

# EPUAP & SOCIÉTÉ FRANÇAISE DE L'ESCARRE

## JOINT ANNUAL MEETING 2019

The 21<sup>st</sup> Annual Meeting of the European Pressure Ulcer Advisory Panel and the Joint Annual Meeting with the Société Française de l'Escarre

18 – 20  
September  
2019  
Lyon, France

[www.epuap2019.org](http://www.epuap2019.org)

Pressure  
ulcer  
prevention  
without  
frontiers

## PROGRAMME AND ABSTRACT BOOK



Organised by the European Pressure Ulcer Advisory Panel (EPUAP) and the Société Française de l'Escarre

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## EPUAP 2019 JOINT ORGANISING COMMITTEE

### **EPUAP 2019 Chairs**

Dominique Sigaudou-Roussel | Benoît Nicolas

### **EPUAP Representatives**

Jane Nixon | Dimitri Beeckman | Zena Moore | Yohan Payan | Carina Bååth | Cees Oomens | Susanne Coleman

### **Société Française de l'Escarre Representatives**

Bérengère Fromy | Martine Barateau | Yann Groc | Sandrine Robineau | Anthony Gélis | Brigitte Barrois

# WELCOME

Dear Colleagues,

It is a great pleasure to welcome you to the 21<sup>st</sup> Annual Meeting of the European Pressure Ulcer Advisory Panel (EPUAP) that we are delighted to organise as a joint annual conference with our colleagues from the French association Société Française de l'Escarre.

This unique cooperation brings us to Lyon this year: a city that is not only known as the capital of French gastronomy and UNESCO world's heritage site, but also particularly important as international centre of innovation and research. Many researchers from Lyon have made major contributions to the sciences over the centuries: Lumière brothers with the invention of cinema, the physician André Ampère and, in the field of medicine, Claude Bernard and Marcel Mérieux.

Nowadays, Lyon continues to develop high tech centres for science and innovation. The city counts over 13.000 researchers and 600 public and private laboratories, Life sciences being one of its 3 sectors of excellence – together with Cleantechnology and Digital.

We would not have found a more suitable location in France to bring together over 600 researchers, clinicians, health professionals and industry representatives coming from all around the world in order to discuss the latest developments and innovations in the field of pressure ulcer prevention, treatment and care during the next full 3 conference days.

The theme of this year's conference is, *Pressure ulcer prevention without frontiers*. The excellent quality of the EPUAP 2019 Scientific programme has been accredited by the European Accreditation Council for Continuing Medical Education and assigned 13 European CME credits.

The programme will offer 12 Key Sessions reflecting the key conference topics and new cutting-edge technologies, presented by key opinion leaders in the field. The programme also contains 10 Free Paper Sessions, Award Sessions, Round Table, over 12 Practical Workshops and Interactive Sessions organised in both English and French together with a number of workshops and symposia organised by Industry. Over 160 abstracts have been submitted in both English and French by researchers from 32 countries across Europe, Asia, Africa, America and Australia. The rich scientific programme will be accompanied by two networking events: the Welcome Reception organised thanks to the kind support of the City and the Metropole of Lyon at the Lyon City Hall and the Conference Dinner taking place in a historical cuve hall of an old château located in Lyon surroundings in order to experience the history and the authenticity of the region.

Welcome to Lyon!

*On behalf of the EPUAP 2019 Joint Organising Committee*  
*Prof. Jane Nixon, EPUAP President*  
*Prof. Dominique Sigaud-Roussel, EPUAP 2019 Chair*  
*Dr. Benoît Nicolas, Journées Nationales de l'Escarre 2019 Chair*

# 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.

## The mission

The mission of EPUAP is to provide relief for persons suffering from, or at risk of, pressure ulcers, through research, education of the public, raising awareness and by influencing pressure ulcer policy in all European countries towards an adequate patient centered and cost effective pressure ulcer care.

A very important activity for the European Pressure Ulcer Advisory Panel is the 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 present new developments in pressure ulcer prevention, treatment and care.

## EPUAP Executive Board Members

Jane Nixon, *President*

Dimitri Beeckman, *President Elect*

Susanne Coleman, *Treasurer*

Alison Porter-Armstrong, *Co-Treasurer*

Yohan Payan, *Scientific Committee Chair*

Zena Moore, *Scientific Committee Co-Chair*

Jan Kottner, *Guidelines Committee Chair*

Katrin Balzer, *Guidelines Committee Co-Chair*

Nils Lahmann, *Research Committee Chair*

Peter Worsley, *Research Committee Co-Chair*

Dominique Sigaudou-Roussel, *EPUAP 2019 Chair*

## EPUAP trustees

Maarit Ahtiala (*Finland*)

Paulo Alves (*Portugal*)

Ida Marie Bredesen (*Norway*)

Carina Bååth (*Sweden*)

Serena Crucianelli (*Italy*)

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Ulrika Källman (*Sweden*)

Cees Oomens (*Netherlands*)

Andrea Pokorna (*Czech Republic*)

Steven Smet (*Belgium*)

Jakub Taradaj (*Poland*)

## EPUAP membership

The EPUAP involves members working in the field as doctors, nurses and other health professionals, but also specialists from research, education and industry.

We all have a single goal, and that is to find out what is the best way to prevent and treat pressure ulcers.

### WHY BECOME AN EPUAP MEMBER?

- Receive regular information related to pressure ulcer prevention and management
- Benefit of a special EPUAP member registration fee at the annual meeting
- Get advice on issues related to the prevention and treatment of pressure ulcers
- Get advice in your daily practice upon the implementation of the guidelines
- Share your projects and information about pressure ulcers with other members
- Networking opportunities with other professionals from the same or related fields
- Opportunities to join regional or local projects and to get support from the EPUAP

# ABOUT SOCIÉTÉ FRANÇAISE DE L'ESCARRE



The Société Française de l'Escarre is a French association of professionals founded in 1991 with the mission of field action in the area of pressure ulcer prevention, education and research.

The main objective is to improve patient's quality of life by using all available means to fight against pressure ulcers.

The Association brings together caregivers, doctors, surgeons, pharmacists and paramedics, nurse managers, rehabilitators (occupational therapists, physiotherapists, dieticians and psychomotor therapists) associated with researchers in the fields of biology, micro-circulation, statistics, physics and force mechanics.

Benoît Nicolas, President  
Martine Barateau, Vice-President  
Bérengère Fromy, Vice-President  
Jean-Marc Michel, Secretary  
Anthony Gélis, Vice-Secretary  
Denis Colin, Treasurer  
Yann Groc, Co-Treasurer

## EPUAP Business Office

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Follow us on



# EPUAP 2019 PROGRAMME OVERVIEW

<b>Wednesday   18 September 2019</b>			
08:00	Registration area > Registration, badge and bag collection		
08:00 - 09:00	Registration area > Morning coffee & tea	Breakout room 1/Pasteur Lounge	Breakout room 2/Rhône 3A
09:00 - 09:25	Plenary hall/Lumière Auditorium		Breakout room 3/Rhône 3B
	<b>Opening session</b> <i>Welcome</i>		
9:25 - 10:40	<b>Key session 1:</b> Patient safety and advocacy for pressure ulcer prevention	 	
10:45 - 12:00	<b>Key session 2:</b> Emerging technologies in pressure ulcer prevention and treatment	 	<b>Free paper session 1:</b> Pressure ulcers and health economics (10:45 - 11:30)
12:00 - 13:50	<b>Exhibition area &gt; Lunch break, Exhibition</b>		<b>Industry session 1: Lunch symposium</b> (12:15 - 13:45)
	<b>Poster area &gt; Poster presentations A</b> (12:45 - 13:45)		
13:50 - 15:05	<b>Key session 3:</b> Prophylactic dressings for prevention	 	<b>Free paper session 3:</b> Patient involvement in pressure ulcer prevention and management in specific patient groups (paediatrics, surgery, spinal cord injury, ER, older persons, palliative care, etc.) (14:00 - 15:00)
15:05 - 15:15	<b>Short break</b>		
15:15 - 16:15	<b>Key session 4:</b> Overcoming barriers to pressure ulcer prevention: learning from the experience across different countries	 	<b>Free paper session 4:</b> Patient safety, quality of care and policy
16:15 - 17:00	<b>Exhibition area &gt; Coffee break, Exhibition</b>		<b>Industry session 3: Workshop</b> (15:15 - 16:15)
17:00 - 18:00	<b>Key session 5:</b> Special populations and pressure ulcer prevention	 	<b>Free paper session 5:</b> Innovations in pressure ulcer prevention and treatment
19:30	<b>Welcome reception</b>		<b>EPUAP awards session:</b> Quality Improvement Projects awards
<b>Thursday   19 September 2019</b>			
08:00	Registration area > Registration, badge and bag collection		
09:00 - 10:15	Plenary hall/Lumière Auditorium	 	Breakout room 1/Pasteur Lounge
	<b>Key session 6:</b> Pressure ulcer aetiology: What can we learn from research?		Breakout room 2/Rhône 3A
10:15 - 10:45	<b>Exhibition area &gt; Coffee break, Exhibition</b>		Breakout room 3/Rhône 3B
10:45 - 12:00	<b>Key session 7:</b> Biofilm and prevention of infections	 	<b>Free paper session 6:</b> Pressure ulcers: Implementation science and education (10:45 - 11:45)
12:00 - 13:50	<b>Exhibition area &gt; Lunch break, Exhibition</b>		<b>Student free paper session 1:</b> Basic science and clinical science (10:45 - 11:45)
	<b>Poster area &gt; Poster presentations B</b> (12:45 - 13:45)		<b>Industry session 5: Lunch symposium</b> (12:15 - 13:45)

13:50 - 15:05	<b>Plenary hall/Pasteur Auditorium</b> <b>Key session 8:</b> Pressure ulcers as key performance indicators: What are the implications for PU care? <b>Exhibition area</b> > <b>Coffee break, Exhibition</b>		<b>Breakout room 1/Pasteur Lounge</b> <b>Free paper session 7:</b> Pressure ulcer prevention and management in specific patient groups (paediatrics, surgery, spinal cord injury, ER, older persons, palliative care, etc.)	<b>Breakout room 2/Rhône 3A</b> <b>Key session 14: Session Franco-Suisse : des programmes, des résultats</b> (14:00-15:30) Exposés et table ronde avec le public	<b>Breakout room 3/Rhône 3B</b> <b>Joint workshop</b> (14:00 - 15:00): Repositioning	
15:05 - 15:50	<b>Exhibition area</b> > <b>Coffee break, Exhibition</b> <b>Annual General Assembly of the EPUAP</b> (Pasteur Auditorium)					
15:50 - 16:50	<b>Key session 9:</b> Guidelines for pressure ulcer prevention and treatment		<b>EPUAP Awards session:</b> Excellence in Education Awards	<b>Free paper session 8:</b> Basic science: Biomechanics, biology and aetiology: theoretical and in vitro approaches	<b>EPUAP Funded projects presentations</b>	
16:50 - 17:00	<b>Short break</b>					
17:00 - 18:00	<b>Key session 10:</b> The impact of education on pressure ulcer prevention and management: the patient and the healthcare team		<b>EPUAP workshop:</b> Dressing selection	<b>Joint workshop:</b> Nutrition	<b>EPUAP workshop:</b> Wound assessment	
20:00	<b>Conference dinner</b>					
<b>Friday   20 September 2019</b>						
08:00	<b>Registration area</b> > <b>Registration, badge and bag collection</b>					
09:00 - 10:15	<b>Plenary hall/Pasteur Auditorium</b> <b>Key session 11:</b> Pain management and pressure ulcer prevention		<b>Breakout room 1/Pasteur Lounge</b> <b>Joint workshop:</b> Repositioning (09:00 - 10:00)	<b>Breakout room 2/Rhône 3A</b> <b>Free paper session 9:</b> Innovative approaches in clinical research (prevention and treatment)	<b>Breakout room 3/Rhône 3B</b> <b>Industry session 6: Satellite symposium</b> (09:00 - 10:30)	
10:15 - 11:00	<b>Exhibition area</b> > <b>Coffee break, Exhibition</b> <b>Annual General Assembly of the Société Française de l'Escarre</b> (Breakout room 1/Pasteur Lounge)					
11:00 - 12:00	<b>Key session 12:</b> Telemedicine and pressure ulcer prevention: striving for no frontiers		<b>Free paper session 10:</b> Free paper session in French language	<b>Student free paper session 2:</b> Basic science	<b>EPUAP workshop:</b> Dressing selection	
12:00 - 12:30	<b>Closing session of the joint programme</b>					
12:30 - 13:30	<b>Exhibition area</b> > <b>Lunch break, Exhibition</b>					
13:30 - 14:30	<b>Controverses:</b> La Prévention et les outils connectés, dangers ou atouts		<b>Atelier:</b> Nutrition	<b>Atelier:</b> Escarre et talon	<b>Atelier:</b> Chirurgie	
14:30 - 14:40	<b>Short break</b>					
14:40 - 15:40	<b>Table ronde:</b> Financement de la prévention en EHPAD		<b>Atelier:</b> Douleur	<b>Atelier:</b> Organisation et vie d'un groupe escarres	<b>Atelier:</b> Escarres et fin de vie	
15:40 - 16:00	<b>Coffee break</b>					
16:00 - 17:30	<b>Closing session of the French programme, Société Française de l'Escarre</b> If not indicated otherwise, the language of the session is English.					

Industry sessions overview is available at pages 117 - 119

# EPUAP 2019 DETAILED PROGRAMME

Wednesday   18 September 2019		
08:00	<b>Registration, badge and bag collection</b>	Registration area
08:00 - 09:00	<b>Morning coffee &amp; tea</b>	Registration area
09:00 - 09:25	<b>Opening session</b> <ul style="list-style-type: none"> <li>Welcome by the EPUAP President; <i>Jane Nixon</i></li> <li>Welcome by the EPUAP 2019 Chair; <i>Dominique Sigaud-Roussel</i></li> <li>Welcome by the Chair of the Journées Nationales de l'Escarre; <i>Benoît Nicolas</i></li> <li>Overview of the programme by the Scientific Programme Chair; <i>Yohan Payan</i></li> </ul>	Plenary hall/ Pasteur Auditorium
09:25 - 10:40	<b>Key session 1: Patient safety and advocacy for pressure ulcer prevention; Chairs: Jane Nixon, Andrea Pokorná</b> <ul style="list-style-type: none"> <li>Work of the EPUAP/EWMA advocacy group; <i>Lisette Schoonhoven, the Netherlands</i></li> <li>Quality monitoring of pressure ulcers – lessons learned; <i>Zena Moore, Ireland</i></li> <li>Artificial intelligence, data science and patient safety: towards zero avoidable PU?; <i>Sandrine Robineau, France</i></li> </ul>	Plenary hall/ Pasteur Auditorium 🇬🇧 🇫🇷 🇮🇪
10:45 - 12:00	<b>Key session 2: Emerging technologies in pressure ulcer prevention and treatment; Chairs: Amit Gefen, Dominique Sigaud-Roussel</b> <ul style="list-style-type: none"> <li>Biochemical markers for early detection and identification of patients at risk of PUs; <i>Cees Oomens, the Netherlands</i></li> <li>Sub-epidermal moisture measurement; <i>Aglecia Budri, Ireland</i></li> <li>Strategy towards wound re-epithelialisation: the extracellular matrix in context; <i>Patricia Rousselle, France</i></li> </ul>	Plenary hall/ Pasteur Auditorium 🇬🇧 🇫🇷 🇮🇪
	<b>Key session 13: EPUAP-EWMA Joint Session; Chairs: Zena Moore, Lisette Schoonhoven</b> <ul style="list-style-type: none"> <li>Wrap-up of overall project activities; <i>Lisette Schoonhoven, the Netherlands</i></li> <li>The results of the consumer survey of the international guidelines; <i>Jan Kottner, Germany</i></li> <li>The case report of a patient with spinal cord injury and experience with pressure ulcer - video interview; <i>Andrea Pokorná, Czech Republic</i></li> <li>Update on International Measurement of Pressure Ulcer Prevalence; <i>Ian Brownwood, OECD</i></li> </ul>	Breakout room 1 /Pasteur Lounge
	<b>Free paper session 1: Pressure ulcers and health economics (10:45-11:30); Chairs: Rolf Jelnes, Katrin Balzer</b> <ul style="list-style-type: none"> <li>The cost and consequences of an intervention-based programme to reduce hospital-acquired pressure injuries in one health district in Australia; <i>Michelle Barakat-Johnson, Australia</i></li> <li>Assessment of static overlays for pressure ulcers prevention; <i>Knaerke Soegaard, Denmark</i></li> <li>Modelling pressure ulcer prevention and treatment pathways: large cost savings achievable with investment in new technology; <i>Martin Burns, United States</i></li> </ul>	Breakout room 2 /Rhône 3A
12:00 - 13:50	<b>Lunch break, Exhibition</b>	Exhibition /Forum 1 & 2
	<b>Poster presentations A (12:45-13:45)</b>	Exhibition /Forum 1 & 2
	<b>Industry session 1: Lunch symposium (12:15 -13:45)</b>	Breakout room 2 /Rhône 3A
	<b>Industry session 2: Lunch symposium (12:15 -13:45)</b>	Breakout room 3 /Rhône 3B
13:50 - 15:05	<b>Key session 3: Prophylactic dressings for prevention; Chairs: Dimitri Beeckman, Steven Smet</b> <ul style="list-style-type: none"> <li>Learnings from designing and performing a nationwide RCT for evaluating prophylactic dressings in pressure ulcer prevention; <i>Dimitri Beeckman, Belgium</i></li> <li>Prophylactic dressings for pressure ulcer prevention: results from a Cochrane review; <i>Zena Moore, Ireland</i></li> <li>Multilayer foam dressings in the therapeutic strategy as an aid to the prevention of pressure ulcers: an experts' consensus opinion; <i>Nathalie Faucher, France</i></li> </ul>	Plenary hall/ Pasteur Auditorium 🇬🇧 🇫🇷 🇮🇪
	<b>Free paper session 2: Basic science: Biomechanics, biology and aetiology: theoretical and in vivo approaches (13:50-14:50); Chairs: Yohan Payan, Peter Worsley</b> <ul style="list-style-type: none"> <li>The effects of two pressure relieving support surface on the pathophysiological cascade of pressure ulcer development - a positron emission tomography (PET) study; <i>Esa Soppi, Finland</i></li> <li>Can we establish a threshold pressure above which lymphatic activity is disturbed? Implication in pressure ulcer aetiology; <i>Hanneke Crielaard, the Netherlands</i></li> <li>Investigation of the in vivo passive mechanical properties of thigh soft tissues in healthy volunteers using a custom-made freehand ultrasound-based indentation set-up; <i>Pierre-Yves Rohan, France</i></li> <li>Evolution of cutaneous bacterial microbiota of pressure ulcers in patients with spinal cord injury; <i>Catherine Dunyach-Remy, France</i></li> <li>The influence of incontinence pad moisture at the loaded skin interface; <i>Luciana Bostan, United Kingdom</i></li> </ul>	Breakout room 1 /Pasteur Lounge
	<b>Free paper session 3: Patient involvement in pressure ulcer prevention and management in specific patient groups (paediatrics, surgery, spinal cord injury, ER, older persons, palliative care, etc.) (14:00 - 15:00); Chairs: Guido Ciprandi, Anthony Gélis</b> <ul style="list-style-type: none"> <li>Maintaining skin integrity in the aged: a systematic review update; <i>Andrea Lichterfeld-Kottner, Germany</i></li> <li>Development of a conceptual framework for the promotion of a systematic long-term follow-up of persons with a spinal cord injury: a patient-approach based on their skin experience; <i>Marc Le Fort, France</i></li> <li>"I was more attentive thanks to my skin breakdown and also to my wife!": Impact of the social support on pressure ulcers prevention in spinal cord injured patients and on their adherence to systematic follow-up: a qualitative study; <i>Marc Le Fort, France</i></li> <li>Body mass index and pressure injury prevalence; <i>Hyunjung Yeo, Republic of South Korea</i></li> <li>Turning and positioning in aged care: the patient perspective; <i>Suzanne Kapp, Australia</i></li> </ul>	Breakout room 2 /Rhône 3A

15:05 - 15:15	<b>Short break</b>	
15:15 - 16:15	<p><b>Key session 4:</b> Overcoming barriers to pressure ulcer prevention: learning from the experience across different countries; <i>Chairs: Maarit Ahtiala, Carina Bååth</i></p> <ul style="list-style-type: none"> <li>Establishing a pressure ulcer prevention strategy in a large, acute, teaching hospital: challenges and outcomes; <i>Pat Mc Cluskey, Ireland</i></li> <li>Therapeutic education in France: cross-over experience; <i>Anthony Gélis, France</i></li> </ul>	Plenary hall/ Pasteur Auditorium 
	<b>Industry session 3: Workshop</b> (15:15-16:15)	Breakout room 3 /Rhône 3B
	<p><b>Free paper session 4:</b> Pressure ulcers: Patient safety, quality of care and policy; <i>Chairs: Andrea Pokorná, Carina Bååth</i></p> <ul style="list-style-type: none"> <li>Repositioning for preventing pressure ulcers: a systematic review; <i>Pinar Avsar, Ireland</i></li> <li>Understanding the barriers and eliminating the gaps towards sustainable reduction of hospital acquired pressure injuries; <i>Marilou Mendoza, United Arab Emirates</i></li> <li>First do no harm? An examination of necessary hospital devices and the development of hospital acquired pressure injuries; <i>Sarah Sage, Australia</i></li> <li>Structures and processes in hospitals for pressure ulcer prevention in general and in A&amp;E departments; <i>Nils Lahmann, Germany</i></li> <li>A three-step approach to reduce the prevalence of pressure ulcers and improve patient care - engaging all levels at a large university hospital; <i>David Thunborg, Sweden</i></li> </ul>	Breakout room 2 /Rhône 3A
	<b>EPUAP workshop:</b> Debridement; <i>Sebastien Probst and Lucie Charbonneau, Switzerland</i>	Breakout room 1 /Pasteur Lounge
16:15 - 17:00	<b>Coffee break, Exhibition</b>	Exhibition /Forum 1 & 2
17:00 - 18:00	<p><b>Key session 5:</b> Special populations and pressure ulcer prevention; <i>Chairs: Ulrika Kallman, Yann Groc</i></p> <ul style="list-style-type: none"> <li>Pressure ulcer prevention in children admitted to critical settings; <i>Guido Ciprandi, Italy</i></li> <li>Ethics and pressure ulcer prevention in palliative care: How and where do we draw the line?; <i>Karen Ericka Newby, France</i></li> </ul>	Plenary hall/ Pasteur Auditorium 
	<p><b>EPUAP Awards session:</b> Quality Improvement Projects Awards; <i>Chairs: Zena Moore, Alison Porter-Armstrong</i></p> <ul style="list-style-type: none"> <li>A new approach of risk assessment and prevention: using the UZ Leuven risk assessment in a pro-active pressure ulcer prevention policy; <i>Annelies de Graaf, Belgium</i></li> <li>The development of the Purpose T pressure ulcer risk instrument into an electronic questionnaire to support mobile working; <i>Nikki Stubbs, United Kingdom</i></li> <li>Striving for Perfect Care – preventing skin breakdown in the community setting in the UK; <i>Nicky Ore, United Kingdom</i></li> </ul>	Breakout room 1 /Pasteur Lounge
	<p><b>Free paper session 5:</b> Innovations in pressure ulcer prevention and treatment; <i>Chairs: Amit Gefen, Cees Oomens</i></p> <ul style="list-style-type: none"> <li>PRESIDIE - concordance study of continuous recording of the sitting pressures of people with a spinal cord injury by an embedded device; <i>Marc Le Fort, France</i></li> <li>Mechanobiology inspired approaches to prolong the safe time in immobile positions; <i>Daphne Weihs, Israel</i></li> <li>Bacterial fluorescence imaging guides pressure ulcer wound assessment, wound bed preparation, and treatment plan in a multi-centre clinical trial; <i>Monique Y. Rennie, Canada</i></li> <li>Using pressure ulcer risk assessment linked monitoring tool to reduce hospital acquired pressure injuries; <i>Marilou Mendoza, United Arab Emirates</i></li> </ul>	Breakout room 2 /Rhône 3A
	<b>EPUAP workshop:</b> IAD and skin frailty; <i>Dimitri Beekman, Belgium</i>	Breakout room 3 /Rhône 3B
19:30	<b>Welcome reception</b>	Lyon City Hall

