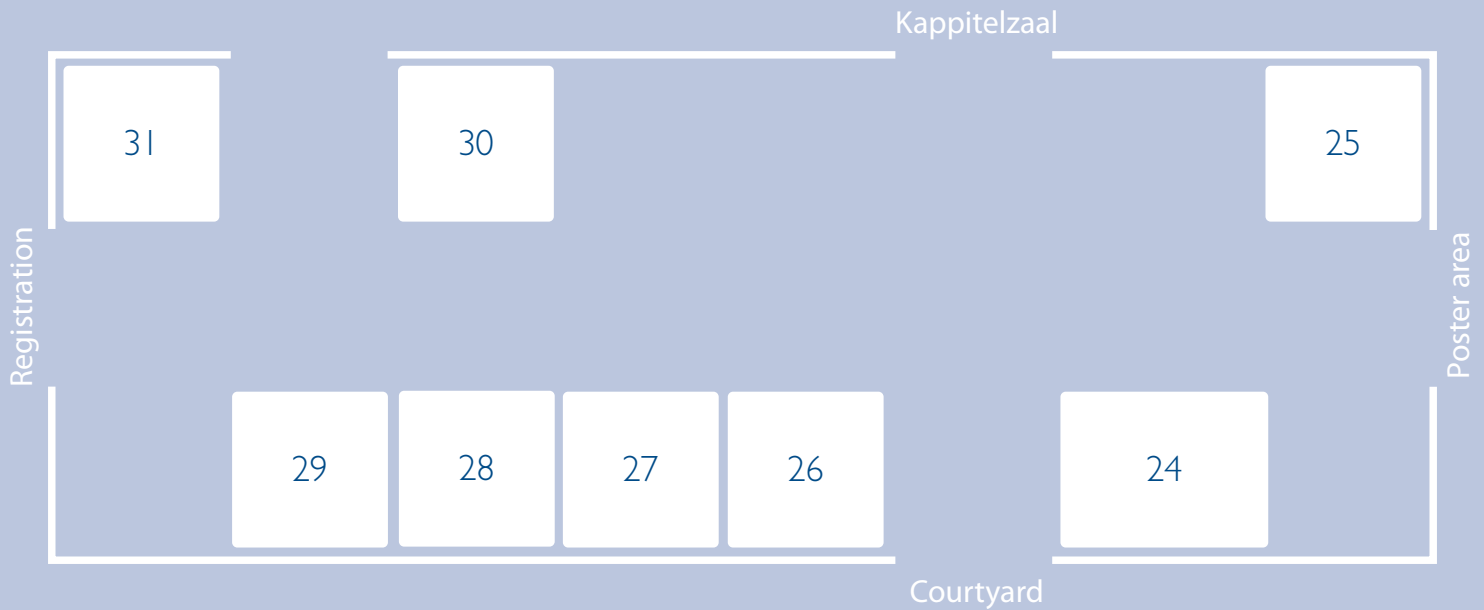
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EXHIBITION PLANS

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Members of LINET Group



LINET therapy mattresses

Effective help in prevention and treatment of pressure ulcers

The LINET company offers a full range of active therapy mattresses adjusted for various hospital departments and diagnoses of individual patients. LINET therapy systems are therefore highly effective in the prevention of pressure ulcers and achieve therapeutic effect in the treatment of pressure ulcers.

LINET active mattresses

- Zero pressure therapy
- Variability for individual approach
- Ergonomic controls

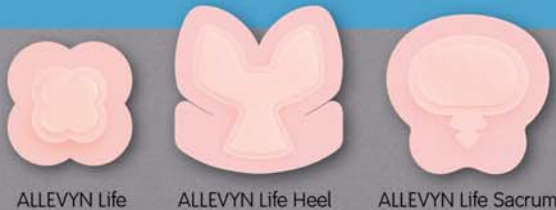
The cost of treating pressure ulcers can be

3.6 times
the cost of preventing them.¹



Designed for people who happen to be patients

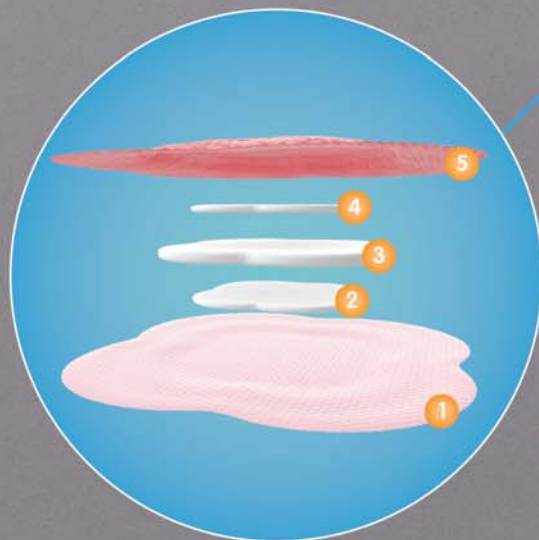
ALLEVYN Life dressings can contribute to a pressure ulcer prevention program to help prevent pressure ulcers^{2,3}



ALLEVYN Life

ALLEVYN Life Heel

ALLEVYN Life Sacrum



1. Silicone adhesive
2. Hydrocellular foam
3. Hyper-absorbent padding layer
4. Protective layer
5. Highly breathable film⁴

Smith & Nephew is proud to **support healthcare professionals**, helping them to deliver better prevention and treatment outcomes for patients and healthcare systems.

We look forward to seeing you at the EPUAP congress 2015! Come and visit us on the **Smith & Nephew booth, stand number 13** at the Culture and Convention Centre Het Pand.

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2. Hoyle, J., Cleveland, C., Jagan, B., Pollin, A., 'Acting Boldly to Reduce Pressure Ulcers in the cardiac/trauma ICU', Poster presented at the annual educational conference of the Wound Society, Charlotte, NC, June 2014.
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4. Data on file, report ID: 012157/001, June 2012, Roberts, Sarah, Physical properties of ALLEVYN Life.

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