Industry sessions overview is available at pages 117 - 119

Thursday   19 September 2019		
08:00	<b>Registration, badge and bag collection</b>	Registration area
09:00 - 10:15	<b>Key session 6:</b> Pressure ulcer aetiology: What can we learn from research?; <i>Chairs: Yohan Payan, Cees Oomens</i> <ul style="list-style-type: none"> <li>■ Skin tissue integrity and intercellular communications in pressure ulcer risk; <i>Dominique Sigauco Rousel, France</i></li> <li>■ Saving lives through aetiological research of pressure ulcers: How can understanding lead to better prevention and care; <i>Amit Gefen, Israel</i></li> <li>■ Translation of research tools and strategies for implementation at the bedside; <i>Dan Bader, United Kingdom</i></li> </ul>	Plenary hall/ Lumière Auditorium 
10:15 - 10:45	<b>Coffee break, Exhibition</b>	Exhibition /Forum 1 & 2
10:45 - 12:00	<b>Key session 7:</b> Biofilm and prevention of infections; <i>Chairs: Dimitri Beeckman, Rolf Jelnes</i> <ul style="list-style-type: none"> <li>■ Anti-biofilm; <i>David Lebeaux, France</i></li> <li>■ Biofilm model and chronic wounds; <i>Claus Moser, Denmark</i></li> <li>■ The prevalence of biofilms in chronic wounds: a systematic review and meta-analysis of published data; <i>Isabelle Fromantin, France</i></li> </ul>	Plenary hall/ Lumière Auditorium 
	<b>Industry session 4: Satellite symposium (10:45 - 12:15)</b>	Breakout room 1 /Pasteur Lounge
	<b>Student free paper session 1:</b> Basic science and clinical science (10:45-11:45); <i>Chairs: Peter Worsley, Bérengère Fromy</i> <ul style="list-style-type: none"> <li>■ Phantom testing of a sub-epidermal moisture measurement device; <i>Lea Cohen, Israel</i></li> <li>■ A novel phantom for efficacy research of therapeutic pressure ulcer dressing performances; <i>Adi Lustig, Israel</i></li> <li>■ A miniature incubator for cell stretching reveals the mechanobiology for delivering better negative pressure therapy; <i>Rona Greifman, Israel</i></li> <li>■ An exploratory randomized controlled trial to evaluate the effect of a basic skin care product on the structural strength of the dermo-epidermal junction; <i>Monira El Genedy, Germany</i></li> <li>■ What is best practice for reducing the incidence and severity of incontinence-associated dermatitis in critically ill patients? a systematic review; <i>Li Chen, United Kingdom</i></li> </ul>	Breakout room 2 /Rhône 3A
	<b>Free paper session 6:</b> Pressure ulcers: Implementation science and education (10:45-11:45); <i>Chairs: Katrin Balzer, Susanne Coleman</i> <ul style="list-style-type: none"> <li>■ Sex-specific differences in pressure ulcer prevention in hospitals: a secondary data analysis; <i>Andrea Lichterfeld-Kottner, Germany</i></li> <li>■ The effect of standard training module on pressure injury classification and wound dressing decisions of health care professionals; <i>Vildan Çakar, Turkey</i></li> <li>■ Atypical PU topography in pediatric disabilities and rare diseases. Customize and properly tailored prevention of pressure injuries; <i>Serena Crucianelli, Italy</i></li> </ul>	Breakout room 3 /Rhône 3B
12:00 - 13:50	<b>Lunch break, Exhibition</b>	Exhibition /Forum 1 & 2
	<b>Poster presentations B (12:45-13:45)</b>	Exhibition /Forum 1 & 2
	<b>Industry session 5: Lunch symposium (12:15 - 13:45)</b>	Breakout room 2 /Rhône 3A
13:50 - 15:05	<b>Key session 8:</b> Pressure ulcers as key performance indicators: What are the implications for PU care?; <i>Chairs: Jane Nixon, Susanne Coleman</i> <ul style="list-style-type: none"> <li>■ Measuring what matters; <i>Jan Kottner, Germany</i></li> <li>■ 1,000 Lives Improvement; <i>Trudie Young, United Kingdom</i></li> <li>■ Indicators in France; <i>Yann Groc, France</i></li> </ul>	Plenary hall/ Pasteur Auditorium 
	<b>Free paper session 7:</b> Pressure ulcer prevention and management in specific patient groups (paediatrics, surgery, spinal cord injury, ER, older persons, palliative care, etc.); <i>Chairs: Ulrika Kallman, Ida Marie Bredesen</i> <ul style="list-style-type: none"> <li>■ Improving prevention and treatment of incontinence associated dermatitis in onco/onco-haematological children; <i>Marjola Gjergji, Italy</i></li> <li>■ Double prevention strategy: preventing skin breakdown in operatory settings in children; <i>Guido Ciprandi, Italy</i></li> <li>■ Risk factors associated with the development of postoperative pressure ulcers in adult surgical patients: a systematic review and meta-analysis; <i>Mette Haisley, Denmark</i></li> <li>■ Prevalence and associated factors of pressure injury in cardiology intensive care unit patients; <i>Paula Nogueira, Brazil</i></li> <li>■ Reducing pressure ulcer (PU) incidence through introduction of new technology; <i>Kate Hancock, United Kingdom</i></li> <li>■ The effectiveness of two silicone dressings for sacral and heel pressure ulcer prevention in high risk intensive care unit patients: results of a randomized controlled parallel-group trial; <i>Elisabeth Hahnel, Germany</i></li> </ul>	Breakout room 1 /Pasteur Lounge
	<b>Key session 14: Session Franco-Suisse : des programmes, des résultats (14.00 - 15:30) 90';</b> <i>Chairs: Brigitte Barrois, Hubert Vuagnat</i> <ul style="list-style-type: none"> <li>■ Introduction; <i>Brigitte Barrois, France, Hubert Vuagnat, Suisse</i></li> <li>■ Hôpitaux universitaires de Genève, Programme Zoom sur l'escarre : une réalité aux HUG depuis 25 ans; <i>Anne Claire Rae, Anne-Laure Blanchard, Suisse</i></li> <li>■ Hôpitaux universitaires Genève, 15 ans d'un groupe interdisciplinaire plaies et cicatrisation dans un service de réadaptation et longs séjours; <i>Hubert Vuagnat, Suisse</i></li> <li>■ Centre hospitalier universitaire vaudois - Objectif Zéro Escarre: où en sommes-nous après 10 ans?; <i>Lucie Charbonneau, Suisse</i></li> <li>■ Prévention des escarres aux HCL: 20 ans d'actions, de progrès, de résultats, comment faire toujours différemment?; <i>Christiane Bollon, France</i></li> <li>■ 30 ans d'actions du « groupe escarre » au Centre Hospitalier de Gonesse; <i>Sylvie Merdinian, Valérie Céphise, France</i></li> <li>■ Réduire de 50% les escarres nosocomiales - un collectif de travail Suisse francophone; <i>Christian Baralon, Suisse</i></li> <li>■ Table ronde avec le public</li> </ul>	Breakout room 2 /Rhône 3A 
	<b>Joint workshop EN &amp; FR (14.00 - 15:00):</b> Repositionning <i>Menno van Etten, Norway and Anthony Gélis, France</i>	Breakout room 3 /Rhône 3B 

15:05 - 15:50	<b>Coffee break, Exhibition</b>	Exhibition /Forum 1 & 2
	<b>Annual General Assembly of the EPUAP</b>	Plenary hall/ Pasteur Auditorium
15:50 - 16:50	<b>Key session 9:</b> Guidelines for pressure ulcer prevention and treatment; <i>Chairs: Katrin Balzer, Zena Moore</i> <ul style="list-style-type: none"> <li>■ Update on the International Guidelines for the Prevention and Treatment of Pressure Ulcers 2019; <i>Janet Cuddigan, USA, Jan Kottner, Germany (on behalf of the Guideline Governance Group)</i></li> <li>■ Guidelines on positioning; <i>Martine Barateau, France</i></li> </ul>	Plenary hall/ Pasteur Auditorium 
	<b>EPUAP Awards session:</b> Excellence in Education Awards; <i>Chairs: Steven Smet, Maarit Ahtiala</i> <ul style="list-style-type: none"> <li>■ Introductory lecture: Training strategies for education in PU prevention in a Belgian University Hospital; <i>Steven Smet, Belgium</i></li> <li>■ Shanley Pressure Ulcer Prevention Programme (SPUPP); <i>Emer Shanley, Ireland</i></li> <li>■ Interdisciplinary systematic education about prevention of pressure injury among patient with spinal cord injury; <i>Hanne Haugland, Norway</i></li> </ul>	Breakout room 1 /Pasteur Lounge
	<b>Free paper session 8:</b> Basic science: Biomechanics, biology and aetiology: theoretical and in vitro approaches; <i>Chairs: Yohan Payan, Dominique Sigaud-Roussel</i> <ul style="list-style-type: none"> <li>■ Mechanobiology of adipose cells: implications for wound healing; <i>Daphne Weihs, Israel</i></li> <li>■ External strain applied on SCI skin depletes calstabin1 in paralyzed skeletal muscles underneath: a new insight on pressure injury aetiology; <i>Marion Le Gall, France</i></li> <li>■ Mechanics of heel pressure ulcers and the influence of the calf and Haglund's deformity; <i>Bethany Keenan, United Kingdom</i></li> <li>■ In vivo and in vitro detection of porphyrin-producing wound pathogens, planktonic and in biofilm, with real-time bacterial fluorescence imaging; <i>Monique Y. Rennie, Canada</i></li> </ul>	Breakout room 2 /Rhône 3A
	<b>EPUAP Funded projects presentations;</b> <i>Chairs: Nils Lahmann, Peter Worsley</i> <ul style="list-style-type: none"> <li>■ A novel approach to identify individual positioning in a range of supine postures; <i>Silvia Caggiari, United Kingdom</i></li> <li>■ The EPUAP Exchange Scholarship - countering medical device-related pressure ulcers; <i>Lea Cohen, Israel</i></li> <li>■ PURPOSE T in Sweden - a clinical evaluation of a risk assessment instrument; <i>Lisa Hultin, Sweden</i></li> </ul>	Breakout room 3 /Rhône 3B
16:50 - 17:00	<b>Short break</b>	
17:00 - 18:00	<b>Key session 10:</b> The impact of education on pressure ulcer prevention and management: the patient and the healthcare team; <i>Chairs: Steven Smet, Anthony Gélis</i> <ul style="list-style-type: none"> <li>■ Education of healthcare professionals for preventing pressure ulcers: a Cochrane review; <i>Alison Porter Armstrong, United Kingdom</i></li> <li>■ Patient and lay carer education for preventing pressure ulceration in at risk populations; <i>Tom O'Connor, Ireland</i></li> </ul>	Plenary hall/ Pasteur Auditorium 
	<b>EPUAP workshop:</b> Dressing selection <i>Helen Strapp and Niamh Mc Lain, Ireland</i>	Breakout room 1 /Pasteur Lounge
	<b>Joint workshop (EN &amp; FR): Nutrition</b> <i>Emanuele Cereda, Italy and Manuel Sanchez, France</i>	Breakout room 2 /Rhône 3A 
	<b>EPUAP workshop:</b> Wound assessment <i>Rolf Jelnes, Denmark</i>	Breakout room 3 /Rhône 3B
20:00	<b>Conference dinner</b>	Château de Saint Trys, Anse

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Friday   20 September 2019		
08:00	<b>Registration, badge and bag collection</b>	Registration area
09:00 - 10:15	<b>Key session 11:</b> Pain management and pressure ulcer prevention; <i>Chairs: Guido Ciprandi, Yann Groc</i> <ul style="list-style-type: none"> <li>The extent of pressure area related pain and it's role as an early indicator of pressure ulcer development; <i>Jane Nixon, United Kingdom</i></li> <li>Pain as risk factor; <i>Isabelle Defouilloy, France</i></li> </ul>	Plenary hall/ Pasteur Auditorium
	<b>Joint workshop (EN &amp; FR):</b> Repositioning (09:00 - 10:00) <i>Menno van Etten, Norway and Anthony Gélis, France</i>	Breakout room 1 /Pasteur Lounge 
	<b>Free paper session 9:</b> Innovative approaches in clinical research (prevention and treatment); <i>Chairs: Jan Kottner, Bérengère Fromy</i> <ul style="list-style-type: none"> <li>Enhancing SKIN health and safety in aged CARE (SKINCARE Trial): a study protocol for an exploratory cluster randomized pragmatic trial; <i>Elisabeth Hahnel, Germany</i></li> <li>The use of pressure ulcer risk assessment instruments in clinical practice; <i>Susanne Coleman, United Kingdom</i></li> <li>Biofilm differentially affects wound healing according to the bacterial community in pressure ulcers; <i>Gojiro Nakagami, Japan</i></li> <li>Predicting pressure injuries by "hackathon": the use of artificial intelligence and machine learning in the development of risk assessment tools for pediatric pressure injury prevention; <i>Adam Lokeh, United States</i></li> <li>Telemedicine in the prevention and management of pressure injuries: Do you see what I see?; <i>Deanna Johnson, United States</i></li> </ul>	Breakout room 2 /Rhône 3A
	<b>Industry session 6: Satellite symposium</b> (09:00 - 10:30)	Breakout room 3 /Rhône 3B
10:15 - 11:00	<b>Coffee break, Exhibition</b>	Exhibition /Forum 1 & 2
10:15-10:50	<b>Annual General Assembly of the Société Française de l'Escarre</b>	Breakout room 1 /Pasteur Lounge
11:00 - 12:00	<b>Key session 12:</b> Telemedicine and pressure ulcer prevention: striving for no frontiers; <i>Chairs: Nils Lahmann, Rolf Jelnes</i> <ul style="list-style-type: none"> <li>Interactive telemedicine in nursing homes for chronic wounds care; <i>Nathalie Salles, France</i></li> <li>Domoplaies: an experimentation of an innovative economical model when managing complex wounds at home using telemedicine; <i>Luc Téot, France</i></li> </ul>	Plenary hall/ Pasteur Auditorium
	<b>Free paper session 10:</b> Free paper session in French language; <i>Chairs: Benoît Nicolas, Brigitte Barrois</i> <ul style="list-style-type: none"> <li>Comment améliorer le dépistage du risque d'escarres et la mise en oeuvre d'actions de prévention, associant toute l'équipe professionnelle, le patient et son entourage?; <i>Caroline Van Wijk, France</i></li> <li>Prévention et traitement des escarres : résultats positifs d'une démarche d'amélioration continue de la qualité; <i>Catherine Harmant, France</i></li> <li>Le programme d'amélioration de la qualité et de la sécurité des soins "escarre" aux Hospices Civils de Lyon ,10 ans déjà; <i>Christiane Bollon, France</i></li> <li>Les équipes mobiles : une réponse au traitement personnalisé des escarres; <i>Perrine Menelli, France</i></li> <li>Sclerose en plaques et escarre; <i>Philippe Gallien, France</i></li> </ul>	Breakout room 1 /Pasteur Lounge 
	<b>Student free paper session 2:</b> Basic science; <i>Chairs: Amit Gefen, Dominique Sigauco-Roussel</i> <ul style="list-style-type: none"> <li>Modelling an adult human head on a donut-shaped head positioner for pressure ulcer prevention; <i>Rona Greifman, Israel</i></li> <li>Integrated experimental-computational analysis of sacral soft tissue stresses during patient migration in bed; <i>Maayan Lustig, Israel</i></li> <li>The risk for a lip pressure ulcer caused by an endotracheal tube: biomechanical modeling of the effect of tube positioning; <i>Golan Amrani, Israel</i></li> <li>Multiphysics modeling studies of the microclimate under a polymeric membrane dressing; <i>Dafna Schwartz, Israel</i></li> <li>Impact of diabetes on CGRP signaling pathway in pressure ulcer healing process; <i>Noelle Remoué, France</i></li> </ul>	Breakout room 2, Rhône 3A
	<b>EPUAP workshop:</b> Dressing selection <i>Helen Strapp and Niamh Mc Lain, Ireland</i>	Breakout room 3 /Rhône 3B
12:00 - 12:30	<b>Closing session of the joint programme</b> <ul style="list-style-type: none"> <li>Presentation of EPUAP 2020, Prague, Czech Republic, <i>Andrea Pokorna, EPUAP Annual Meeting 2020 Chair</i></li> <li>Presentation of Focus Meeting 2020, Sønderborg, Denmark, <i>Rolf Jelnes, EPUAP Focus Meeting 2020 Chair</i></li> <li>Closing remarks of the joint programme by the EPUAP President, <i>Dimitri Beeckman</i></li> </ul>	Plenary hall/ Pasteur Auditorium
12:30 - 13:30	<b>Lunch break, Exhibition</b>	Exhibition /Forum 1 & 2
13:30 - 14:30	<b>Société Française de l'Escarre, Controverse:</b> La Prévention et les outils connectés, dangers ou atouts <i>Yohan Payan, Benoît Nicolas</i>	Plenary hall/ Pasteur Auditorium 
	<b>Atelier:</b> Nutrition <i>Manuel Sanchez</i>	Breakout room 1 /Pasteur Lounge 
	<b>Atelier:</b> Escarre et talon <i>Ali Mojallal</i>	Breakout room 2 /Rhône 3A 
	<b>Atelier:</b> Chirurgie <i>Marc Lefort, Célia Rech</i>	Breakout room 3 /Rhône 3B 
14:30 - 14:40	<b>Short break</b>	

14:40 - 15:40	<b>Société Française de l'Escarre, Table ronde:</b> Financement de la prévention en EHPAD	Plenary hall/ Pasteur Auditorium ■ ■
	<b>Atelier:</b> Douleur <i>Sabine Petrilli, Isabelle Defouilloy</i>	Breakout room 1 /Pasteur Lounge ■ ■
	<b>Atelier:</b> Organisation et vie d'un groupe escarres <i>Christiane Bollon, Martine Barateau, Sandrine Robineau</i>	Breakout room 2 /Rhône 3A ■ ■
	<b>Atelier:</b> Escarres et fin de vie <i>Jean-Marc Michel, Françoise Balliet</i>	Breakout room 3 /Rhône 3B ■ ■
15:40 - 16:00	<b>Coffee break</b>	Rhône level
16:00 - 17:30	<b>Société Française de l'Escarre Closing session:</b> <ul style="list-style-type: none"> <li>■ Recommandations de bonne pratique pour la prévention des escarres: quelle est la place de l'EBM ( évidence based medecine)?; <i>Brigitte Barrois</i></li> <li>■ Quelle recherche fondamentale et clinique dans l'avenir pour développer les stratégies de prévention?; <i>Bérengère Fromy</i></li> <li>■ Croyances et connaissances : comment développer la prévention des escarres; <i>Benoît Nicolas</i></li> </ul>	Plenary hall/ Pasteur Auditorium ■ ■

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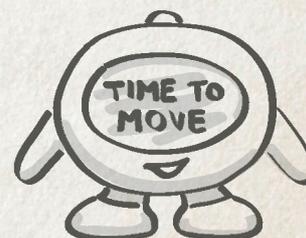
one GOAL worldwide:

**STOP**  
**PRESSURE ULCERS**  
**21<sup>st</sup> November 2019**



*How can you get involved?*

- Host educational activities on prevention and treatment of pressure ulcers
- Organise awareness raising events to share information about pressure ulcers
- Reach out to your local community to inform them about pressure ulcers
- Make policy makers aware about pressure ulcers
- Join Stop Pressure Ulcers community on Social media



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# EPUAP 2020

23 – 25 September 2020, Prague, Czech Republic

[www.epuap2020.org](http://www.epuap2020.org)



**FROM INNOVATION AND GUIDELINES,  
TO HIGH QUALITY CARE AND BETTER PATIENT  
OUTCOMES: A JOURNEY TO TRAVEL TOGETHER!**

Abstract  
submission  
opens

**January  
2020**

Registration  
opens

**February  
2020**

Abstract  
submission  
deadline

**6 April  
2020**

Review  
notification  
deadline

**15 May  
2020**

Early  
registration  
deadline

**15 June  
2020**

**Conference venue:** Clarion Congress Hotel Prague; Freyova 33; 190 00 Prague; Czech Republic

**EPUAP Business Office:** Codan Consulting; Vodickova 12/5, Prague 2, 120 00; [office@epuap.org](mailto:office@epuap.org); Tel.: +420 251 019 379

Partnerships: Masaryk University, Faculty of Medicine, Brno; Institute of Health Information and Statistics,  
Czech Wound Management Association, Ministry of Health of the Czech Republic



# KEY SESSIONS OVERVIEW

## Plenary Key Session 1: Patient safety and advocacy for pressure ulcer prevention

*Chairs: Jane Nixon, Andrea Pokorna*

- KS 1.1** Work of the EPUAP/EWMA advocacy group; *Lisette Schoonhoven, the Netherlands*
- KS 1.2** Quality monitoring of pressure ulcers – lessons learned; *Zena Moore, Ireland*
- KS 1.3** Artificial intelligence, data science and patient safety: towards zero avoidable PU?; *Sandrine Robineau, France*

## Key Session 2: Emerging technologies in pressure ulcer prevention and treatment

*Chairs: Amit Gefen, Dominique Sigauo Roussel*

- KS 2.1** Biochemical markers for early detection and identification of patients at risk of PUs; *Cees Oomens, the Netherlands*
- KS 2.2** Sub-epidermal moisture measurement; *Aglecia Budri, Ireland*
- KS 2.3** Strategy towards wound re-epithelialisation: the extracellular matrix in context; *Patricia Rousselle, France*

## Key Session 3: Prophylactic dressings for prevention

*Chairs: Dimitri Beeckman, Steven Smet*

- KS 3.1** Learnings from designing and performing a nationwide RCT for evaluating prophylactic dressings in pressure ulcer prevention; *Dimitri Beeckman, Belgium*
- KS 3.2** Prophylactic dressings for pressure ulcer prevention: results from a Cochrane review; *Zena Moore, Ireland*
- KS 3.3** Multilayer foam dressings in the therapeutic strategy as an aid to the prevention of pressure ulcers: an experts' consensus opinion; *Nathalie Faucher, France*

## Key Session 4: Overcoming barriers to pressure ulcer prevention: learning from the experience across different countries

*Chairs: Maarit Ahtiala, Carina Bååth*

- KS 4.1** Establishing a pressure ulcer prevention strategy in a large, acute, teaching hospital: challenges and outcomes; *Pat Mc Cluskey, Ireland*
- KS 4.2** Therapeutic education in France: cross-over experience; *Anthony Gélis, France*

## Key Session 5: Special populations and pressure ulcer prevention

*Chairs: Ulrika Kallman, Yann Groc*

- KS 5.1** Pressure ulcer prevention in children admitted to critical settings; *Guido Ciprandi, Italy*
- KS 5.2** Ethics and pressure ulcer prevention in palliative care; *Karen Ericka Newby, France*

## Plenary Key Session 6: Pressure ulcer aetiology: What can we learn from research?

*Chairs: Yohan Payan, Cees Oomens*

- KS 6.1** Skin tissue integrity and intercellular communications in pressure ulcer risk; *Dominique Sigauo-Roussel, France*
- KS 6.2** Saving lives through aetiological research of pressure ulcers: How can understanding lead to better prevention and care; *Amit Gefen, Israel*
- KS 6.3** Translation of research tools and strategies for implementation at the bedside; *Dan Bader, United Kingdom*

## Key Session 7: Biofilm and prevention of infections

*Chairs: Dimitri Beeckman, Rolf Jelnes*

- KS 7.1** Anti-biofilm; *David Lebeaux, France*
- KS 7.2** Biofilm model and chronic wounds; *Claus Moser, Denmark*
- KS 7.3** The prevalence of biofilms in chronic wounds: a systematic review and meta-analysis of published data; *Isabelle Fromantin, France*

## Key Session 8: Pressure ulcers as key performance indicators: What are the implications for PU care?

*Chairs: Jane Nixon, Susanne Coleman*

- KS 8.1** Measuring what matters; *Jan Kottner, Germany*
- KS 8.2** 1,000 Lives Improvement; *Trudie Young, United Kingdom*
- KS 8.3** Indicators in France; *Yann Groc, France*

## Key Session 9: Guidelines for pressure ulcer prevention and treatment

*Chairs: Katrin Balzer, Zena Moore*

- KS 9.1** Update on the International Guidelines for the Prevention and Treatment of Pressure Ulcers 2019; *Janet Cuddigan, USA, Jan Kottner, Germany (on behalf of the Guideline Governance Group)*
- KS 9.2** Guidelines on positioning; *Martine Barateau, France*

## Key Session 10: The impact of education on pressure ulcer prevention and management: the patient and the healthcare team

*Chairs: Steven Smet, Anthony Gélis*

- KS 10.1** Education of healthcare professionals for preventing pressure ulcers: a Cochrane Review; *Alison Porter Armstrong, United Kingdom*
- KS 10.2** Patient and lay carer education for preventing pressure ulceration in at risk populations; *Tom O'Connor, Ireland*

## Key Session 11: Pain management and pressure ulcer prevention

*Chairs: Guido Ciprandi, Yann Groc*

- KS 11.1** The extent of pressure area related pain and its role as an early indicator of pressure ulcer development; *Jane Nixon, United Kingdom*
- KS 11.2** Pain as risk factor; *Isabelle Defouilloy, France*

## Key Session 12: Telemedicine and pressure ulcer prevention: striving for no frontiers

*Chairs: Nils Lahmann, Rolf Jelnes*

- KS 12.1** Interactive telemedicine in nursing homes for chronic wounds care; *Nathalie Salles, France*
- KS 12.2** Domoplaie: an experimentation of an innovative economical model when managing complex wounds at home using telemedicine; *Luc Téot, France*

## Key Session 13: EPUAP - EWMA Joint Session

*Chairs: Lisette Schoonhoven, Zena Moore*

- KS 13.1** Wrap-up of overall project activities; *Lisette Schoonhoven, the Netherlands*
- KS 13.2** The results of the consumer survey of International Prevention and Treatment of Pressure Ulcers Guideline initiative; *Jan Kottner, Germany*
- KS 13.3** The Case report of a patient with spinal cord injury and experience with pressure ulcer - video interview; *Andrea Pokorná, Czech Republic*
- KS 13.4** Update on International Measurement of Pressure Ulcer Prevalence; *Ian Brownwood, OECD*

## Key session 14: Session Franco-Suisse: des programmes, des résultats

*Chairs: Brigitte Barrois, Hubert Vuagnat.* This session is organised in French only.

- KS 14.1** Hôpitaux universitaires de Genève, Programme Zoom sur l'escarre : une réalité aux HUG depuis 25 ans;  
*Anne Claire Rae, Anne-Laure Blanchard, Suisse*
- KS 14.2** Hôpitaux universitaires Genève, 15 ans d'un groupe interdisciplinaire plaies et cicatrisation dans un service de réadaptation et longs séjours; *Hubert Vuagnat, Suisse*
- KS 14.3** Centre hospitalier universitaire vaudois - Objectif Zéro Escarre: où en sommes-nous après 10 ans ?;  
*Lucie Charbonneau, Suisse*
- KS 14.4** Prévention des escarres aux HCL: 20 ans d'actions, de progrès, de résultats, comment faire toujours différemment ?;  
*Christiane Bollon, France*
- KS 14.5** 30 ans d'actions du « groupe escarre » au Centre Hospitalier de Gonesse; *Sylvie Merdinian, Valéire Céphise, France*
- KS 14.6** Réduire de 50% les escarres nosocomiales - un collectif de travail Suisse francophone; *Christian Baralon, Suisse*

## EPUAP Awards Session 1: Quality Improvement Projects Awards

*Chairs: Zena Moore, Alison Porter Armstrong*

- ES 1.1** A new approach of risk assessment and prevention: using the UZ Leuven risk assessment in a pro-active pressure ulcer prevention policy; *Annelies de Graaf, Belgium*
- ES 1.2** The development of the Purpose T pressure ulcer risk instrument into an electronic questionnaire to support mobile working; *Nikki Stubbs, United Kingdom*
- ES 1.3** Striving for Perfect Care – Preventing skin breakdown in the community setting in the UK;  
*Nicky Ore, United Kingdom*

## EPUAP Awards Session 2: Excellence in Education Awards

*Chairs: Steven Smet, Maarit Ahtiala*

- ES 2.1** Introductory lecture: Training strategies for education in PU prevention in a Belgian University Hospital;  
*Steven Smet, Belgium*
- ES 2.2** Shanley Pressure Ulcer Prevention Programme (SPUPP); *Emer Shanley, Ireland*
- ES 2.3** Interdisciplinary systematic education about prevention of pressure injury among patient with spinal cord injury;  
*Hanne Haugland, Norway*

## EPUAP Funded Projects Session

*Chairs: Nils Lahmann, Peter Worsley*

- ES 3.1** A novel approach to identify individual positioning in a range of supine postures; *Silvia Caggiari, United Kingdom*
- ES 3.2** The EPUAP Exchange Scholarship - countering medical device-related pressure ulcers; *Lea Cohen, Israel*
- ES 3.3** PURPOSE T in Sweden: a clinical evaluation of a risk assessment instrument; *Lisa Hultin, Sweden*

## KEY SESSIONS PRESENTATIONS

## KSI.2

## Quality monitoring of pressure ulcers - lessons learned

Zena Moore<sup>1</sup><sup>1</sup> RCSI (Royal College of Surgeons in Ireland), Dublin, Ireland

**Objectives:** The main aim of this systematic review was to establish the prevalence of pressure ulcers within published studies from Europe.

Methods: Using systematic review methodology, we considered quantitative design studies which explored prevalence data and/or the epidemiology of pressure ulcers in Europe. Our primary outcome was pressure ulcer prevalence whilst secondary outcomes included stages of pressure ulcers, anatomical location and receiving healthcare settings. The search was conducted in April 2019, using Cochrane, Medline, Embase, CINAHL, PubMed, Scopus and Web of Science databases, and returned 3065 records, of which 79 met the inclusion criteria. Data were extracted using a pre-designed extraction tool, and validity analysis was undertaken using the Evidence-Based Librarianship (EBL) Critical Appraisal Checklist.

**Results:** Seventy-nine articles were included in this review. Across the studies included, the mean prevalence was 13.7% (SD 7%; Min= 4.6%; Max= 27.2%). The highest PU prevalence reported was from the Netherlands 27.2% (n= 17494 participants), and the lowest was reported from Finland 4.60% (n= 1629). Almost 35% of the pressure ulcers were grade 1 and the most common site for pressure ulcers was the sacrum. The methodologies employed within the studies are diverse and as such show a lack of consensus around prevalence monitoring and in addition to the different classification systems for PUs used, means that it is unclear if all studies are reporting the same thing. Thus, we cannot be completely confident in the data because there is a risk of indirectness and imprecision, further, only 44% of studies were considered to have high validity.

**Conclusion:** Despite the limitations in data collection methods, we have provided an insight into the scope of the problem and this can be used as an impetus for arguing for a more focussed approach to pressure ulcer prevention. The prevalence data is consistently high indicating the continued need for resource allocation into pressure ulcer prevention and management.

## KSI.3

## Artificial intelligence, data science and patient safety: Towards zero avoidable pressure ulcer?

Sandrine Robineau<sup>1</sup><sup>1</sup> Pôle Saint Hélier Médecine Physique Et De Réadaptation, Rennes, France

Myth or reality of tomorrow? The lines are moving and the recent experiences in prevention are working on the goal "zero avoidable pressure ulcers".

Today hospital-acquired pressure injuries remain a serious problem among elderly people in nursing homes, disabled persons, critical care patients in term of safety for the patient and cost for the hospital. Some automated devices such as specialized beds and wheelchair cushions automate already the offloading task. It is possible to use connected and smart cushion with a smartphone dedicated application, that informs the user about the status of its positioning, urging him to change his position if needed. Nevertheless, decisions about which patient would benefit most from a specialty bed or a more specific prevent approach by the caregivers are difficult because results of existing tools to determine risk for pressure injury indicate that most of those patients are at high risk.

Could Artificial intelligence help caregivers to prevent avoidable pressure ulcers among those high-risk patients? Could connected and smart objects help caregivers and patients to be informed live

Some medical units use already data science to develop research on prevention. Machine-learning approach differs from other available models because it does not require clinicians to input information into a tool. It is supposed to use large amounts of data from the electronic health record to predict development of pressure injuries. In this case we will have to think differently, data will become essential to "feed" the machine-learning system in order to help medical staff to be expert. Thus, the use of medical databases and AI is a way to improve the safety of patients. It is a new paradigm and we will discuss it.

**KS2.1****Biochemical markers for early detection and identification of patients at risk of Pus****Cees Oomens<sup>1</sup>**<sup>1</sup> *Eindhoven University of Technology, Eindhoven, Netherlands*

For the prevention of pressure ulcers it is necessary that they can be detected in a very early stage. Early detection of superficial ulcers may help to identify patients at risk and allow an adequate application of resources for the prevention. An early detection of pressure related deep tissue injury might help – using a rigorous unloading protocol – to prevent these from developing into category 3 or 4 pressure ulcers.

A short overview will be given of the latest findings and recent developments in the use of biomarkers for early detection. For detection of superficial ulcers methodology is based on measurements of cytokines and metabolic waste products at the skin surface. Deep tissue injury is detected by means of biomarkers related to muscle damage in blood and urine.

It is clear from our recent animal- and human cohort studies that large variation in biomarker expression levels may hamper their application. However, at the same time this variation between individuals can potentially be used to identify patients at risk. In the presentation this opportunity will be discussed.

1. *Traa et al. Myoglobin and Troponin concentrations are increased in early stage deep tissue injury. JIMBBM, 92, pp.50 – 57, 2019.*
2. *Soetens et al. Investigating the influence of intermittent and continuous mechanical loading on skin through non-invasive sampling of IL-1 . J. Tissue Viability, 28, pp. 1 – 6, 2019.*

**KS2.2****Sub-epidermal moisture (SEM) measurement****Aglécia Budri<sup>1</sup>**<sup>1</sup> *RCSI (Royal College of Surgeons in Ireland), Dublin, Ireland*

The pathways that lead to cell damage included localised ischaemia, ischaemia-reperfusion injury, impaired lymphatic drainage and tissue distortion or deformation (1). All these mechanisms cause changes in cell metabolism, alter the cell's inner scaffold structures (proteins that build the cytoskeleton) and cause changes in the cell membrane (2). Furthermore, disruption of cell homeostasis can cause cell death, triggering the inflammatory process (3). During this process, plasma also leaks as a response to the increased blood vessel permeability, which increases the water content around the affected area. This local oedema is known as sub-epidermal moisture (SEM) and the local increase of moisture changes the electrical capacitance of the tissues which can be measured using an electrical bioimpedance device (4, 5). Sub-epidermal moisture is a biophysical marker, and is a product of the leak of plasma after the inflammation process increases local vasculature permeability (5, 6). Of note, SEM is different from epidermal hydration, another biophysical marker for microclimate damage, that expresses the water content of the epidermis and it is known to be influenced by deeper layers, it is not influenced by environmental changes, yet is directly related to inflammation (3, 7). When plasma leakage through the blood vessels, the inflammation markers increase along with the tissue damage progresses to a greater number of cells, the inflammation markers increase along with the SEM, and will address the potential role of SEM in early detection of pressure ulcers.

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7. *Moore Z, Patton D, Rhodes SL, O'Connor T. Subepidermal moisture (SEM) and bioimpedance: a literature review of a novel method for early detection of pressure-induced tissue damage (pressure ulcers). Int Wound J. 2017;14(2):331-7.*

## KEY SESSIONS PRESENTATIONS

## KS2.3

## Strategy towards wound re-epithelialisation: the extracellular matrix in context

Patricia Rousselle<sup>1</sup><sup>1</sup> CNRS UMR 5305, Laboratoire de Biologie Tissulaire et Ingénierie Thérapeutique, Lyon, France

**Introduction:** Wound healing in adult mammals is a complex multi-step process involving overlapping stages of blood clot formation, inflammation, re-epithelialization, granulation tissue formation, neovascularization, and remodelling. The cellular and molecular processes involved in epithelialization are essential for successful wound closure involving growth factors, cytokines and extracellular matrix (ECM). Inability to re-epithelialize is a clear indicator of chronic non-healing wounds. Pressure ulcers are a type of injury where ischemia and nutrition/oxygen deprivation causes tissue necrosis. Chronic pressure ulcers display high levels of inflammation and disruption of the ECM, along with increased apoptosis and decreased levels of epidermal regeneration. Prevention and treatment of pressure ulcers are highly relevant to wound care professionals; however, more research is needed to develop more effective products. While an increased number of therapies are available, no product is currently on the market that specifically targets wound epithelialization. We have developed a decapeptide with a sequence derived from the ECM protein laminin, known to be involved in migration of epidermal keratinocytes.

**Methods:** The efficacy of the laminin peptide was evaluated in an in vitro wound closure assay generated with primary human keratinocytes. Porcine models of superficial and partial thickness wounds were developed. Wound closure follow-up and evaluation included macroscopic observations and microscopic analysis of biopsies taken at different times. Characterization of the newly made epidermis and granulation tissue was realized by imaging on tissue sections stained or labelled with antibodies.

**Results:** The peptide was integrated within hyaluronic acid compresses to facilitate its application over the wounds. A significant acceleration of epidermal closure by the peptide was found in vitro and the epidermis of the treated wounds in vivo was thicker suggesting an improved regenerative process. The treated wounds surprisingly revealed a thinner granulation tissue linked to a decreased inflammation process, caused by a lesser extend of macrophages recruitment.

**Conclusions:** In the absence of re-epithelialization, a wound cannot be considered healed. Developing strategies towards epithelialization may provide insights into new therapeutic approaches to accelerate wound closure, particularly in chronic wounds.

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## KS3.2

## Prophylactic dressings for pressure ulcer prevention: results from a Cochrane review

Zena Moore<sup>1</sup><sup>1</sup> RCSI (Royal College of Surgeons in Ireland), Dublin, Ireland

**Background:** Pressure ulcers, localised injuries to the skin or underlying tissue, or both, occur when people cannot reposition themselves to relieve pressure on bony prominences. Dressing and topical agents aimed at prevention are also widely used, however, it remains unclear which, if any, are most effective. This presentation will provide results for studies pertaining to the use of dressings for pressure ulcer prevention.

**Objectives:** To evaluate the effects of dressings on pressure ulcer prevention, in people of any age, without existing pressure ulcers, but considered to be at risk of developing one, in any healthcare setting.

**Methods:** In May 2018 we searched the Cochrane Wounds Group Specialised Register, CENTRAL, MEDLINE, MEDLINE (In-Process & Other Non-Indexed Citations), Embase, and EBSCO CINAHL Plus. We searched clinical trials registries for ongoing trials, and bibliographies of relevant publications to identify further eligible trials. There was no restriction on language, date of trial or setting. We included randomised controlled trials that enrolled people at risk of pressure ulcers. Two review authors independently selected trials, assessed risk of bias and extracted data.

**Results:** We identified 10 eligible trials. Six trials (n = 1247) compared a silicone dressing with no dressing. Silicone dressings may reduce pressure ulcer incidence (any stage) (RR 0.25, 95% CI 0.16 to 0.41); low-certainty evidence). In the one trial (n=77) we rated as being at low risk of bias; there was no clear difference in pressure ulcer incidence between silicone dressing and placebo-treated groups (RR 1.95, 95% CI 0.18 to 20.61; low-certainty evidence). One trial (n=74) (very low certainty evidence) reported no clear difference in pressure ulcer incidence when a thin polyurethane dressing was compared with no dressing (RR 1.31, 95% CI 0.83 to 2.07). In the same trial pressure ulcer incidence was reported to be higher in an adhesive foam dressing compared with no dressing (RR 1.65, 95% CI 1.10 to 2.48). Four trials (very low certainty evidence) compared other dressings with different controls. Trials reported that there was no clear difference in pressure ulcer incidence between the following comparisons: polyurethane film and hydrocolloid dressing (n=160, RR 0.58, 95% CI 0.24 to 1.41); Kang' huiier versus routine care n=100; RR 0.42, 95% CI 0.08 to 2.05); 'pressure ulcer preventive dressing' (PPD) versus no dressing (n=74; RR 0.18, 95% CI 0.04 to 0.76).

**Conclusion:** Silicone dressings may reduce pressure ulcer incidence (any stage). However the low level of evidence certainty means that additional research is required to confirm these results.

**Reference:** Moore ZEH, Webster J. Dressings and topical agents for preventing pressure ulcers. *Cochrane Database of Systematic Reviews* 2018, Issue 12. Art. No.: CD009362. DOI: 10.1002/14651858.CD009362.pub3.

**KS4.1****Establishing a pressure ulcer prevention strategy in an acute large, teaching hospital: challenges and outcomes****Pat McCluskey**<sup>1</sup><sup>1</sup> Cork University Hospital Group, Cork, Ireland

**Introduction:** Estimates suggest that one in five patients, in both acute and long term care facilities, will develop pressure ulcers (EPUAP, 2002). Pressure ulcers are associated with significant morbidity, mortality and resource utilisation. The length of hospital stay is estimated to be two to three times greater for a patient who develops a pressure ulcer than for a patient who does not. (Zhan & Muller (2003). Moore et al in their European study (2013) revealed a mean prevalence of 16% with an incidence of 11% for Ireland, with consistently higher prevalence of 18% for the acute setting. Hospital Acquired Pressure Ulcer (HAPU) prevention has become a key quality indicator of the provision of care, and strategies to prevent HAPUs are of growing interest in all healthcare settings. The Health Service Executive (HSE) Ireland, Quality Improvement Division (QID), in collaboration with the Royal College of Physicians Ireland (RCPI) achieved a 73% reduction of HAPUs over a six month period (HSE, 2015) as part of Phase 1 of a collaborative known as the Pressure Ulcer To Zero (PUTZ) campaign. The (PUTZ) collaborative was the first large scale improvement collaborative to take place in Ireland. Phase 3 of the campaign concentrated on the Acute Hospital sector and Cork University Hospital was one of the sites invited to participate in the collaborative.

**Aim:** To reduce newly acquired HAPUs by 50% across participating teams in a six month timeframe and to sustain this reduction for twelve months (28th February 2018).

**Methods:** Presentation of the data from Phase 1 and 2 coupled with existing data from the risk management/quality office highlighted the need of a planned strategy for prevention of HAPUs. An invitation to participate was issued from the QID to the Executive Management Board of the hospital. A site co-ordinator was appointed to lead the project and collaborate with the wound management team to develop and manage the project over a 12 month period from February 2017 to March 2018. Online educational resources and 'Learning Days' were supported by the QID. A multidisciplinary PUTZ implementation group was formed and meetings were held monthly. Two pilot wards were selected based on willingness to participate, acuity and data obtained from audit measures. The role of the team was to implement the SSKIN bundle which is a specific five step process that when performed collectively and reliably can improve PU prevention by guiding assessment and preventative strategies.

**Result:** PUTZ 3 achieved a 67.5% reduction in avoidable HAPUs across the participating sites.

**Conclusion:** Participation in the PUTZ collaborative to prevent HAPUs was a timely intervention when nationally and internationally recognition of HAPUs was identified as a quality of care indicator. The implementation of the SSKIN bundle whilst onerous due to requiring commitment at all levels of the organisation was achievable; however on-going commitment to sustain the outcome is a necessity.

**References:**

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**KS3.3****Multilayer foam dressings in the therapeutic strategy as an aid to the prevention of pressure ulcers: an experts' consensus opinion****Nathalie Faucher**<sup>1</sup>, **Martine Barateau**<sup>2</sup>, **Franck Hentz**<sup>3</sup>, **Marc Le fort**<sup>4</sup>, **Philippe Miché**<sup>5</sup>, **Laura Moisi**<sup>6</sup>, **Sylvie Meaurio**<sup>7</sup>, **Benoît Nicolas**<sup>8</sup>

- Hôpital Bichat Claude Bernard, Service de Gériatrie, Paris, France
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- Centre Hospitalier Universitaire Clermont-Ferrand, Direction des soins CHU, Clermont-Ferrand, France
- Centre Hospitalier Universitaire Nantes, Hôpital Saint Jacques, Nantes, France
- Centre Hospitalier René Dubois, Réanimation Médico Chirurgicale, Poitiers, France
- Hôpital Saint Antoine, UPOG Service de gériatrie, Paris, France
- Hôpital Rothschild, Gériatrie, Plaies et Cicatrisation, Paris, France
- Pôle Saint Hélier, Rennes, France

**Introduction:** Pressure ulcer (PU) prevention requires a global approach. Skin protection by a dressing may be a helpful adjuvant measure in some patients. Despite recommendations (1, 2, 3) on utility of dressings as an aid to PU prevention, caregivers face difficulties in identifying the profile of patients who may usefully benefit from this adjuvant measure. This work aimed to draft an experts' consensus opinion on the place of multilayer foam dressings in PU prevention in high-risk subjects of PU.

**Methods:** Two techniques were combined. 1/ The Nominal Group Technique (NGT) involved 8 experts specialized in wounds and scarring in a first meeting. NGT is a structured method of brainstorming that facilitates the contributions of participants. Each participant (in pairs in this case) begins by writing his opinion. The proposals are then discussed and the group retains what they find most appropriate. The opinion was based on literature on risk factors of PU, PU prevention guidelines, results of randomized clinical trials (RCT) on the use of dressings in PU prevention and clinical expertise of experts 2/ The Delphi method involved 16 experts specialized in wounds and scarring. The experts' opinion issued at the first meeting of the NGT group was submitted to the Delphi experts who had to be questioned about the relevance and clarity of the proposals and could comment. The NGT group was to meet a second time to analyze the notes and comments of this Delphi tour and finalize the experts' consensus opinion with grading. A senior methodologist in consensus method coordinated the project and moderated both meetings.

**Results:** The process ran from December 2018 to March 2019. The final experts' consensus opinion includes 8 recommendations "for"; 3 recommendations recall the general principles of PU prevention measures; 1 recommendation recalls that 5 RCT evaluating the effectiveness of dressings in PU prevention were conducted with multilayer foam dressings. ; 5 recommendations led to recommend the use of antimicrobial foam dressing\* in PU prevention occurrence, in high-risk patients and by patient care location (intensive care unit, surgery, medicine department, rehabilitation department, home residence or at home) and specific risk conditions.

**Conclusion:** These recommendations, which will be fully presented, should allow clinicians to identify the profile of patients who may usefully benefit from adjuvant multilayer foam dressings application to prevent PU. \*Mepilex Border sacrum and Mepilex Border Heel

**Reference**

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## KEY SESSIONS PRESENTATIONS

**KS4.2****Therapeutic education in France: cross-over experience****Anthony Gélis**

1 Centre Mutualiste Neurologique PROPARA, Montpellier, France

In France, Public Health Authorities have elaborated national recommendations in 2007 regarding therapeutic education for people with chronic conditions. More than 34000 persons are living with a spinal cord injury (SCI), and Pressure Ulcer (PU) is one of the most common secondary condition following SCI. The French Pressure Ulcer Society enlightened the place of self-management interventions to prevent PU in SCI in its upgraded national recommendations in 2012 (grade B).

REFESCAR Project aimed to develop a practical guide, published in 2013 with data from both evidence and experience based practices that help professionals to develop or enhance PU self-management interventions. The objective of this lecture is to describe the REFESCAR methodology, as well as the guide and its nationwide diffusion in France.

**KS5.1****Pressure ulcer prevention in children admitted to critical settings****Guido Ciprandi**

1 Bambino Gesù Children's Hospital, Research Institute, Dpt of Surgery, Division of Plastic and Maxillofacial Surgery, Rome, Italy

**Introduction:** The increasing complexity of paediatric patients in terms of morbidity and associated comorbidities requiring technological innovations and devices, are directly related to the risk of multiple sites skin breakdown and consequently of pressure ulcers and device related injuries. Long-lasting surgical procedure together with the limited possibility of using a rotational protocol in children in a forced position, lead to an increasing number of ulcers and friction-shearing injuries on fragile for age skin. The onset of pressure injury and/or a device related injury stands as a negative hospital quality indicator and has an important economic and welfare impact for patient's present and future. Our aim is to prevent and drastically reduce the number and grade of these injuries, through the development of a Teamwork that revise incorrect positions on the operating table before surgery and properly protect critical areas, using multiple layer foams coupled with a fluidized technology, the so-called Double Protection Strategy (DPS).

**Methods:** Monocentric, interdepartmental, prospective study, model of "cohort study", with recruitment of patients in 4 different Departments of the Bambino Gesù Paediatric Hospital. Consistency and reliability (Inter Rater Reliability) are ensured by the knowledge both of the Braden QD risk scale and of updated EPUAP / NPUAP 2014-16 classification for staging pressure ulcers. Selection and enrollment of candidates, is performed as follows: 1. Customized preoperative mapping of patient's obliged positions, associated pathologies and body areas more leaning on the operating bed. 2. Use of fluidizing technology positioners, Latex and DEHP-free\*; how to position them for the maximum benefit, how to prevent dislocation during surgical and / or resuscitation manoeuvres. 3. value of pressure load and injury induced using the Braden QD risk assessment scale, specific for paediatric population. The characteristics of the observed population will be parametrically evaluated as follows: age at enrollment, sex, severity of the disease \*\*, functional and cognitive status at admission, type of pathology, postoperative setting, skin assessment at admission and Braden Q-QD at admission: analysis of HAPI (Hospital-acquired Pressure Injuries) positive and HAPI negative patients and analysis of the two groups.

**Results:** During the first 8 mos, the use of DPS reduced the incidence of PU from 19,1% to 4,4%; in the study group pts were only affected by 1st stage of the disease, requiring only an accurate home-caring follow-up. NPWT and graft procedure were advocated in various amount in pts enrolled in the control's group. Children with multiple PU were only pertinent to the control's group (Tab 1).

**Conclusions:** Using the Double Protection Strategy design in critical settings, i.e. OT and N-PICU allowed to drastically reduce the whole incidence of PU but also the severity of which they appear. Using the DPS protocol means to increase the culture of prevention in critical areas, reducing at the same time the parental stress, the hospital stay and the number of undue surgical procedures.

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2. Levy A, Koppalin K, Gefen A. Adjustability and Adaptability Are Critical Characteristics of Pediatric Support Surfaces. Adv Wound Care. 2015; 17(4):10:16-15-622.
3. Curley MAQ, Hasbani NR, Quigley SM et al. Predicting Pressure Injury Risk in Pediatric Patients: The Braden QDScale. J Pediatr. 2018;192:189-195.

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 \*\*SNAP-II – SNAPPE-II, PRISM III – PELOD II

## KS5.2

### Ethics and pressure ulcer prevention in palliative care: How and where do we draw the line?

**Karen Ericka Newby<sup>1</sup>**

<sup>1</sup> *Maison Médicale de Meudon la Foret, Nursing / Palliative Care, Meudon la Foret, France*

**Introduction:** The main focus of this presentation is the determination of a right and ethical approach to pressure ulcer prevention in the practice of palliative care.

Pressure ulcers are prevalent amongst the array of wounds apprehended in patients in the different phases of palliative care. However, the inherent time imperative of a palliative context implies that ethical rather than prognostic considerations guide us in our care planning for the prevention of pressure ulcers. In this context, there is a necessary compromise between standardized book-based clinical recommendations and our ethical rationale of care.

What is implicit here is the dialogue: a compromise is a negotiation. Can we, as a multidisciplinary team, negotiate (talk through and explore a complex situation) with patients and their families to achieve the best possible treatment. Where therapeutic choices shadow the patient's progressive decline towards dying, there are implied stages of renunciation and reinvestment. The subtlety in this rationale lies, therefore, in proportionality judgments: a just balance between 'savoir faire' and 'savoir ne pas faire'.

**Methods:** But how do we decide what to and what not to do in this context? The ethical principles of expertise, autonomy, humanity, and proportionality and futility, proposed by international consensus by the WHO and EAPC, provide the framework which allows us to tread a middle way on a path bordered by obstinacy on one side and abandonment on the other.

Applying these principles to a case study of a 97 year old patient cared for by a team of palliative care nurses in her home, we explore together in this session the treatment choices relating to the different aspects of the care plan devised by a team of health professionals from a community palliative care network in a South suburb of Paris, in collaboration with the family, district nurses, social worker and carers for preventing pressure ulcers from developing. We will review the different ethical considerations. How they limit us and how they assist us.

**Conclusions:** This lecture will offer participants a tool-kit of ethical principles, which they may use case-by-case in care planning for patients at the end of life. It will invite them to think proportionality versus futility in the prevention of pressure ulcers for this group of patients.

**References:** Schaefer, R., 1999. *Éthique et fin de vie*. Rev Prat, 49, pp.1081-5.

## KS6.1

### Skin integrity and intercellular communications in pressure ulcer risk

**Dominique Sigaud-Roussel<sup>1</sup>**

<sup>1</sup> *Laboratoire de Biologie tissulaire et Ingénierie Thérapeutique UMR 5305 CNRS, France*

The skin is a vital organ ensuring the integrity of the organism and allowing its exchanges with the surrounding environment. The maintenance of the skin homeostasis relies on a finely tuned equilibrium of well-regulated interactions between the different layers of the skin with their cellular and subcellular structures. Indeed, all major cells such as keratinocytes, fibroblasts, vascular cells, macrophages, and adipocytes have a capacity to communicate between themselves within the skin layers and interact with their environment. However, skin integrity can be weakened by environmental changes that give rise to a fragile tissue.

Here we will discuss on the integrated vision of skin tissue in both the analysis of the physiological and molecular mechanisms controlling the architecture of the matrix organization and the study of the functional consequences of any change in its environment such as skin weakened by stress i.e. aging, diabetes or pressure that could lead to pressure ulcer.

## KEY SESSIONS PRESENTATIONS

**KS6.2****Saving lives through aetiological research of pressure ulcers:  
How can understanding lead to better prevention and care****Amit Gefen<sup>1</sup>**<sup>1</sup> Tel Aviv University, Faculty of Engineering, Department of Biomedical Engineering, Tel Aviv-Yafo, Israel

This talk will provide an overview of our contemporary research concepts and latest published aetiological discoveries related to prevention and treatment of pressure ulcers. Pressure ulcers make a significant portion of the hard-to-heal wounds and are currently considered among the most important, unsolved and expensive medical burdens. Our research in the last twenty years has explained why quantitative, absolute and generic injury thresholds to predict when pressure ulcers may occur will forever remain intangible, despite the vast efforts and resources that have been invested in allegedly discovering such injury thresholds. This talk will explain the specific reasons for this. Yet, the talk will also describe the routes for constructive future bioengineering work which will likely lead to better prevention and treatment of pressure ulcers, even if currently, there are no simple or straight-forward injury thresholds to predict when a person may suffer these injuries. The role of mechanobiology, as a relatively new biomedical engineering frontier, will be highlighted, in the contexts of both basic and applied research, and prospects offered by mechanobiology in lowering the risk for pressure ulcers in individuals will be discussed. Inherent complexities in the prevention and treatment of pressure ulcers will be elucidated, particularly that: (i) the susceptibility to pressure ulcers depends on integrated body system functions which are extremely difficult to predict in individuals, especially in seriously ill patients, and (ii) a continuum exists between prevention and treatment of pressure ulcers, and hence, in many cases, clinicians are required to treat an existing wound and protect adjacent tissues from deteriorating at the same time.

**KS6.3****Translation of research tools and strategies for implementation  
at the bedside****Dan Bader<sup>1,2</sup>**<sup>1</sup> University of Southampton, School of Health Sciences, Skin Health Group, Southampton, United Kingdom  
<sup>2</sup> Eindhoven University of Technology, Department of Biomedical Engineering, Eindhoven, Netherlands

There have been a considerable array of bioengineering tools, which have been developed to inform scientific knowledge as to the direction of approach in pressure ulcer prevention [1]. Many of these have been demonstrated with able-bodied participants in laboratory-based controlled conditions [2], although very few have been successfully translated to appropriate clinical settings [3]. The presentation will examine the reasons for this focusing on the critical features needed to bridge the translational gap, which have proved so problematic in many areas of bioengineering. In achieving this it will highlight the importance of the involvement of clinicians, patients and carers at the early stages of development of measurements tools, sensors and preventative strategies. This presentation will also identify a number of solutions, each of which must consider individual susceptibility and tissue tolerance levels and how they can be affected by specific characteristics, such as age and co-morbidities.

<sup>[1]</sup> Bader and Worsley (2018) Technologies to monitor the health of loaded skin tissues. *Biomed Eng Online*. 17(1):40<sup>[2]</sup> Worsley et al. (2016) Investigating the effects of strap tension during non-invasive ventilation mask application: a combined biomechanical and biomarker approach. *Med Devices* 9: 409-417<sup>[3]</sup> Bader and Oomens (2018) The potential of biomarkers in the early detection of pressure ulcers. In: *Science and Practice of Pressure Ulcer Management 2nd Edition* (Romanelli, M et al. Eds) Springer-Verlag, Berlin pp 1-15

**KS7.2****Biofilm models and chronic wounds****Claus Moser**<sup>1</sup><sup>1</sup> Rigshospitalet, Clinical Microbiology, Copenhagen, Denmark

**Introduction:** Several studies have revealed biofilm formation as important contribution for lack of healing in chronic wounds. It is estimated that biofilm formation is established in approximately 60% of chronic wounds. Chronic wounds also have a highly diverse background and the patients often suffer from substantial co-morbidities, making it challenging to perform strict clinical studies. Therefore, representative model systems are important to generate pre-clinical data before testing and implementation of novel treatment strategies in humans.

**Results:** The present talk provides an overview of fundamental issues on biofilm formation and antibiotic tolerance, biofilm models of chronic wounds, with special focus on the usefulness of the models for testing anti-biofilm regimens. Special focus will be on antibiotic enhancing strategies.

**Conclusions:** Biofilms are present in the majority of chronic wounds. To identify novel treatment options, model systems are mandatory. The present overview will present such model systems and how they can be used for testing of promising candidates

**References:** Provided during the presentation

**KS7.3****The prevalence of biofilms in chronic wounds: a systematic review and meta-analysis of published data****Isabelle Fromantin**<sup>1</sup><sup>1</sup> Institut Curie, Research and Wound Care Unit, Paris, France

Many studies show that bacteria are present in biofilm-phase in chronic wound, including pressure ulcers. Biofilms corresponds to sessile bacterial communities encased in polysaccharide matrix (slime). This way of life confers to the bacteria a better resistance to antimicrobials, to antibiotics, and to the immune response. It therefore increases the risk of repetitive infections and delays healing.

But the biofilm is difficult to diagnose with usual clinical signs of infection, and it is not possible either to detect it with usual microbiological analyses. As a consequence, it is difficult to assure when and why it is present in clinical practice and if it is necessary to use an anti-biofilm technique. However, different experts' consensus and publications help clinicians and make it possible to propose good practices, associating care with anti-biofilm products.

In the future, new diagnosis tools could change our clinical practices, and could help us to conduct better clinical trials on large patients' cohorts and develop other new potential anti-biofilm solutions. Meantime, biofilm is a surface phenomenon and we can be effective on the top of the wound.

## KEY SESSIONS PRESENTATIONS

**KS8.1****Measuring what matters****Jan Kottner**<sup>1</sup><sup>1</sup> Charité – Universitätsmedizin Berlin, Berlin, Germany

Worldwide, pressure ulcers are regarded as a major unwanted and mostly preventable harm in health care. Therefore, there are various activities to evaluate the quality of pressure ulcer prevention and care. Quality evaluations are usually based on quality indicators. Indicators are standardised measurements producing quantitative data that may be related to the quality of a service or performance. In order to perform this task, quality indicators have to meet quality criteria themselves to produce accurate and reliable data. Worldwide, numerous pressure ulcer prevention indicators have been proposed or are used, but there are ongoing discussions about which indicators are most useful for quality and patient safety measurements. Compared to acute care, performance measurements in community and acute care settings are clearly underrepresented. To make an informed decision about which indicators to use, the purpose of performance and quality measurements needs to be defined first. Indicators measure only a small part of the complex pressure ulcer care and there is a difference between performance measurement and quality evaluation. Results of performance measurements must be used to improve care.

**Reference**

Kottner J, Hahnel E, Licherfeld-Kottner A, Blume-Peytavi U, Blüschner A. *Measuring the quality of pressure ulcer prevention: A systematic mapping review of quality indicators.* *Int Wound J.* 2018;15(2):218-224.

**KS8.2****1,000 Lives Improvement****Trudie Young**<sup>1</sup><sup>1</sup> Welsh Wound Innovation Centre, Wales, United Kingdom

**Introduction:** Healthcare in the United Kingdom is devolved to the constituent countries – England, Scotland, Wales and Northern Ireland. While care remains free at the point of delivery, the management of healthcare varies greatly across the four countries. In Wales, seven Health Boards provide community and secondary care for geographic areas ranging in size from 471 km<sup>2</sup> (Cardiff & Vale) to 6172 km<sup>2</sup> (Betsi Cadwaladr). In addition, three NHS Trusts hold an All-Wales role – Welsh Ambulance Service Trust, Velindre NHS Trust (specialist cancer care) and Public Health Wales.

- Public Health Wales holds seven key priorities<sup>1</sup>;
- Influencing the wider determinants of health
  - Improving mental well-being and resilience
  - Promoting healthy behaviours
  - Securing a healthy future for the next generation
  - Protecting the public from infection and environmental threats to health
  - Supporting the development of a sustainable health and care system focused on prevention and early intervention
  - Building and mobilising knowledge and skills to improve health and well-being across Wales

Within Public Health Wales, the 1000 Lives Improvement is the national quality improvement service for NHS Wales.

**Methods:** A key aim of the 1000 Lives Improvement is to support the NHS to improve outcomes for people by reducing variation, harm and inequality in healthcare delivery. One major project of the 1000 Lives Improvement program was the introduction of zero tolerance to pressure ulcers as part of a transforming care program through which Health Boards and Trusts were required to accelerate the implementation and spread of mandatory interventions, which included the prevention of hospital acquired pressure ulcers. This work included the introduction of the SSkin Bundle and the safety cross initiative to prevent the development of health organisation acquired pressure ulcers. The SSkin bundle looked at five key areas to improve patient care: Support surface, skin, mobility, incontinence and nutrition.

The safety cross is a visual display of how many pressure ulcer free days each clinical area has experienced within a month.

**Results:** Few results are available from the 1000 Lives work on pressure ulcer prevention. Within one Health Board, it was noted that across a range of medical wards the number of days free from pressure ulcers ranged from 185 to 454 however no incidence or prevalence data was reported from these units<sup>2</sup>. Later it was claimed that the initiative had achieved a 100% success in preventing pressure ulcers<sup>3</sup> although this observation remains unpublished.

**Conclusions:** The 1000 Lives improvement initiative was an important starting point for raising the problem of pressure ulcer development within healthcare organisations in Wales.

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2. *Williams N* (2010). *Outcomes and successes. Preventing Hospital Acquired Pressure Ulcers.* 16th June 2010, Cardiff. <http://www.1000livesplus.wales.nhs.uk/pressure-ulcers/> Accessed on 15th July 2019.
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**KS9.1****Update on the International Guidelines for the Prevention and Treatment of Pressure Ulcers/Injuries 2019****Jan Kottner<sup>1</sup>, Janet Cuddigan<sup>2</sup>**

- 1 Charité – Universitätsmedizin Berlin, Berlin, Germany
- 2 University of Nebraska Medical Center, Omaha, United States

The three organizations EPUAP, NPUAP and PPPPIA agreed to collaborate and update the third edition of the 'Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline' (CPG). A guideline governance group (GGG) was formed in 2017 consisting of four representatives of each organization. With the assistance of the methodologist, Emily Haesler, PhD, this group is responsible for overseeing the CPG revision process. The overall objective of the GGG is to develop a high-quality and trustworthy guideline and to improve pressure ulcer care worldwide. Fifteen international Associate Organizations that share the mission of the GGG support the work and share expertise and perspectives to complement EPUAP, NPUAP or PPPPIA. The full guideline development protocol can be accessed from the International CPG website (<http://www.internationalguideline.com/>) and a protocol summary has been published as open access (Kottner et al. 2019). The CPG is intended to be used by healthcare professionals and will provide guidance for caregivers and individuals at pressure ulcer risk and those with existing pressure ulcers. Small Working Groups (SWGs) were formed to review the evidence, and to review and draft recommendations and guideline content. Systematic evidence searches were conducted covering the period from July 2013 through August 2018. The risk of bias of all eligible evidence sources was evaluated using a structured approach and 'levels of evidence' were assigned. The SWGs formulated conclusions based on the evidence and critical appraisals and levels of evidence. The SWGs also drafted guideline recommendations. An international stakeholder review is currently ongoing. The launch of the guideline will be at the Leonard D. Schaeffer Center for Health Policy & Economics, University of Southern California, Los Angeles on 15 and 16 November 2019.

**Reference**

Kottner J, Cuddigan J, Carville K, Balzer K, Berlowitz D, Law S, Litchford M, Mitchell P, Moore Z, Pittman J, Sigaudo-Roussel D, Yee CY, Haesler E. Prevention and treatment of pressure ulcers/injuries: The protocol for the second update of the International Clinical Practice Guideline 2019. *J Tissue Viability*. 2019;28(2):51-58.

**KS9.2****Guidelines on positioning****Martine Barateau<sup>1,2</sup>, Brigitte Barrois<sup>2</sup>, Anthony Célys<sup>2,3</sup>, Sandrine Robineau<sup>2,4</sup>, Benoît Nicolas<sup>2,4</sup>**

- 1 Hospital Center University De Bordeaux, Bordeaux, France
- 2 Société Française de l'Escarre, Paris, France
- 3 Centre Propara, Montpellier, France
- 4 Pole Saint Hélier/Médecine Physique Et De Réadaptation, Rennes, France

Guidelines for positioning patients are published in international guidelines, but they are not specified. EBM Literature is poor in this field. And for example, no specification is proposed for time to move patients.

The Société Française de l'Escarre conducted and produced scientifically validated guidelines for positioning patients.

The Société conducted a survey during year 2018 (previously presented in EPUAP conference).

Then the Société organized a DELPHI scientific method with a writer group. Then 2 turns were organized for reviewing and rating each guideline by experts from different professional groups.

At the end, the Société can provide 15 french guidelines. The Société will be proud to share with other countries and to provide international specified guidelines for positioning patients.

## KEY SESSIONS PRESENTATIONS

**KS10.2****Patient and lay carer education for preventing pressure ulceration in at risk populations****Tom O'Connor<sup>1</sup>, Zena Moore<sup>2</sup>, Declan Patton<sup>1</sup>**

- 1 *RCSI (Royal College of Surgeons in Ireland), School of Nursing and Midwifery/RCSI Skin Wounds, and Trauma - SWaT Research Centre, Dublin, Ireland*
- 2 *RCSI (Royal College of Surgeons in Ireland), School of Nursing and Midwifery/SWaT Research Centre, Dublin, Ireland*

**Introduction:** Pressure ulcers (PUs) are, in the main, preventable and education targeted at patients and their carers is considered important. This review aimed to assess the effects of patient and/or lay carer education on preventing pressure ulceration in at-risk people, in any care setting.

**Methods:** Cochrane Systematic review. In June 2019 we searched relevant databases and registries for RCTs which recruited people of any age at risk of pressure ulceration, and RCTs that recruited people who informally care for someone at risk of pressure ulceration.

**Results:** The search yielded 666 citations, of which 11 studies were relevant and are included in the review. Eight studies were aimed at patients, two included patients and their family carers, and one included carers. The studies included 2302 participants, five studies included people with spinal cord injuries, mainly males, with a mean age of < 60 years. There were two main types of interventions, the provision of information on prevention of pressure ulcers and the use of different types of education programmes.

Three studies (237 participants) looked at the provision of information on prevention of PUs. We are uncertain in all three cases about the effectiveness of the interventions as the certainty of the evidence has been assessed as very low.

Eight studies (2065 participants) assessed the impact of various educational programmes on the prevention of pressure ulcers. Five studies reported on the primary outcome, risk of pressure ulceration. In four out of five studies we are uncertain about the effectiveness of the intervention as the certainty of the evidence was assessed as very low. In the fifth study there is high certainty evidence that use of a PU prevention care bundle reduces the risk of PU development (RR 0.58; 95% CI 0.42 to 0.82).

For the secondary outcomes, the evidence for impact on patient knowledge was uncertain but one study, at low risk of bias, showed some impact on pressure ulcer grade.

**Conclusions:** In ten of eleven studies we are uncertain whether educational interventions effect PU risk or patient or lay carer knowledge, because the certainty of the evidence was assessed as very low, or low. Conversely, one study, at low risk of bias, showed that use of a PU prevention care bundle reduces the risk of PUs among at risk patients, with high certainty evidence. The low level of evidence certainty means that additional research is required to confirm these results.

**KS10.1****Education of healthcare professionals for preventing pressure ulcers: a Cochrane review****Alison Porter-Armstrong<sup>1</sup>, Zena Moore<sup>2</sup>, Suzanne McDonough<sup>1</sup>, Ian Bradbury<sup>3</sup>**

- 1 *Ulster University, School of Health Sciences, Belfast, United Kingdom*
- 2 *Royal College of Surgeons Ireland, School of Nursing and Midwifery, Dublin, Ireland*
- 3 *Frontier Science Scotland, United Kingdom*

**Introduction:** In order to stop pressure ulcers from developing, it is imperative that healthcare staff are educated on how best to prevent them. Whilst it is accepted that education is an integral component of preventative practice, this Cochrane Systematic Review aimed to assess whether these programmes were effective in preventing pressure ulcers and to explore a number of comparisons with regards to the educational components or format of delivery of these programmes. Three primary outcome measures were sought including changes in healthcare professionals' knowledge, change in healthcare professionals' clinical behavior and the incidence of new pressure ulcers

**Methods:** With the support of the Cochrane Wounds' Information Specialist, we searched the Cochrane Wounds Specialised Register; the Cochrane Central Register of Controlled Trials (CENTRAL); Ovid MEDLINE (including In-Process & Other Non-Indexed Citations); Ovid Embase and EBSCO CINAHL Plus for any Randomised Controlled Trials (RCTs) that evaluated the effect of any educational intervention delivered to any healthcare staff in any clinical setting to prevent pressure ulceration. There were no restrictions with respect to language, date of publication or study setting.

**Results:** Five studies were identified that met the inclusion criteria for this review. Due to the heterogeneity of the studies identified, pooling of data could not be undertaken and a narrative overview was constructed instead. We assessed each study for Risk of Bias, and used the GRADE approach to assess the certainty of the evidence. We conducted 7 comparisons exploring various aspects of educational delivery.

**Conclusions:** This presentation will present the findings of this published review in detail and will illustrate that the overall certainty of the existing evidence is low. The authors will provide an update on the current evidence being reported within the area and make recommendations for further research.

**References:**

Porter-Armstrong AP, Moore ZEH, Bradbury I, McDonough S. Education of healthcare professionals for preventing pressure ulcers. *Cochrane Database of Systematic Reviews* 2018, Issue 5. Art. No.: CD011620. DOI: 10.1002/14651858.CD011620.pub2.

## KS11.1

### The extent of pressure area related pain and it's role as an early indicator of pressure ulcer development

Jane Nixon<sup>1</sup>

<sup>1</sup> University of Leeds, Clinical Trials Research Unit, Leeds, United Kingdom

**Introduction:** Patients have reported; pressure ulcer pain is their most distressing symptom; that pain at 'pressure areas' was experienced prior to pressure ulcer manifestation and; patient's reports of pain are ignored by nurses. A number of related studies have aimed to determine the extent of pressure area and pressure ulcer pain and explore the role of pain as a predictor of Category  $\geq 2$  pressure ulcers in acute hospital and community populations.

**Methods:** Methods include: a) mixed methods systematic review (1), b) multi-centre, acute hospital pain prevalence study (2); c) multi-centre community pain prevalence (3) d) multicentre, prospective cohort study (4) and e) multi-centre randomised controlled trial (5).

**Results:** The pressure area related pain prevalence was 16.3% (327/2010) in the hospital population. Of 1269 hospital patients with no observable pressure ulcers 12.6% (233) reported pressure area related pain. The prevalence of pressure area related pain in patients with pressure ulcers was 43.2% (104/241) in hospital and 75.6% (133/176) in community patients. The detailed pain assessment of 197 patients identified pressure area related pain on skin areas assessed as normal as well as pressure ulcers. The distribution of pain intensity was similar for all grades and both inflammatory and neuropathic pain was observed.

The prospective cohort study of 632 acutely ill hospital and community patients identified significant evidence that the presence of pain at a skin site is an independent predictor for developing a Category  $\geq 2$  in four multi-variable models as follows: a priori logistic regression, over-dispersion logistic regression model and an Accelerated Failure Time model for analyses conducted on a patient level, and a multi-level logistic regression model for the analysis conducted on a skin site level.

The randomised controlled trial evaluating alternating pressure mattresses and high specification foam in 2029 acute admission in-patients in secondary care and community care facilities did not find that the presence of pain at a skin site was a predictor of Category  $\geq 2$  pressure ulcer development in the adjusted time to event Fine and Gray model.

**Conclusions:** The scale and scope of PU pain in hospital and community patients, are clearly highlighted, indicating that pain is a common symptom experienced by patients. There have been only two prospective studies which have investigated the role of pain as a predictor of subsequent Category  $\geq 2$  PU development, and replication studies are required. Skin site level analyses should be considered in addition to patient level analyses in PU research.

#### References:

1. Gorecki C, et al DOI:10.1016/j.jpainsymman.2010.11.016
2. Briggs M, et al DOI:10.1186/1472-6955-12-19
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4. Smith J, et al DOI: 10.1136/bmjopen-2016-01362
5. Nixon et al PRESSURE 2 trial in press

## KS11.2

### Pain as risk factor

Isabelle Defouilloy<sup>1</sup>

<sup>1</sup> University Hospital Amiens, Amiens, France

Pressure area related pain is now a proved predictive risk factor of category 2 pressure ulcer development. A study shows that unspecific pain is strongly correlated with pressure ulcer (PU) development in palliative care. Specialty literature is extensive on the identification and management of the risk factors causing pressure ulcers, but the number of studies exploring this potential risk factor is quite low.

Although pain is taken into account at the patient's bedside and cited by nurses in several articles, and also by geriatric and paediatric clinicians as a risk factor, unspecific pain has never been validated by studies as a risk factor and pain never appears in any assessment scale.

However, this symptom generates a lot of adverse effects, and some of them are demonstrated risk factors of PU development:

- Immobilitation due to stupor, antalgic position or sedation because of pain treatment (opioid medications, muscle relaxant...), and less change of position by health care professionals because of generating iatrogenic pain...
- Under nutrition and weight loss due to loss of appetite in case of apathy and depressive mood, which are secondary to chronic pain or nausea and vomiting because of opioid treatment...
- Friction due to restlessness and delirium manifested by the cognitively-impaired elderly or due to agitation encountered in the very young child, both unable to express and describe their pain

Pending new studies on specific pains (chronic pain, lower limbs arthritis pain...), health professionals should always take into consideration that:

- Pain is a very common symptom in the elderly (particularly nursing home residents and long-term care unit patients) and is too often undertreated;
- Pain must always be evaluated especially with non-communicant people;
- Risk factors are often cumulative and place the patient at high risk for pressure ulcer.
- Using assessment scales is absolutely necessary either for pain or for pressure ulcer prevention but they have to be added to clinical judgement and never replace it.

## KEY SESSIONS PRESENTATIONS

**KS12.2****Domoplaies: an experimentation of an innovative economical model when managing complex wounds at home using telemedicine****Luc Téot<sup>1</sup>**<sup>1</sup> Montpellier University Hospital, Montpellier, France

Use of telemedicine has expanded rapidly in recent years, yet there are few comparative studies to determine its effectiveness in wound care. To provide experimental data in the field of telemedicine with respect to wound care, a pilot project named "Domoplaies" was publicly funded in France in 2011. A randomized, controlled trial was performed to measure outcomes of patients with complex wounds who received home wound care from a local clinician guided by an off-site wound care expert via telemedicine, versus patients who received in-home or wound clinic visits with wound care professionals. The publicly funded Hospital Home Network in Languedoc-Roussillon, France, a developed network of nurses and physicians highly experienced in wound healing, was used to provide wound care recommendations via telemedicine for the study. The healing rate at 6 months was slightly better for patients who received wound care via telemedicine (61/89; 68.5%) versus wound care professional at home (38/59; 64.4%) versus wound care clinic (22/35; 62.9%), but the difference was not significant. Average time to healing for the 121/183 wounds that healed within 6 months was 66.8 ± 32.8 days for the telemedicine group, 69.3 ± 26.7 for the wound care professional at home group, and 55.8 ± 25.0 days for the wound care clinic group. Transportation costs for the telemedicine and home health care groups were significantly lower than the wound clinic group, and death rate was similar between all three groups. Telemedicine performed by wound healing clinicians working in a network setting offered a safe option to remotely manage comorbid, complex wound care patients with reduced mobility. The French Ministry of Health recently accepted to fund a new experimentation over the next 5 years concerning a lumpsum mode of payment of an episode of care concerning complex wounds, based on the Domoplaies study. More than 20000 acts of teleconsultations have been realized at this day. This new mode of organisation of care will be presented and detailed during the session.

**KS12.1****Interactive telemedicine in nursing homes for chronic wounds care****Nathalie Salles<sup>1</sup>, Martine Barateau<sup>1</sup>, Caroline Anras<sup>1</sup>, Elise Thiel<sup>1</sup>, Aurelie Lafargue<sup>1</sup>**<sup>1</sup> University Hospital Bordeaux, Bordeaux, France

Interactive telemedicine in nursing homes for chronic wounds care

**Introduction:** One of the priorities of the French national strategic plan of telemedicine deployment is to improve health management of patients living in nursing homes (NHs). In fact, the first aim of this plan is to improve access to care, especially for old, dependent with multi-morbidity patients living in NHs. Telemedicine could be a pertinent tool to improve quality of care and quality of life for these patients, with, for example, the possibility of taking care of NH residents in their places of life and with their usual caregivers. Literature data published by our team showed that interactive telemedicine is feasible in NHs, and is an appropriate tool for the care of complex situations such as chronic wounds.

**Methods:** prospective and comparative analyses, using SPSS 2018 software

**Results:** Our results showed that telemedicine significantly improved wound healing, and it decreased dressing expenditure by reducing the pace of dressing changes ( $p = 0.005$ ). In another study, we reported that telemedicine made possible the realization of geriatric assessment, i.e., level of autonomy, cognitive status, and severity of comorbidities. In terms of care pathway, our results showed that interactive telemedicine enabled the avoidance of more than 70% of requests to specialists either with consultations or hospitalizations. Results showed an improvement in the quality of life of the residents with fewer trips to the hospital, sources of complications. Our results also showed that NH staffs were satisfied with the use of telemedicine for their patients, they felt less alone and could freely discuss about chronic disorders of their patients whether they were doctors, nurses or caregivers. Most of the time, beyond the reason of virtual consultation, exchanges educate healthcare providers on methods for assessing chronic wounds and methods of necrotic wounds debridement, etc. In a recent prospective study, we compared efficiency of telemedicine versus day hospital for the treatment of patients with complex chronic wounds. Preliminary results showed higher rate of recommendations applied in the telemedicine group compared to the day hospital group (OR: 15, CI 95% [1.8-17],  $p=0.002$ ). Interestingly, results showed that telemedicine was as effective as day hospital care for chronic wounds care, based on colorimetric evaluation and wound area.

**Conclusions:** Telemedicine allowed the simplification of care pathways for dependent residents and the avoidance of the multiplication of interventions by specialized teams. NH residents could then have access to expertise in less than one week regardless of their geographical location.

**KS13.2****The results of the consumer survey of International Prevention and Treatment of Pressure Ulcers Guideline initiative****Jan Kottner<sup>1</sup>, Emily Haesler<sup>2</sup>**<sup>1</sup> Charité – Universitätsmedizin Berlin, Berlin, Germany  
<sup>2</sup> Australian National University, Perth, Australia

The three organizations EPUAP, NPUAP and PPPPIA agreed to collaborate and update the third edition of the 'Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline' (CPG). In order to establish consumer needs and their interest in guideline topics an international consumer survey was conducted between 24 April 2018 to 30 October 2018. In total, n = 383 subjects participated who identified themselves as patient and n = 850 respondents identified themselves as informal caregivers. 'Stopping any pressure ulcer' was considered the most important care goal of patients and care givers. Most relevant topics for care givers and patients were: (1) stopping a PU when being immobile, (2) healthcare professionals must know about PUs, (3) how to heal PUs. Overall, all guideline topics were rated as 'important' or 'very important' by all respondents. This is the largest international survey identifying information needs of patients and informal caregivers. The results are used to support the guideline topics and recommendations.

**Reference**

Kottner J, Cuddigan J, Carville K, Balzer K, Berlowitz D, Law S, Litchford M, Mitchell P, Moore Z, Pittman J, Sigaud-Roussel D, Yee CY, Haesler E. Prevention and treatment of pressure ulcers/injuries: The protocol for the second update of the International Clinical Practice Guideline 2019. *J Tissue Viability*. 2019;28(2):51-58.

**KS13.3****The case report of a patient with spinal cord injury and experience with pressure ulcer - video interview****Andrea Pokorna<sup>1</sup>**<sup>1</sup> Masaryk University, Department of Nursing, Brno, Czech Republic

The life experience changes the view of people to their lives. When we would like to understand the patient's perspectives, we should try to identify their feeling and needs and a potential reason for the devaluation of the problems. One of the best ways how to share the knowledge, experiences, and have a view into patients or clients life is the interview. We want to present a video interview with men who suffer from spinal cord injury and is a wheelchair user for more than 40 years. This man is expressing not only his own experiences but also the need for some changes which should be made in the healthcare system to promote preventative measures and early identification of pressure ulcers. He also highlights the need for effective education and comprehensive approach when caring for patients with spinal cord injury who are chairbound. The specific message of these men is that the disability is not the end of life. Disabled people can enjoy their life as productive and successful the only need is to have appropriate support, enough information and access to the healthcare services which understand specific requirements and a specialized type of care. The most important knowledge which chairbound people need to know concerning the prevention of pressure ulcers are related to the early symptomatology identification (even non-specific symptoms and signs), something like an early warning system, an appropriate type of evaluation and skin inspection and easy to use first aid tools and materials. In the same time, the possibility to discuss the problem, to be seen by a specialist or referred to the special unit is essential. There is still a lot of problems discussed related to the reimbursement of antidecubital cushions in chairbound patients, and maybe there is a need to listen to the patients with a long history and a lot of experiences. The patients can be role models for other patients as well as for carers. We will present one of them who can share his life story and encourage other patients to be more visible, to be a voice of receivers of the care and who can promote the idea of patient-centered care.

## KEY SESSIONS PRESENTATIONS

**KS 14.1****Programme Zoom sur l'escarre, une réalité depuis 20 ans****Anne-Claire Raë<sup>1</sup>, Anne-Laure Blanchard<sup>1</sup>**<sup>1</sup> HUG, Direction des soins, Genève 11, Switzerland

**Introduction:** Pour tout hôpital prônant le développement de la qualité des soins, la prévention et le traitement des plaies de pression font partie des priorités. Depuis 1998, les Hôpitaux Universitaires de Genève ont mis en place un programme Qualité transversal nommé "Zoom sur l'escarre". Les objectifs principaux de ce programme sont de promouvoir une approche multidisciplinaire de cette problématique, de documenter les pratiques de soin et les résultats-patients et ainsi de contribuer à la documentation de la gestion des risques institutionnels par les mesures et améliorations régulières de cet indicateur.

**Méthodes:** La dynamique mise en place repose sur :

- Une mesure régulière de la prévalence des escarres réalisée auprès de l'ensemble des quelques 1500 patients hospitalisés dans une centaine d'unités de soins.
- L'analyse et la diffusion rapide des résultats dans les services.
- L'existence de recommandations, actualisées régulièrement, de bonnes pratiques en termes de détection et de prévention des patients à risques et de traitement des plaies.
- La création d'une équipe d'experts médico-infirmiers "plaies et cicatrisation" à disposition au quotidien des équipes de soins.
- L'identification d'une infirmière de référence par unité de soins bénéficiant d'une formation continue.
- Des actions de formation/information adaptées aux publics cibles (nouveaux collaborateurs, infirmières de référence, aides-soignants...) déployées et soutenues par des supports de diffusion (e-learning, affiches, newsletters, sous-main, stylos...).

**Résultats:** Ce programme a permis de diminuer le taux de prévalence d'escarres nosocomiales toutes catégories, (11.3% en 2000 versus 6.2 % en 2018), d'améliorer la détection systématique des patients à l'admission (86% des patients ont une échelle Braden documentés dans les 48h premières d'hospitalisation), d'améliorer la mise en place des mesures de prévention. En 2018, les patients à risques élevés sont 75% à bénéficier d'un matelas à air dynamique et d'un supplément nutritif oral versus respectivement 12% et 37% en 2000.

**Conclusions:** Si ce programme existe toujours après 20 ans, c'est grâce à l'engagement des directions de soins et médicale, au soutien des cadres des services, une discussion systématique et concertée des résultats en termes de structure, processus et résultats patient, l'actualisation de la formation des collaborateurs et l'intégration aujourd'hui de l'indicateur escarre dans le tableau de bord institutionnel des indicateurs qualité.

**Références**

Inscrivez votre texte ici

**KS13.4****Update on International Measurement of Pressure Ulcer Prevalence****Ian Brownwood<sup>1</sup>**<sup>1</sup> OECD, Health Care Quality and Outcomes, Paris, France

The OECD has an active program of work on measuring and reporting quality and outcomes of health care across its 36 member countries. This work has been underway for over 15 years. In framing its quality measurement efforts, the OECD focuses on clinical effectiveness, patient safety and person centered care. Pressure ulcer prevalence can extend to 30-50% of patients in care settings and through safer care practices the occurrence of pressure ulcers can be largely prevented. The OECD is working collaboratively with the EWMA and EPUAP to build capacity for international measurement and reporting of pressure ulcer indicators, thereby enabling further opportunities for cross-national monitoring and improvement. An update on progress made in this work during 2018-19 will be presented, along with the identification of possible next steps in further refining the current approach.

**KS 14.2**

**Hôpitaux universitaires Genève, 15 ans d'un groupe interdisciplinaire plaies et cicatrisation dans un service de réadaptation et longs séjours**

**Hubert Vuagnat<sup>1</sup>**

<sup>1</sup> Hôpitaux Universitaires de Genève (HUG), Genève, Switzerland

Les premières mesures de prévalence effectuées dans ce service de 200 lits au milieu des années nonante montrent :

- le haut taux d'escarre (30%),
- le manque de connaissance des soignants pour la prévention et le traitement,
- le manque de documents de référence dans les domaines de la prévention et du traitement,
- le matériel très limité à disposition des soignants pour la prévention.

Ces constats conduisent, avec le soutien de leurs hiérarchies, un groupe de médecins et d'infirmiers du service à créer deux structures :

- 1) une équipe mobile plaies médo-soignante
- 2) un groupe interdisciplinaire plaies et cicatrisation

L'équipe mobile va consulter directement au lit du patient, en la présence d'un membre de l'équipe soignante afin de faciliter la transmission du savoir. Pour ce qui est de la composition du groupe, il convient de se souvenir, tant pour la prévention que pour le traitement, le nombre élevé de facteurs et cofacteurs physiques, anatomiques et physiopathologiques conduisant à la formation d'une escarre rendant l'action d'une seule profession peu efficace. C'est pourquoi la participation de tous, en interdisciplinarité (ou professionnalité), revêt un rôle crucial et se reflète dans la composition de ce groupe.

Equipe mobile soins de plaies	1 infirmières spécialistes clinique 1 médecin	Consultation en binôme au lit du patient, avec personnel de soins Création de documents de référence Acquisition de matériel de soins adéquat	Consultation en binôme au lit du patient, avec personnel de soins	Jours ouvrables
Groupe interdisciplinaire plaies et cicatrisation	1 infirmière relai de chaque unité de soins 1 ergothérapeute 1 kinésithérapeute 1 kinésithérapeute 1 responsable des moyens auxiliaires 1 responsable du matériel de soins 1 psychologue 1 psychomotricienne	Présentation de cas Présentation de matériel professionnelles Enseignement Diffusion des documents de référence	Animation par équipe mobile	1x/mois nuit 1 mois sur 2

Enfin, un cours obligatoire de 2x2h30 sur le thème du positionnement et du transfert des patients a lieu et touchera tout le personnel soignant sur une période d'une année. Pour des raisons évidentes, ce dispositif s'appuie et se coordonne avec le bureau du groupe plaies et cicatrisation des Hôpitaux universitaires de Genève auxquels le service précité est rattaché. Résultats: ces différentes actions combinées, permettent de ramener la prévalence aux alentours de 8%.

**En conclusion:** la création de ces structures, dont un groupe interdisciplinaire « élargi » autour de la problématique de l'escarre a été un des piliers de la diminution de sa prévalence.

**KS 14.3**

**Objectif Zéro Escarre : où en sommes-nous après 10 ans?**

**Lucie Charbonneau<sup>1</sup>**

<sup>1</sup> CHUV, Cellule Plaies et Cicatrisation, Lausanne, Switzerland

**Introduction:** La prévention des escarres est une problématique actuelle, tant pour le Centre hospitalier universitaire vaudois que pour les autres institutions de santé nationales et internationales. Depuis 2008, un programme institutionnel appelé « Objectif Zéro Escarre » (OZE) a été mis en œuvre à l'hôpital.

**Methods:** Sur la base d'une revue de la littérature, des recommandations de bonnes pratiques internationales et les résultats d'enquêtes de prévalence annuelles, l'analyse des données récoltées a permis d'établir de mesures pertinentes et efficaces et adapter les interventions pour diminuer le taux de prévalence des escarres.

**Results:** Lors du lancement du programme institutionnel, la prévalence globale des escarres était à 19.2%. En novembre 2018, le taux de prévalence nosocomiales de catégorie 2 à 4 et plus est de 2.8%.

**Discussions:** Le non-respect des directives institutionnelles peut affecter la qualité des soins prodigués au patient et conduire au développement de l'ulcère de pression. Au fil des ans, plusieurs mesures ont été mises en œuvre pour garantir un effet à long terme sur la prévalence et assurer la sensibilisation de l'ensemble des professionnels de la santé à la prévention des escarres. Au cours des 10 années du programme OZE, la prévalence annuelle a diminué. Cette réduction est probablement due à l'effort fait par l'ensemble des professionnels de la santé et l'approche multifocal du programme institutionnel.

**Clinical relevance:** La littérature montre que des programmes institutionnels et la formation continue sont nécessaires pour soutenir les professionnels dans leur prise en charge des patients au quotidien. Maintenir l'effort nécessaire à long terme est maintenant le défi grand défi qui s'offre à nous.

## KEY SESSIONS PRESENTATIONS

**KS 14.5****30 ans d'actions du "groupe escarre" au Centre Hospitalier de Gonesse****Sylvie Merdinian<sup>1</sup>, Valérie Céphise<sup>1</sup>**<sup>1</sup> *Hospital Center of Gonesse, Gonesse, France*

Précurseur dans la dynamique de prévention et de prise en charge de l'escarre, le groupe garde depuis 30 ans les objectifs de coordonner, mettre à jour et diffuser les informations, d'harmoniser et optimiser les pratiques professionnelles et de recenser et analyser les escarres sur l'établissement.

Si en 30 ans les membres du groupe se sont renouvelés, le dynamisme et la convivialité sont toujours là. Le groupe pluridisciplinaire accueille des soignants du terrain. L'organisation bien « rodée » du groupe repose sur le recensement trimestriel des escarres sur l'établissement. A ce jour et depuis plusieurs trimestres, notre taux de prévalence est en dessous de la moyenne nationale. A chaque trimestre, le groupe en analyse les données et agit en conséquence par des actions ponctuelles.

En 30 ans le groupe pluridisciplinaire a formalisé l'évaluation du risque escarre, a rédigé et actualisé des protocoles de soins préventifs et curatifs qui sont tous maintenant dans la base documentaire de l'établissement. Soutenu par l'institution, il a monté une formation institutionnelle rendue obligatoire qui assure la mise à jour des connaissances de nos professionnels de santé. Il y a quatre sessions par an.

Aujourd'hui, le groupe cherche à poursuivre ses actions en s'adaptant aux nouvelles organisations de travail, aux nouveaux professionnels de santé mais aussi aux nouvelles technologies d'apprentissages. C'est avec une grande confiance que nous abordons cette nouvelle décennie qui demandera de la réactivité face aux organisations de travail, à la recherche qui se poursuit dans le domaine des plaies, et aux nouvelles approches du prendre soin.

**KS 14.6****Réduire de 50% les escarres nosocomiales: un collectif de travail Suisse francophone****Christian Baralon<sup>1</sup>**<sup>1</sup> *Hôpital Riviera-Chablais, Coordinateur sécurité des patients, Vevey, Switzerland*

Sous l'égide de la fédération des hôpitaux vaudois (FHV), 6 de ses établissements, sur la base du volontariat, ont rejoint un collectif de travail inter hospitalier dont l'objectif était, sur une période de 18 mois, de réduire de 50% le taux de survenue des escarres nosocomiales.

Chaque hôpital s'est alors doté d'un comité de pilotage, d'une équipe projet et d'une équipe chargée des indicateurs. Le plan multimodal d'amélioration intégrait 6 axes.

Axe 1 : évaluation du risque d'escarre

Axe 2 : amélioration des pratiques cliniques par l'application du bundle de prévention

Axe 3 : formation des collaborateurs

Axe 4 : responsabilisation des collaborateurs par la mesure et la restitution

Axe 5 : implication des patients et des familles

Axe 6 : culture institutionnelle de la sécurité et leadership

Une stratégie de mesure accompagnait ce programme avec des indicateurs de structure, de processus et de résultats. La majorité de ces données étaient extraites du dossier patient et des calendriers de survenue des escarres (sur lequel l'équipe identifiait en vert les jours sans escarre, en rouge les jours avec une escarre nosocomiale et en bleu les jours avec une escarre présente à l'admission).

Au terme des 18 mois de projet, le nombre de nouveaux patients porteurs d'escarre nosocomiale est passé de 4.6 par 1000 journées à 2.3 soit une baisse de 50% pour l'ensemble des établissements participant au collectif de travail et on estime que la survenue d'escarre a été évitée pour 1142 patients.

Chaque institution a pu s'approprier chacun des axes d'amélioration proposés. Des actions propres à chaque structure ont été initiées et adaptées aux pratiques sur cette base.

Ainsi, l'Hôpital Riviera Chablais (HRC) a créé l'acronyme ESCARRE, outil mnémotechnique permettant de structurer la démarche de prévention des escarres.

E : Evaluer le risque

S : Scorer avec l'échelle de Braden dans les 24h

C : Cibler le concept de prévention pour les patients à risque

A : Agir avec des actions de prévention

R : Réévaluer l'état cutané et le score de Braden

R : Responsabiliser le travail en interdisciplinarité

E : Enseigner au patient et à son entourage.

L'Ensemble Hospitalier de la Côte (EHC) a mis à jour sa procédure de prévention interne et revu ses supports de traçabilité avec la clarification de la stratégie de prévention attendue et son application systématique pour les patients à risques. L'institution a également orienté ses actions sur la communication et l'accompagnement pédagogique de la démarche avec la réalisation de supports visuels de recueil de données et de restitution des résultats, la diversification de son offre de formation, la récompense des services et l'organisation d'événements.

En conclusion, la méthode des collectifs de travail inter établissement semble se prêter à des projets ambitieux de réduction des escarres tout en permettant à chaque partenaire de l'adapter à son contexte institutionnel. Pour son suivi, la phase de pérennisation a été longuement préparée avec les équipes du projet.

## ESI.1

### A new approach of risk assessment and prevention: using the UZ Leuven risk assessment in a pro-active pressure ulcer prevention policy

**Annelies de Graaf<sup>1</sup>, Kris Bernaerts<sup>1</sup>**

<sup>1</sup> University Hospitals Leuven, Clinical Nurse Specialist Woundcare, Leuven, Belgium

**Introduction:** Pressure ulcers (PUs) incidence rates in Belgian hospitals are unknown, however a PU prevalence of 12.1% is described (1). PUs have a major impact on patient's physical and psychological health, increases costs to healthcare providers and are an important care-quality indicator (2).

In our University hospital the PU prevention policy consisted of a risk-assessment (Norton), nurses clinical judgement and associated preventive measures. This policy has been in place since 2012. During this time there was no decrease in PU prevalence (+/-5%) and hospital management and staff felt that a new policy and risk-assessment tool was required. In collaboration with another university hospital we developed a new PU risk-assessment tool, implemented in a more pro-active policy in an attempt to reduce PU incidence.

What did you do and how did you do it? Which actions and steps did you take?: First we developed the new pragmatic RA tool which is based on international EPUAP guidelines (3) and available RA tools. The new RA tool uses 2 variables, the presence of a PU injury and the presence of immobility (absent autonomous mobilization every three hours). The RA tools predictive validity was tested in our university hospital in 2017.

Secondly we reshaped our PU prevention protocol in a pro-active policy. Now we start on admission (including on ER) and it's applicable for all patients. With elective surgery we now start with a pre-risk start of preventive measures. We updated our preventive aids: basic supporting mattresses on ER, boots for offloading heels, seat cushions and active therapy 1-in-4 cell cycle mattress. Preventive aids are 24/7 available to guaranty a quick start of measurements.

Thirdly, we started using incidence rates and tracers to evaluate the impact of our policy. We plan to give feedback to nursing units and together we start tailor-made action plans for improvement. What were the results? Which improvements did you see?: The incidence of category 2-4 pressure ulcers across the hospital (including ICU patients) has decreased from 420 (0.62%) in 2015 to 297 (0.44%) in 2018. We have noticed a more pro-active positive working mindset with nursing staff including the ER.

**Discussion and further steps:** Initiating focused, PU preventive measures starting immediately after patients are admitted into our hospital has reduced the risk of patient harm by pressure injuries. Furthermore we will be looking to reduce PU incidence, using the action plans to further optimize prevention and reduce faulty processes like under registrations of PU's or incorrect differential diagnoses with IAD. In this way we also hope to reduce the overshoot of resources which will decrease costs. However the simplified RA tool has simplified risk assessment, we still need to refine this tool. This will be done in collaboration with the other University hospital and could become a national RA tool for use across Belgium. Clinical relevance: A pro-active preventive policy using a new RA tool based on only 2 variables (PU status and immobility)

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## ESI.2

### The development of the Purpose T pressure ulcer risk instrument into an electronic questionnaire to support mobile working

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**Introduction:** "Methodological and practical limitations associated with traditional pressure ulcer risk assessment tools prompted a programme of work to develop a new instrument this led to the development of Purpose T (PT).

What did you do and how did you do it? Which actions and steps did you take?: " Purpose T was implemented it within my local organization in 2015. At this time all our community services were transitioning away from paper records to electronic patient assessment and mobile working. The development of the Purpose T questionnaire enabled real time assessment of pressure ulcer risk at the bedside and also enabled data to be extracted centrally to describe our at risk population.

This data helps the organisation make informed predictions about resource use with regards to equipment and potential impact upon capacity and demand within community teams.

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

A previous citywide cross-sectional survey conducted in 2011 identified pressure ulcers as the most frequent wound type in the city (N=236).

Since the development of the PT questionnaire we are now able to describe our local at risk and not at risk % population in real time. This is flagged visually using a green, amber or red icon on the patient record to ensure this risk is communicated to the healthcare professionals involved in that patient's care.

**Discussion and further steps:** Since the development of Purpose T we have been contacted by several other NHS and independent sector organisations' wishing to 'pinch with pride' and adopt the same questionnaire, this has helped to progress the adoption of this evidence based tool nationally. We have more recently adopted the paediatric version of the Purpose T tool and developed this into a questionnaire for use in our children's business unit.

**Clinical relevance:** We have been able to identify patients who have not been assessed via this electronic process. In total there were 6% of patients with no risk assigned, which equates to 60 patients per week. In terms of overall activity within the organisation there are 29,430 face to face contacts per week. Based on high levels of activity and relatively low patients numbers we are confident that the majority of 'at risk' patients have been assessed and have a plan in place to manage risk. However we are not complacent and are working with our clinical staff and performance team to expedite ways to identify those patients with an unassessed/unassigned risk.

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### ES1.3

## Striving for Perfect Care: preventing skin breakdown in the community setting in the UK

**Nicky Ore<sup>1</sup>, Michelle Gallagher<sup>1</sup>, Catherine Fox-Smith<sup>1</sup>**

<sup>1</sup> Mersey Care NHS Foundation Trust, Liverpool, United Kingdom

**Introduction:** "Mersey Care NHS Foundation Trust serves 11m people across 85 different clinical care sites in the North West of the UK. A key Trust goal is the continual improvement (CI) in quality of care under the theme of Striving for Perfect Care. Two District Nurse (DN) bases identified a CI project to reduce skin breakdown in palliative care patients. Pressure Ulcers (PU) are a pernicious clinical issue: NHSr report that >1700 patients develop a PU per month: costing the NHS more than £3.8m per day.<sup>1</sup> Palliative care patients pose unique challenges in PU prevention as their care priorities are often focused on quality of life issues."

What did you do and how did you do it? Which actions and steps did you take?: "Following the Plan; Do; Study; Act (PDSA) principles of Quality Improvement<sup>2</sup>, a project was developed. It enabled the DN bases to evaluate the impact of including a hand held wireless device which gives objective, anatomically specific data highlighting increased risk of developing a PU, facilitating more informed clinical decision making. To enable the latter an Algorithm was developed to support clinicians with PU prevention strategies."

The 2 DN bases followed the PDSA process:

- 11-week project
- Data collection:
  - PU incidence rates – pre and during the project
  - Daily Heel and Sacral SEM delta readings
  - Analysis on impact on clinical decision making
  - Analysis on impact of choice of therapeutic equipment intervention"

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

- "Pre project PU incidence rate 16%
- During project PU incidence rate 11.8%
- PU incidence reduction 26.9%
- 17 patients
- 58% SEM delta readings >0.6 – indicating increased risk for PU; 55% of which had no visible redness
- 82% DN's stated that the SEM delta readings changed their clinical decision making
- 94% cases additional prevention interventions were initiated such as heel gel pads"

**Discussion and further steps:** "This project has enabled the DN bases to reevaluate their approach to PU prevention in palliative care patients. Whilst recognising the challenges in this difficult group of patients the team believe that with the addition of the innovative technology providing additional, objective risk data; clinical decision making can be altered in order to achieve specific care objectives"  
 Clinical relevance: "Achieving PU Incidence reduction in such a challenging group of patients is an important quality achievement. However, the impact on the patient and their families in terms of reduction in pain and distress by avoidance of a PU at a difficult period of their lives should be considered a real success."

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### ES2.1

## Training strategies for education in PU prevention in a Belgian university hospital

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**Introduction:** Pressure ulcer prevalence in Europe remains high, till 18,2% in hospitals. Only 10,8 till 13,9% of the patients at risk receive adequate prevention while more than 70% of the patients without risk receive a form of prevention. Lack of knowledge and a negative attitude towards pressure ulcer (PU) prevention hinders a good consecution of a prevention protocol. In 2014 only 14% of the patients in Ghent University Hospital (UZGent) received adequate prevention.

**Methods:** Since 2014 multiple training strategies are developed in UZGent to improve the quality of care regarding PU prevention. The coordination of the PU committee mutated from the infection control department to the wound care team and per ward one or more bedside nurses(s) became responsible for PU prevention and control (expertise). A more simplified PU risk assessment, connected with a concrete prevention protocol was developed and implemented, followed by a training program for all the bedside nurses in the hospital (general high-level knowledge). Figures about screening, risk assessment and incidence are since 2014 intensively collected from the electronic patient files and a digital care bundle supports the nurses to stay up to date (responsibility and feedback).

**Results:** UZGent reported a significant increase of the proportion of patients that were daily assessed for pressure ulcer risk (from 50% in 2016 to 85% in 2018). The proportion of patients at risk remained stable at 25% but the pressure ulcer prevalence rates decreased from 5,27% in 2015 to 3,89% in 2016 and 4,01% in 2018. Adequate prevention rates around 80% were reported. The designated nurses meet twice a year and provide at least yearly an update to all the colleagues on the ward, using the available figures. In 2020, the knowledge of all nurses will be tested by an E-learning tool and the nurses will be supported by a hospital wide digital decision-making algorithm.

**Conclusions:** A high knowledge level and a positive attitude towards PU prevention is essential to lower PU prevalence and incidence rates. Ghent University hospital implemented since 2014 multiple strategies to increase the knowledge level of the hospital wide nursing team. A clear and simplified protocol was created and a new educational strategy was developed. This resulted already in lower prevalence rates and more than 80% of patients receiving adequate prevention.

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## ES2.2

### Shanley Pressure Ulcer Prevention Programme (SPUPP)

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**Introduction:** There is a potential for increase in the incidence of pressure ulcers (PU) in the older population due to the relationship between ageing and reduced mobility. Prevention of PUs is a key issue for enhancing health, and education is a means to empower people to take an active role in health promotion.

Which educational methods did you use and how did you apply them in practice:

SPUPP is a multimedia programme developed by the author to address the key tenets of pressure ulcer prevention described by the SKIN2 bundle which are: S: Skin, K: Keep Moving, I: Incontinence; Nutrition. A multi-centre RCT was employed to determine the impact of SPUPP1. Following ethical approval 64 older adults living in the community setting participated in the intervention. The intervention group (n=32) participated in the education programme, which consisted of 5 multimedia sessions delivered every 5 days. Both groups completed the KPUP tool, which is a validated knowledge, attitudes and behaviours questionnaire, pre and post intervention. Knowledge was scored from 0-20. Descriptive analysis was used to summarise, describe and explain the data. Inferential statistics were used to test for possible associations between variables.

What were the results? The participants ranged in age from 70-96 years, 75% (n=48) were female. Pre-intervention the mean knowledge scores were 11.68 (SD: 3.09, intervention group) and 11.68 (SD: 3.60, control group). Post intervention the mean knowledge score in the intervention group was 16.87 (SD: 1.87), and the control group was 12.40 (SD: 3.2). The mean difference in knowledge scores post-test was 4.47 (95% CI: 3.19 to 5.75; p=0.00001) indicating a positive impact within the experimental group participants. Positive changes were also noted in favour of the intervention group, regarding self-reported health behaviours and attitudes towards PU prevention.

**Discussion and further steps:** SPUPP impacted positively on knowledge scores of the participants and also positively influenced attitudes and behaviours towards PU prevention. The significance of this is that it is possible to impact upon individuals' knowledge, and in doing so; provide the person with the ability to participate in their own health promotion and ill-health prevention. Patient involvement in healthcare and the rights of patients to have a central part to play in the healthcare process have long been seen as an important aspect of health care provision, and the benefits are believed to include enhanced motivation and knowledge about health and illness resulting in an increased ability to monitor and care for themselves.

**Clinical relevance:** SPUPP contributes to the concept of active and healthy ageing, of patient empowerment and of enhancing the capacity and capability of individuals living within the community care setting. This study will add to the growing body of evidence for preventing pressure ulcers and provide valuable data for this cohort of people.

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## ES2.3

### Interdisciplinary systematic education about prevention of pressure injury among patient with spinal cord injury

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People with spinal cord injury (SCI) using wheelchair are at high risk of incurring pressure injury. Obtaining such pressure injury is usually a serious and prolonged condition, which requires systematic monitoring from various participants in the treatment line. Sunnaas Rehabilitation Hospital has extended experience in life-time, interdisciplinary monitoring follow-up. The interdisciplinary team is well aware of the risk these patients experiencing while sitting.

**Objectives:** Ensure quality of interdisciplinary prevention of pressure injury in people with SCI. To increase the knowledge of SCI and pressure injury risk and prevention among patients and healthcare professionals in own institution, and towards the community healthcare services. Develop education programs that assess activities within a 24:7 perspective. Develop education programs for patients, next of kin, homecare services and nursing institutions. Utilize Tele rehabilitation as a tool in the collaboration and knowledge translation of the patient with an aim to prevent pressure injury. Which educational method(s) did you use and how did you apply them in practice?: Based on interdisciplinary teamwork, clinical experience and literature review, a structured approach has been established, where user participation is crucial.

**Oral communication:** Weekly lecture for in-patients about risks and prevention. Twice- a- year lectures for the interdisciplinary staff at the hospital

**Written information:** Wallet information cards, brochures and booklets given to the patients Online: Webinar Available on <https://www.youtube.com/watch?v=ZMqlbG8Fus4>, E-learning course available on [www://https://sunnaas.no](http://www://https://sunnaas.no) and [www://https://helseosorost.no](http://www://https://helseosorost.no)

**Tele-rehabilitation:** Videoconference between Sunnaas Rehabilitation Hospital, the patient and the homecare services. Plastic surgeons included when needed. Group guidance from Sunnaas Rehabilitation Hospital to the municipality. Hot Line: Dedicated mobile number operated by a specialized wound nurse. Conferences and meetings: Information share and knowledge transfer.

**What were the results?:** Low threshold for contact from the patients and the homecare services. Early contact when the pressure injury is at grade 1 or 2 Increased possibility to reverse and to prevent further worsening of the pressure injury.

**Discussion and further steps:** Maintain and further develop the outpatient service. Need for a competent and dedicated wound team and to continue the work in the hospital. Changing the focus from treatment to prevention. Further develop systematic, predictable multi- and interdisciplinary cooperation  
**Clinical relevance:** Prevention of pressure injury should be given even closer attention and top priority in educating hospitalized patients, and also in education of the interdisciplinary staff at the hospital and the local care givers.

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## KEY SESSIONS PRESENTATIONS

## ES3.1

## A novel approach to identify individual positioning in a range of supine postures

**Silvia Caggiari<sup>1</sup>**, Peter Worsley<sup>1</sup>, Yohan Payan<sup>2</sup>, Marek Bucki<sup>3</sup>, Dan Bader<sup>1</sup>

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- 3 Taxisense, France

**Introduction:** Pressure mapping provides visual feedback of the interface pressures between vulnerable tissues and supporting surfaces [1]. However, the short-term nature of these measures provides limited insight into the temporal changes in pressure during evoked or self-induced movements. We examined the performance of selected parameters derived from continuous pressure monitoring and actimetry to detect postural changes [2]. This yielded large data sets, which would benefit from intelligent data processing. This motivates the present study, which examines the accuracy of machine learning for the prediction of supine postures.

**Methods:** Nineteen healthy participants adopted supine postures on a standard mattress, movements were evoked using the head of bed (HOB) angle and a tilting system to achieve sagittal (HOB between 0 and 60) and lateral (left and right) postures, respectively. A series of time-related biomechanical parameters were estimated using a pressure monitor\* and actimetry\*\* placed on the sternum. Two supervised machine learning algorithms were assessed, namely K-nearest neighbors (KNN) and Naive-Bayes (NB), established with training data (n=9) and cross-validated with test data (n=10). KNN estimates the distance between a test data point and the nearest data point in the training phase, and NB the probability that a test data point belongs to specific cluster of postures.

**Results:** Ranking of the biomechanical parameters revealed whole body contact area (>20mmHg) and trunk tilt angles provided the highest discrimination for postural changes. Separate clusters were identified for postures incorporating 20oHOB increments (Figure1). The accuracy in predicting the range of sagittal and lateral postures was >80% for all subjects, for NB approach. By contrast, KNN accuracy resulted >70% for 8/10 subjects. An exemplar of both results are presented for one participant (Figure2). The NB algorithm was probably able to accommodate part of the non-linearity in the data, which could explain the differences in accuracy.

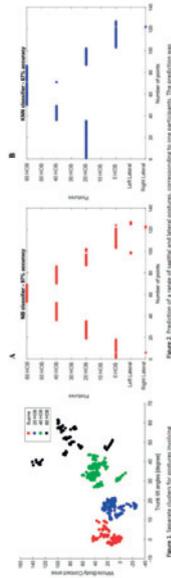


Figure 1. Scatter plot for postures training

Figure 2. Prediction of a range of sagittal and lateral postures, corresponding to participants. The prediction was obtained using the NB algorithm. The NB algorithm was probably able to accommodate part of the non-linearity in the data, which could explain the differences in accuracy.

**Conclusions:** Accurate prediction of supine postures was achieved by combining machine-learning approaches with robust parameters estimated from two monitoring systems. This approach represents an advanced method of monitoring postures and mobility. Future work will combined evaluation of the local physiological response to these postures in order to create intelligent monitoring solutions. These technologies have the potential to identify pressure ulcer risk and efficient strategies for prevention in practice.

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\* ForeSitePT, Xsensoir, Canada

\*\* Shimmer, Ireland

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## ES3.2

## The EPUAP Exchange Scholarship - countering medical device-related pressure ulcers

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**Introduction:** The EPUAP Exchange Scholarship enabled the first author LPC of the Israeli research group led by AG to engage with the counterpart UK group led by DB. Both research groups have internationally leading programmes of research concerning the aetiology and prevention of medical device-related pressure ulcers (MDRPUs). The research visit identified a range of state-of-the-art experimental techniques and protocols, which can be used in conjunction with established computational finite element (FE) methodologies for the design and evaluation of medical devices, aimed to minimize the risk of skin damage.

**Methods:** The EPUAP internship facilitated the involvement of LPC in several projects focused on monitoring tissue health during application of medical devices [1]. For example, magnetic resonance imaging (MRI) and modelling were employed to evaluate designs of penile clamps that are used post-prostatectomy. A series of MRI scans from a small cohort of patients post-prostatectomy was analysed to determine tissue thickness with the device applied, normalised to the unloaded baseline tissue state [2]. These data were then used to support the development of a FE model of a penis with clamp. In addition, LPC was also involved in microvasculature evaluations of deformed tissues and analysis of inflammatory biomarkers using an enzyme-linked immunosorbent assay (ELISA).

**Results:** The aforementioned MRI analyses revealed that penile tissue deformations ranged between 68-84% across subjects with no difference between two tested clamp designs, which were both able to close the urethra (Fig 1) [2]. If sustained, the above tissue deformations can lead to a MDRPU, particularly given that prostatectomy may compromise penile sensation.

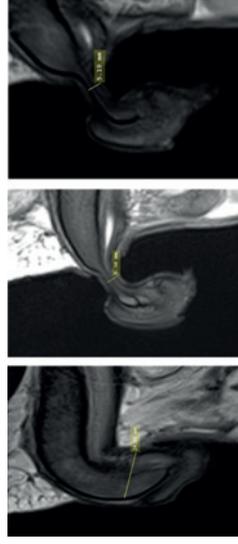


Figure 1. Sagittal plane images (T2) of the penis of one participant with (a) no clamp, and (b,c) following application of two different clamps which differ by their design.

**Conclusions:** The EPUAP exchange scholarship has been a unique career opportunity for LPC to gain new knowledge and skills, working in conjunction with the leaders in the field of MDRPUS. Future research will aim to translate this experience in order to drive the frontier of research into the aetiology and approaches for prevention of MDRPUS.

**References:**

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### ES3.3

## PURPOSE T in Sweden-a clinical evaluation of a risk assessment instrument

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**Introduction:** Pressure ulcers (PUs) remain a considerable patient safety issue worldwide. The European Pressure Ulcer Advisory Panel (EPUAP) recommends the use of a structured PU risk assessment (PU-RAI) in combination with skin inspection to identify patients at risk of PUs.1 PURPOSE T is a new innovative PU-RAI developed in England and differs from other traditional PU-RAIs as it includes a screening step, skin assessment and uses color, rather than a numerical score.2 The aim of the present study was to evaluate the psychometric characteristics (reliability and validity) of PURPOSE T in a Swedish context.

**Methods:** The clinical evaluation included 235 patients, purposely sampled across four broad levels of PU risk, with representation from six hospital wards and two nursing homes. Blinded and simultaneous paired (expert nurse and ward/community nurse) PURPOSE T assessments were undertaken (inter-rater). Follow-up retest were undertaken by the expert nurse (test-retest). Data were collected between May 2018- November 2018.

**Results:** The clinical evaluation demonstrated "very good" (kappa) inter-rater and test-retest agreement for PURPOSE T assessments overall. The percentages of agreement for "problem/no problem" was over 71.3 % for the main risk factors. The percentages agreement for "at risk"/"not at risk" was over 94.5 %.

**Conclusions:** The psychometric evaluation of PURPOSE T shows that PURPOSE T is suitable for use in clinical practice in Sweden. Further studies are needed to evaluate the nurses' perspective of using PURPOSE T, as well as the impact on PU prevention.

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- 11.4 An exploratory randomized controlled trial to evaluate the effect of a basic skin care product on the structural strength of the dermo-epidermal junction; *Monira El Genedy, Germany*
- 11.5 What is best practice for reducing the incidence and severity of incontinence-associated dermatitis in critically ill patients? a systematic review; *Li Chen, United Kingdom*

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## I.1

## The cost and consequences of an intervention-based programme to reduce hospital-acquired pressure injuries in one health district in Australia

Michelle Barakat-Johnson<sup>1,2</sup>, Michelle Lai<sup>2</sup>, Timothy Wand<sup>2,3</sup>, Kathryn White<sup>4,5</sup>, Richard De Abreu Lourenco<sup>6</sup>

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- 6 University of Technology, Centre for Health Economics Research and Evaluation, Sydney, Australia

**Introduction:** Hospital-acquired pressure injuries (HAPIs) are costly to the individual, the organisation and the health system.<sup>1,2</sup> There is limited research on the economic impact of HAPIs and the costs and consequences for hospitals of implementation strategies to reduce HAPI occurrence. Insights into the costs associated with strategies for HAPI prevention would help organisations inform health and policy decision-making related to resource allocation and HAPI expenditure.

The objectives of this study were to (1) determine the costs of hospital-acquired pressure injuries (HAPIs) in one local health district in Australia and (2) compare the costs and consequences of an intervention-based programme to reduce HAPI incidence and prevalence.

**Methods:** We conducted a retrospective cost-consequence analysis using HAPI incidence rate per occupied bed days, HAPI point prevalence rates, Australian Refined Diagnosis Related Groups (AR-DRG)3 costs, and the costs of the programme to reduce HAPI occurrence. Data were analysed using IBM SPSS Statistics Version 24 for two phases: pre-programme implementation (1 June 2015 – 1 June 2016), and post-programme implementation (August 2016 – 31 July 2017).

**Results:** The HAPI programme resulted in a 51.4% reduction in HAPI incidence (1.46 per occupied bed days in 2014 to 0.71 per occupied bed days in 2017) and 71.6% reduction in HAPI prevalence (from 6.7% in 2014 to 1.9% in 2017). The occurrence of HAPI added an average cost of \$3,332 per episode, such that the overall programme, including implementation, reduced costs by \$837,387. The greatest cost reduction was due to the cessation of washable and disposable underpads. The largest contributor to the cost of HAPI prevention was the education and training on HAPI prevention initiatives.

**Conclusions:** The programme halved the HAPI incidence and substantially reduced the prevalence with a 23.1% cost saving compared to the district's previous approach to preventing HAPIs. Such a programme is potentially transferable to other health care settings.

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## I.2

## Assessment of static overlays for pressure ulcers prevention

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<sup>1</sup> Odense University Hospital, Department of Plastic and Reconstructive Surgery, Odense, Denmark

**Introduction:** Pressure ulcers (PU) are common among admitted patients in developed countries, and have severe consequences for patients as well as economy. At a large university hospital alternating air mattresses (AAM) are used in prevention of PU but static mattress overlays might be more effective for preventing PU and with lower cost.

**Methods:** A hospital-based Health Technology Assessment (HTA) was nested within a clinical pilot-test at a geriatric and an orthopedic unit at the hospital, where two types of static overlays were tested during 6 months. Incidence of PU was investigated before and after the implementation. Incidence using static overlays compared to AAM was also investigated in a literature review. Staff attitudes were examined in a questionnaire survey and interviews. Patients who had tried both the overlays and the AAM were interviewed and a budget impact analysis was carried out.

**Results:** There were no indication of difference in the incidence of PU between overlays and the AAM. The staff showed mixed attitudes towards the overlays but in general preferred the overlays instead of AAM. Interviewed patients preferred overlays compared to AAM i.a. due to less noise and improved mobility. The economic analysis estimates significant savings (250.000 – 347.000 € over four years) at the hospital by using either of the two overlays compared to the AAM.

**Conclusions:** Based on the results in the MTV, it is recommended to introduce static top mattresses as an alternative to alternating pressure mattresses as overlays have lower costs than AAM. Clinicians at the hospital still recommend AAM to completely immobile patients as there may be differences that it has not been possible to document in this MTV.

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### 1.3 Modelling pressure ulcer prevention and treatment pathways: large cost savings achievable with investment in new technology

**Martin Burns**<sup>1</sup>

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**Introduction:** Most healthcare-acquired pressure ulcers (HAPU) are preventable and treatment costs are considerable<sup>1,2</sup>. HAPU prevention in the UK follows guidelines published by the National Institute for Health and Care Excellence (NICE)<sup>3</sup>. Preventing HAPU is potentially cost-saving and a measure of the effectiveness of care. An economic model was constructed of the cost of a HAPU and the theoretical savings possible with effective prevention using an innovative device\* that uses biocapacitance to alert clinicians to increased risk of PU earlier than visual skin assessment<sup>4</sup>.

**Methods:** Cost models were developed for two indicative patients who follow different care pathways with different outcomes. "George" (75yr) and "Jane" (71yr) have limited mobility and poor nutrition, at high risk of HAPU, admitted for fractured neck of femur.

The following inputs were used: with current standard care (SOC)3, George developed a Grade 1 HAPU on the heel on day 4 which progressed to Grade 4 on day 10. Surgical debridement was required on day 11. George's costs were further modelled assuming that he was managed using SOC3 and a heel HAPU was prevented.

Jane's care pathway includes anatomy-specific heel risk assessment using the device\* and does not develop a heel HAPU.

Prevention and treatment costs were estimated from published data for staff time, equipment, drugs and surgery, and applied to George and Jane's differing pathways according to the cost components consumed by each.

**Results:**

- Total costs for George (Grade 4 heel HAPU and surgical debridement) were £5137
- Total costs for Jane (HAPU prevented) were £332, a saving of £4,805
- Total costs for George where standard care prevented a heel HAPU were £211
- The major cost differences for George with a Grade 4 heel HAPU and Jane without were accounted for by HAPU treatment, in particular George's surgical debridement, additional nursing time and dressings

**Conclusions:** In this modelled scenario, a shift to prevention saves - use of the new technology as an adjunct to SOC is more effective and less costly than the current standard of care.

Investment in new technology as part of the prevention care pathway to prevent a heel HAPU led to overall cost savings of £4,805 for one single patient.

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### 2.1

## The effects of two pressure relieving support surface on the pathophysiological cascade of pressure ulcer development - A positron emission tomography (PET) study

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**Introduction:** To study the pathophysiological cascade of pressure ulcer development: deformation, inflammation and hypoxia.

**Methods:** Healthy volunteers (N=8) lie supine (crossover design) on either foam mattress or computerized, individually and precisely adaptive minimum pressure air mattress system (MPA). The region of interest (ROI) for PET was pelvic region soft tissues. Tissue deformation was studied with low energy CT scan together with positron emission tomography (PET) utilizing radiowater to examine blood flow in different tissues. Furthermore mattress-body contact area was measured in the beginning of the exposure on both mattresses. Subepidermal moisture (SEM) to investigate inflammatory reaction and temperature from the skin-mattress interface were also recorded among others.

**Results:** Discussion: Skin temperature reached about 1oC higher values on foam than on MPA (p<0.001). The body-mattress contact area was significantly smaller on foam than on MPA (p<0.001). The body contour remains unchanged (CT images) on the MPA compared to foam which induced 1-26% (p<0.001) lateral spreading of tissues indicating major tissue deformation and strain. PET results show complex, dynamic and unexpected blood flow changes deep in the tissues between the mattresses which are dependent on the pressure on ROI.

**Conclusions:** The results indicate that on the foam support surface both hypoxia and deformation thresholds may be exceeded while on the MPA support surface neither will take place. These results are in concordance with clinical results achieved in RCT with the MPA, where the PU development was prevented in critically ill patients (RR 0, CI 95% 0.00,0.42; p=0.0059, Takala et al 1996).

2.2

Can we establish a threshold pressure above which lymphatic activity is disturbed? Implication in pressure ulcer aetiology

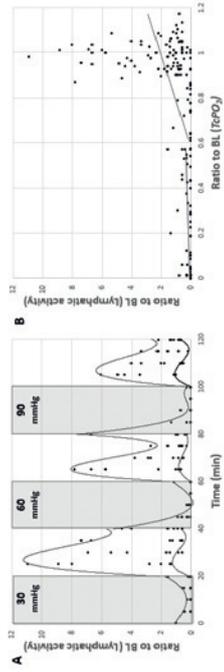
Hanneke Crielaard<sup>1,2</sup>, Cees Oomens<sup>2</sup>, Luciana E. Bostan<sup>1</sup>, Peter R. Worsley<sup>1</sup>, Dan L. Bader<sup>1,2</sup>

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**Introduction:** Several mechanisms have been implicated in the aetiology of pressure ulcers (PUs), including mechanical-induced ischaemia and impaired lymphatic flow. There are only few investigations of the latter, either using animal models [1,2] or, more recently, with human volunteers employing near-infrared (NIR) imaging associated with a dermal injection of fluorophore, Indocyanine Green (ICG) [3]. The present study extends the human study by examining the effects of different magnitudes of uniaxial loading on dermal lymphatic activity and its relationship with mechanical-induced ischaemia.

**Methods:** Participants were injected with ICG (micro-dose, 0.05% w/v). A delineated dermal lymphatic vessel in the forearm was selected and loaded using a curved-edged indenter at nominal pressures of 30, 60 and 90mmHg, each for 20 minute periods, separated by 20 minute unloaded periods. Video sequences of lymph activity proximal to the loading-site were recorded using NIR imaging<sup>\*</sup> before, during and after each loading condition. Transcutaneous gas tensions (Radiometer) of oxygen (TcPO2) and carbon dioxide (TcPCO2) were integrated at the loaded site to also investigate local mechanical-induced ischaemia. Parameters characterizing lymph activity were established using image standardised approach [3].

**Results:** Loading was associated with decreased incidence of directional drainage of ICG (Fig 1A). Recovery was achieved during unloaded periods, attaining elevated lymphatic activity values, particularly at the lowest pressure. There was a large intra-subject variation in lymph activity during unloading. Transcutaneous gas tensions revealed that increases in pressure resulted in a monotonic decrease in TcPO2 with, in some cases, associated increases in TcPCO2. In unloading, the TcPO2 returns to or even exceeds pre-loading values. A ~60% reduction in TcPO2 corresponded with reduced lymphatic activity (Fig 1B).



**Conclusions:** This methodology succeeded in simultaneously monitoring both dermal lymphatic activity and ischaemia. Findings reveal compromised lymphatic behaviour, even at the lowest pressure (30mmHg), contrasting with those from earlier animal studies, where lymph clearance increased at low cuff pressures [1]. Some association were observed between lymph activity and local mechanical-induced ischaemia, at a critical threshold for the latter. This study has provided additional insight into the behaviour of lymphatic vessels under mechanical loads, providing the basis to inform critical thresholds which can put dermal tissues at risk of damage. <sup>\*</sup> Fluobeam 800, Fluoptics

- References:**  
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2.3

Investigation of the in vivo passive mechanical properties of thigh soft tissues in healthy volunteers using a custom-made freehand ultrasound-based indentation set-up

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**Introduction:** In the prosthetics field, several computer models have been developed to try to predict mechanical loads at the interface between the residual limb of a person with amputation and the socket for different prosthetic designs and residual limb conditions. The results from FE models are very attractive and the potential benefits of improving the comfort of the residual limb–prosthetic limb interface are substantial for the life of the prosthetic limb user. However, currently several barriers exist to the clinical translation of these tools. Amongst these the application of subject-specific tissue material parameters is an important issue, recognizing that there will be inter-subject variations in many factors, including local tissue tolerance and fat content. This is especially common with diabetes and peripheral neuropathy and disuse-atrophy after amputation.

**Methods:** In this contribution, we propose an innovative, freehand, experimental setup coupled with inverse FEA to identify subject-specific constitutive material parameters of the soft tissues of the thigh. Force displacement data were collected from an ultrasound probe<sup>\*</sup> instrumented with a force sensor<sup>\*\*</sup> on 7 healthy volunteers lying in a relax state (fig 1a). For each subject, three acquisitions of ten loading/unloading cycles were acquired. From ultrasound images, an idealized geometry of the thigh was designed and a FE model was designed to simulate the biomechanical response of soft tissues during indentation (> 20 mm) with a first-order Ogden hyperelastic constitutive model. Constitutive parameters were calibrated against experimental curves using an iterative procedure.

**Results:** Average experimental and simulation curves of the force-displacement response for the seven subjects are provided in figure 1(b) below. The optimized values of the shear modulus and of the material constant were respectively  $1.06 \pm 0.03$  kPa and  $21.7 \pm 6.6$ .

**Conclusions:** Preliminary results obtained on 7 healthy volunteers are very promising and demonstrate the feasibility of using the custom-made ultrasound-based freehand experimental setup for the assessment of subject-specific constitutive material parameters of the soft tissues of the thigh in strain domains compatible with the use of prosthesis. Future work will include assessing the robustness of the method and investigating the impact of different configurations.

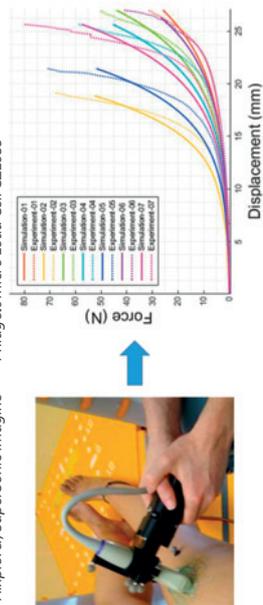


Figure 1 : (a) Stiffness assessment using an innovative, freehand, experimental setup composed of a force sensor mounted in series with an ultrasound probe (b) Experimental and simulation curves of the force-displacement response for the seven subjects

<sup>\*</sup> SL15-4-Explorer, SuperSonic Imagine <sup>\*\*</sup> Phidgets Micro Load Cell CZL635

## 2.4

## Evolution of cutaneous bacterial microbiota of pressure ulcers in patients with spinal cord injury

Catherine Dunyach-Remy<sup>1</sup>, Anthony Gélis<sup>2</sup>, Sophie Bastide<sup>3</sup>, Alex Yahiaoui<sup>1</sup>, Jean Philippe Lavigne<sup>1</sup>, Albert Sotto<sup>4</sup>

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**Introduction:** Bacterial species and their role in delaying the healing of pressure ulcers (PU) in spinal cord injury (SCI) patients have not been well described. The aim of this study was to characterize the evolution of the cutaneous microbiota of PU in SCI population using a metagenomic approach.

**Methods:** Patients presenting stage 3/4 PU were prospectively included between May 2015 to December 2016. For each patient, clinical data were collected. PU tissular biopsies were performed at baseline (D0) and 28 days after (D28). The PU were quantitatively and qualitatively analysed by metagenomics using 16S rRNA gene-based sequencing analysis of the V3-V4 region at baseline and D28 and interpreted with the clinical evolution of PU.

**Results:** 24 patients with 24 pelvic PU were included (15 males, 9 females; median age 62.5 years (31-89)). 12 PU were ischial (50.0%), 11 sacral (45.8%) and one trochanteral (4.2%). Most of PU belonged to stage III (66.7%). Analysis of the evolution of bacterial communities at D0 and D28 showed an increase of the Firmicutes phylum at D28 (76.3% (D0) vs 94.7% (D28)) and a decrease of the Proteobacteria phylum (22.7% (D0) vs 5.03% (D28)). This evolution is found whatever the clinical evolution of the wound (degradation/stagnation and improvement). The main bacterial genera present at D0 were Staphylococcus (30.8% of Firmicutes), Anaerococcus (24.0% of Firmicutes), Streptococcus (21.4% of Firmicutes) and Escherichia (88.8% of Proteobacteria). At D28, no evolution in bacterial genera could be noted except for Anaerococcus (3.04% of Firmicutes at D28). Interestingly, according to the clinical evolution, the association Anaerococcus and Finegoldia had a statistically higher relative abundance at D0 for wounds that have stagnated or deteriorated at 28 days (0.77% vs 4.98%, p=0.056 and 1.50% vs 53.89%, p=0.036 respectively). Moreover, at D28, Proteus were significantly detected in these worsened wounds (0.00% vs 32.02%, p=0.001).

**Conclusions:** This study shows that the association of Anaerococcus/Finegoldia could be a prognostic tool of the wound evolution and Proteus a marker of wound degradation. The knowledge of skin microbiota could represent an interesting tool to manage PU.

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## 2.5

## The influence of incontinence pad moisture at the loaded skin interface

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**Introduction:** Prolonged mechanical loading and local microclimate predisposes skin and underlying soft tissues to tissue damage, in the form of pressure ulcers (PUs). Exposure to moisture at the skin interface, commonly observed in individuals with incontinence, can lower the tolerance to mechanical loads [1]. As a result, maintaining moisture-free skin is an important issue for individuals at risk of PUs, with absorbent pads used in community and clinical settings to manage incontinence. The present study investigates the relative effects of dry and wet incontinence pads on skin physiology during periods of mechanical loading.

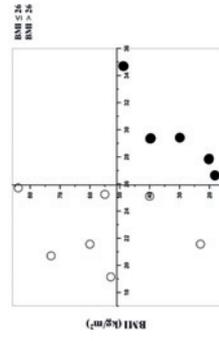
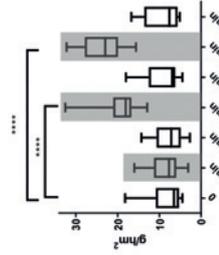
**Methods:** Twelve healthy participants were recruited to evaluate a single incontinence pad design [2] under three conditions involving dry pads and pads subsequently moistened at 50% and 100% fluid capacity. For each pad condition, pressure (9kPa) or pressure in combination with shear (3N) was applied to the sacrum (30 minutes), separated by periods of off-loading (30 minutes). A series of non-invasive methods were used to evaluate the physiological response pre- and post-mechanical loading, namely trans-epidermal water loss (TEWL) and inflammatory biomarker analysis [3].

**Results:** Results revealed no change in TEWL in the loaded dry pad condition (30 min data in Fig.1a). Dry incontinence pads provide some skin barrier protection during mechanical loading. When the pads contained moisture (90 and 150 min data), significant increases in TEWL were observed (Fig.1a). These increases were reversed during off-loading periods. Inflammatory biomarkers, specifically IL-1 $\alpha$ /total protein ratio, were up-regulated during dry pad loading, which recovered during off-loading. Loaded moist pads caused a significant increase in biomarkers, which remained elevated throughout the test period. Cluster analysis of inflammatory biomarker IL-1 $\alpha$  revealed some association with body mass index (BMI), namely an increased inflammation response for BMI  $\leq 26$  kg/m<sup>2</sup> (Fig.1b).

**Conclusions:** The study revealed a marked compromise to stratum corneum integrity when the skin was exposed to moist incontinence pads in combination with mechanical loads. These physiological changes were largely reversed during off-loading, highlighting the importance of regular changes of pads. Incontinence pads provided some protection in the dry state, although more research is required to determine optimal clinical guidance for their use. Close examination of data revealed clusters of individuals demonstrating an enhanced inflammatory response, associated with low BMI. Further investigation is required to assess the relative importance of this finding in a clinical setting.

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## 3.1

## Maintaining skin integrity in the aged: a systematic review update

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**Introduction:** Prevalence of adverse skin conditions such as pressure ulcers or xerosis cutis is high in aged care settings (1). Adequate skin care strategies are an effective method for maintaining and enhancing skin health in the aged (2, 3). A previous systematic review of 2013 found that the empirical evidence supporting skin care interventions is rare and is of high risk of bias. This update aimed to summarize the empirical evidence of effects and effectiveness of non-drug topical skin care strategies to maintain skin health and integrity in the aged, to identify outcome domains and outcome measurement instruments in this field.

**Methods:** A systematic review was conducted to update an existing systematic review of 2013. Databases MEDLINE and EMBASE via OvidSP and CINAHL were searched. Forward searches in Web of Science were conducted. Main inclusion criteria were primary intervention studies reporting treatment effects of basic skin care strategies in aged people with a lower limit of age of 50 years. Primary empirical studies were included with experimental study designs including RCTs and quasi-experimental designs. Methodological quality of RCTs was evaluated using the Cochrane Collaboration's Tool for assessing risk of bias. Level of evidence were assigned for all studies.

**Results:** Thirty articles were included in the final analysis reporting results about skin dryness, pruritus, general skin barrier improvement, incontinence-associated dermatitis, skin tears and pressure ulcer treatment and/or prevention. Most studies were of high risk of bias. Leave-on products containing humectants decreased skin dryness and reduced pruritus. Products with pH 4 improved skin barrier. Application of skin protectants and structured skin care protocols decreased severity of incontinence-associated dermatitis. Thirty-five outcome domains were identified with nearly 100 outcome measurement instruments.

**Conclusions:** Included studies showed substantial heterogeneity regarding design, interventions and outcomes. Basic skin care strategies including low-irritating cleansers and humectant-containing leave-on products are helpful for treating dry skin and improving skin barrier in the aged. Lower pH of leave-on products may have additional benefits. The number of different outcome domains was unexpectedly high. We recommend to identify critical outcome domains in the field of skin care to make trial results more comparable in future.

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## 3.2

## Development of a conceptual framework for the promotion of a systematic long-term follow-up of persons with a spinal cord injury : a patient-approach based on their skin experience

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**Introduction:** Long-term medical follow-up after a spinal cord injury (SCI) reduces frequency and severity of complications, notably pressure ulcers. We explored through a narrative approach the perceptions of persons with an SCI (PwSCI) in order to better understand their adherence to this follow-up. Our final aim was to build a conceptual framework representing follow-up and promotion of the long-term health of PwSCI from their point of view.

**Methods:** PwSCI who had completed their first rehabilitation period for > 1 year were particularly included with regard to two variables: 1 / with an actual medical follow-up or not and 2 / with a history of pressure ulcer or not. A review of the literature has led to the development of an inventory-table of items to be systematically addressed during interviews, which were prospectively analyzed. Thematic saturation was reached at 28 interviews, and 32 interviews were finally completed.

**Results:** We grouped the domains and sub-domains from the interviews according to the knowledge, attitudes, beliefs and practices developed by the participants concerning pressure ulcer, its prevention and the available medical follow-up. In the long term, the inductive and deductive analysis of our data led to the emergence of three main areas concerning participants' perceptions about issues of prevention and long-term medical follow-up: 1 / to establish one's own truth, 2 / to integrate different periods of life and 3 / to negotiate follow-up after an SCI.

**Conclusions:** The initial therapeutic education of PwSCI must involve mentors with SCI and be repeated throughout the life of patients to target their disposition to preventive programs at any point. We considered that the responsibility of the patient and the modulation of the follow-up both constituted the synthesis of major contextual factors interacting with promotion of PwSCI's health in the long term.

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## 3.4

## Body mass index and pressure injury prevalence

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**Introduction:** Pressure injuries (PI) are a significant clinical problem across all healthcare facilities, associated with poor patient outcomes, increased length of stay and healthcare costs. Immobility is a marked risk factor for pressure injuries in patients. Obesity decreases mobility in patients, increasing the risk for pressure injuries. This study aimed to determine whether PI prevalence was associated with levels of obesity.

**Methods:** The research design was a retrospective cohort study with data from cumulative electronic health records of patients. To assess the relationships among pressure injury prevalence and body mass index (BMI), patient data collected from January 2014 through December 2016 were obtained from the information warehouse of an academic medical center. 8,591 patients were included in the prevalence study. The study was approved by the appropriate institutional review board.

**Results:** Patients were classified into 5 BMI groups (underweight, normal weight, overweight, obese, and extremely obese). The prevalence of pressure injuries in the underweight and extremely obese groups was 9.3% and 7.2%, respectively. BMI associated with occurrence of pressure injuries in patients. Patients in the underweight and extremely obese groups had higher rates of pressure injuries than did patients in the normal weight or obese groups.

**Conclusions:** Underweight, morbid obesity is a significant risk factor for pressure injury development. Therefore, routine and formal assessment of BMI status is important to enable the identification of patients at high risk of pressure injuries.

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## 3.3

"I was more attentive thanks to my skin breakdown and also to my wife!": Impact of the social support on pressure ulcers prevention in spinal cord injured patients and on their adherence to systematic follow-up: a qualitative study

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**Introduction:** The impact of social support on preventive behaviors after a spinal cord injury (SCI), including medical follow-up, varies in the literature, whether this support is family, friendly and/or professional-based but methodological differences make it difficult to compare studies. Thus, we found useful to carry out a study based on semi-structured interviews, to try to better understand this social functioning and to explain linked variations concerning the prevention of secondary conditions in paraplegic or tetraplegic persons.

**Methods:** We combined a « top-down » approach from a literature review to build a guide for our interviews and a « bottom-up » approach by interviewing 32 persons with a spinal cord injury (PwSCI) who completed their first rehabilitation for > 1 year. The prospective analysis of their content was computer-assisted until saturation of our theoretical model. Codes were identified and categorized into domains and sub-domains related to social support and prevention (based on the risk of pressure ulcers and adherence to a long-term follow-up).

**Results:** Participants' social support had a significant role in pressure ulcers prevention. Reciprocity appeared to be protective and was expressed in various ways: common choices of couples when pre-existing to the SCI; well-defined roles for a couple formed afterwards; helping each other in PwSCI couples.... While a unilateral contribution appeared less protective: multiple activities of the couple managed by the spouse; occasional control of the skin, iterative reminders to order....

**Conclusions:** Manns and May described the perceived challenges within couples especially in the early period after discharge from first rehabilitation. King also reported the experience of PwSCI who took heart from prevention so as to avoid worry among their relatives. Self-management and the importance of empowerment, even associated with an active social support, have been well reported in several previous studies as major preventative factors for the recurrence of pressure ulcers.

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## 3.5

## Turning and positioning in aged care: the patient perspective

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**Introduction:** Turning and positioning immobile patients who are in bed can assist to prevent pressure injuries (1) and is an integral component of the care provided to patients of aged care (long term or nursing home) facilities. An understanding of the patient's experience of turning and positioning will assist to better understand the challenges experienced by patients and staff, and the contribution that patients can make to preventing associated pressure injuries. Aged care patients who are at risk of pressure injuries however are often unable to share their perspectives due to cognitive impairment and other conditions that impair their ability to communicate. The perspectives of aged care residents on turning and positioning are therefore highly valuable.

**Methods:** A case series study was conducted with aged care patients who were at high risk of developing pressure injuries and who needed full assistance to move and position when in bed. Participants were over 18 years of age, did not have cognitive impairment and were permanent residents in their aged care facility in Victoria, Australia. The study was approved by an ethics committee.

**Results:** The three patients (two female and one male) were 68 years of age on average. Turning and positioning was an essential activity from the patient's perspective, however one which caused them concern on account of perceived risks to their wellbeing and that of the staff providing their care. Patients described their level of confidence during turning and positioning, and the impact of device use on their satisfaction. Temperature and moisture management, when devices were in use for positioning, were rated as important factors for consideration with respect to device selection. Patients reported a range of benefits associated with effective positioning including less bodily pain, reduction in fear, and feeling more secure in bed.

**Discussion:** Understanding the perspectives of aged care residents on turning and positioning to prevent pressure injuries is essential to provide effective and acceptable care. The case series provides a means to understand the perspective of a stakeholder group that is difficult to represent in research and whose voices should be heard.

**References:**

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## 4.1

## Repositioning for preventing pressure ulcers: a systematic review

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**Introduction:** Pressure ulcers (PU) are common, costly and impact negatively on individuals. The primary cause for PU development is exposure to prolonged, unrelieved pressure related to decreased activity and mobility. Repositioning is a powerful and common PU prevention strategy, yet there is debate in the literature surrounding the use of repositioning in practice 1. The aim of this systematic review was to assess the effects of different repositioning regimens on PU incidence in at-risk adult individuals without existing PU.

**Methods:** Using systematic review methodology, we considered randomised controlled trials (RCTs), including cluster-RCTs, non-RCTs prospective, pre-post studies and interrupted-time-series studies. We specifically explored the impact of the frequency of repositioning, use of repositioning systems and use of turning teams. The search was conducted in January 2019, using PubMed, CINAHL, SCOPUS, Cochrane, and EMBASE databases, and returned 530 records, of which 15 met the inclusion criteria. Data were extracted using a pre-designed extraction tool, and analysis was undertaken using computer system\*.

**Results:** Most studies were conducted in intensive care units (50%). The mean sample size was 628.28±605.04 participants. Nine studies explored the frequency of repositioning, PU incidence was 8%, 221/2834, for more frequent repositioning, versus 13%, 398/3050 for usual care. The Odds Ratio (OR) = 0.75 (95% CI: 0.61-0.90, p=0.03), suggesting that there is a 25% reduction in the odds of PU development in favour of more frequent repositioning. Three studies explored use of a repositioning system. PU incidence was 2%, 17/865, for use of a repositioning system, versus 5.5%, 51/926 for usual care. The OR = 0.41 (95% CI: 0.23-0.73, p=0.002), suggesting that there is a 59% reduction in the odds of PU development when a repositioning system is used. Two studies explored use of turning team. PU incidence was 11%, 22/200, for use of a turn team versus 20%, 40/200 for usual care. The OR = 0.49 (95% CI: 0.27-0.86, p=0.01) suggesting that there is a 51% reduction in the odds of PU development in favour of use of a turn team.

**Conclusions:** The results of this systematic review indicate that more frequent repositioning, repositioning system and turn team reduce PU incidence.

\*RevMan

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## 4.2

## Understanding the barriers and eliminating the gaps towards sustainable reduction of hospital acquired pressure injuries

**Marilou Mendoza<sup>1</sup>**

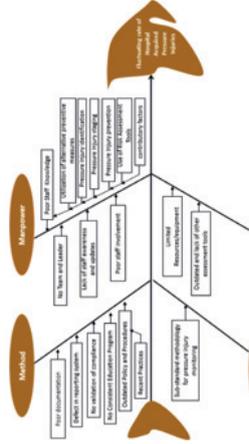
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**Introduction:** Hospital Acquired Pressure Injuries (HAPI) are common challenges in most of healthcare settings. Our organization is guided by policies and procedures regarding Management and Prevention of Pressure Injuries. Our monthly rates on the first 9 months of 2017 has challenged us to review, find the gaps and modify our practices towards pressure injury prevention. Majority of our HAPI incidences documented then were from ICU (56%) and adult in-patient units (Medical-Surgical), 34%.

**Methods:** A PDCA project was tailored. Current practices and gaps were reviewed using fishbone analysis then were clustered to Method, Manpower, Measurement and Material.

A team was created (CNO, Wound Care Specialist Nurse, Link Nurses, Clinical Resource Nurses, and Quality Management). Staffs' view towards pressure injury prevention was assessed. Series of staff education took place regarding skin and wound care; pressure injury staging, prevention and use of assessment documents. Policies and procedures and methodology in HAPI rate monitoring were revised with emphasis in the process of incident reporting of skin injuries which is now coordinated between Quality Management and Wound Care Specialist. Quarterly Pressure Injury Prevalence Survey was also initiated to ensure evidence-based practices are applied. Unit appreciation with 0% HAPI on monthly basis was also initiated. HAPI monthly rate was made visible in our quality dashboards available in all nursing units to update our staffs with the current status of HAPI prevention. With our continuous effort to enhance the prevention of HAPI in the facility, the yearly analysis of our incidences is now used to direct our pressure injury prevention projects each year.

**Results:** Our modified process towards pressure injury monitoring and prevention has achieved sustained monthly rates of below 0.5 per thousand patient days for the past 18 months (October 2017 to March 2019) with 42% decreased of average rate in 2018 (0.21%) compared with 2017 (0.36%) HAPI rate.



**Conclusions:** HAPI prevention does not end after each prevention activities. It is a continuous process in a healthcare system as causes varies and the main component of its prevention is continuous awareness that it can exist anytime. Most pressure injuries are preventable. However, the success of reducing the incidence of HAPIs does not rely merely on nurses checking the skin and turning the patient but needs an interdisciplinary approach with a positive attitude to prevention and maintaining both the patients' and healthcare professionals' awareness of the cause and prevention.

## 4.3

## First do no harm? An examination of necessary hospital devices and the development of hospital acquired pressure injuries

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**Introduction:** Hospital acquired pressure injuries are a preventable harm that can lead to pain, disability and death for some patients; and reputational damage and revenue loss for health services. Pressure injury risk assessments assess for intrinsic patient factors such as sensation, or independent mobility; and root causes analysis (RCAs) identify knowledge, practice and procedural gaps. A review of the Royal Melbourne Hospital's Hospital Acquired Pressure Injuries (HA PIs) showed that necessary medical devices prescribed to prevent falls, VTEs or was critical for life saving (e.g. Oxygen therapy) was the identified cause of many of the HA PIs. Much of this equipment could not be removed without creating new risks for the patient.

**Methods:** A review of the electronic incident logs from, 1 July 2017- 30 June 2018 was undertaken and proportions were calculated for PI characteristics and mechanisms of injury ie. Device used. PIs that were deemed to be IAD on reviewed were excluded from the data.

**Results:** P42 % (n=223) of the HA PIs were directly caused by prescribed medical equipment. The 2 largest categories of risk were VTE prophylactic stockings 35% of medical device related injuries (n=78) and 14% of all pressure injuries; and airway management and oxygen therapy 33% of medical device related injuries (n=74) and 13% of all pressure injuries. Overall, medical devices are twice as likely to result in significant harm (i.e. Stage 3, stage 4, unstageable or suspected deep tissue injury) 20% (n=49).

**Conclusions:** The results at the Royal Melbourne Hospital suggest that HA PIs are a larger clinical issue than previously identified in the literature (Black et al, 2010). Further research is needed to identify which patients; types of equipment or materials are most likely to cause a HA PI. Additionally, work is needed to determine if these PIs are preventable and provide decision and prescribing support to clinicians on commencing, or ceasing devices based on the risks and patient goals of care.

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## 4.4

## Structures and processes in hospitals for pressure ulcer prevention in general and in A&amp;E departments

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**Introduction:** Despite numerous efforts to introduce and implement specific structures and processes regarding pressure ulcer prevention, the prevalence of pressure ulcers remains high. These structures and processes are recommended in national and international guidelines, but it is not clear, if these are actually used daily hospital care routines. This empirical study addressed this issue to give an insight about which structures and processes for pressure ulcer prevention in hospitals in General and in A&E Departments is currently performed in Germany?

**Methods:** We conducted a cross sectional survey with all hospitals in Germany (ca. 1.500). In every hospital the head of nursing was invited to provide information via on a two page standardized questionnaire, about the structures and processes of pressure ulcer prevention in General and in A&E Departments which are currently performed in their hospital.

**Results:** 276 questionnaires could be analyzed. Regarding structures in general, 2/3 of hospital have at least on person assigned for pressure ulcer prevention. More than 95% of these persons are nurses. Although more than 90% of all hospital comply pressure ulcer related SOPs, in about 27% of all hospital, no regular audits are performed. Regarding processes: 30 degree positioning is performed very often (68%) and often (20%), non-powered special surfaces are used very often (54%) in comparison to powered special surfaces (22%). In A&E departments only 1/3 are having a specific guideline for pressure ulcer prevention

**Discussion/ Conclusion:** The results indicate that not all hospitals in Germany do have institutionalized structures for pressure ulcers prevention, which may cause non regular audits. In A&E, pressure ulcers guidelines are very uncommon, therefore the risk of pressure ulcers for patients admitted via A&E remains high.

## 4.5

## A three-step approach to reduce the prevalence of pressure ulcers and improve patient care - engaging all levels at a large university hospital

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**Introduction:** The prevalence of pressure ulcers (PU) is used as a quality indicator worldwide. Our hospital has conducted PU prevalence studies according to the EPUAP methodology since 2002 (Vanderwee et al., 2007). In 2012, annual national PU studies were introduced as part of a national patient safety initiative. The PU prevalence figures in our university hospital have been approximately around 16%. However, in March 2018, our hospital had the highest PU prevalence in the country (25.1%). An intensified quality improvement program was initiated on all levels in the organization. The aim is to describe the quality improvement program during 2018/2019 led by the quality department.

**Methods:** The quality improvement program was organized in macro, meso and micro levels.

**Macro-** Goals and action plan decided by hospital board and politicians on a regional level, including reporting PU prevalence three times/ year.

**Meso -** PU rounds conducted by Quality department. Inventory of mattresses (type and quality). Focus on documentation and skin inspection at admission. Seminars for PU nurses.

**Micro -** Daily huddles regarding hospital acquired PU.

**Results:** The PU prevalence figures were reduced to 11.7% (August 2018), 9.5% (December 2018) and 14.1% (March 2019). Hospital acquired PUs were reduced from 22.4% to 9.1% (March 2019). The estimated cost savings were approximately 1 million euros.

**Conclusions:** It is crucial to engage all levels in the organization in PU prevalence. Feedback of outcome is important in creating a desire to change.

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## 5.2

## Mechanobiology inspired approaches to prolong the safe time in immobile positions

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**Introduction:** Pressure ulcer (PU) prevention is the only effective strategy for decreasing the associated morbidity, mortality and healthcare costs including treatments. PUs occur in subjects with transiently or permanently deficient neuro-alarm mechanisms and/or lacking ability to alleviate localized mechanical loads in soft tissues. Those loads cause focal, sustained mechanical deformations (strains) and stresses that structurally damage cells, eventually causing their death. Such microscopic injury may progress to the macroscopic tissue-scale [1]. We have developed mechanobiology-inspired approaches to prolong the safe-time in an immobile position e.g. during planned surgery, by reducing cell damage and preventing initial stages of PU formation under sustained bodyweight or external (e.g. medical device-related) forces.

**Methods:** Cells were grown in vitro on an elastic substrate, then stretched to varying levels (catastrophic/gradual damage or non-damaging) using a 3D-printed cell-stretching apparatus [2]. We evaluate plasma-membrane permeability (cell-damage marker) through cell-uptake of small, fluorescently labelled dextran (4kDa). Representative cell types (murine NIH3T3 fibroblasts and C2C12 myoblasts, respective models for skin and deep tissues) are stretched to damaging-level strains (12%) for 4 hours. We evaluated changes in cell damage under pre-treatment with increasing levels of sodium pyruvate (NaPy). Concurrently, we evaluated combinations of NaPy with non-damaging-level stretches on cell migration rates and kinematics [3] during closure of locally induced micro-damage in cell monolayers.

**Results:** We show that NaPy pretreatment, before onset of damaging-level strain (12% stretching load), significantly reduced the strain-induced, plasma-membrane permeability that can lead to loss of cell homeostasis. Concurrently, we demonstrated that closure of micro-scale gaps, an initial stage of PU formation, can be accelerated by combining externally applied, low-level (non-damaging) 3-6% strains [4] with the NaPy pre-treatment [5].

**Conclusions:** We experimentally show that NaPy pre-treatment allows cells to dynamically resist damage from sustained-deformations, reducing initial cell-damage [6]. Combining NaPy with low-level non-damaging stretching can accelerate closure of micro-scale gaps that may form due to initial-stage damage. The NaPy and mechanical stimulation applied synergistically may delay onset of PUs by averting loss of cell homeostasis and by accelerating closure of microscale gaps.

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## 5.1

## PRESDIE - concordance study of continuous recording of the sitting pressures of people with a spinal cord injury by an embedded device

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**Introduction:** We report the final results of the « Prévention des Escarres par un Dispositif Embarqué » (PRESDIE) concordance study. Up to 85% of persons with a spinal cord injury (PwSCI) develop at least one pressure ulcer in their lifetime and 7 to 8% may die because of this secondary condition. Data from the literature also demonstrated that the incidence and prevalence of pressure ulcers are still high and not reducing. Therefore, prevention remains a challenge. The main aim of this study was to assess the concordance between the continuous recording of sitting pressures measured by the embedded device TexiCare, a 100% sensor-matrices knitted textile, and subject-dependent pressure parameters in everyday activities.

**Methods:** The PRESIDIE study included 90 subjects using a manual wheelchair, from 3 SCI-specialized French departments, that respected the a priori calculated number. The follow-up duration was of 28 days, with a comprehensive overview of the daily habits of PwSCI. Clinical and electronic data were analyzed during this period. We carried out a weekly in-site control, including an inspection of the pelvic skin status, the collection of data recorded by the TexiCare central unit and, in parallel, those recorded by the participants in their personal diaries concerning « remarkable events » that might have changed sitting pressures in their everyday activities.

**Results:** 83% of the PwSCI presented a motor-complete SCI. One pressure ulcer (grade 1) event occurred during the study. The durations of discharge after transfers of various "types" (toilets, shower, car or bed), estimated by TexiCare pressure data, appeared consistent with the nature of the corresponding activities through the annotations in the subjects' diaries. We found a correlation between mobility features collected by the device and the motor score according to the ISNCSCI: both the minimum ellipse (containing 95% of the day's pressure centres) and the distance covered by this pressure centre during the same period were positively correlated to the motor score (Spearman and Kendall test;  $p < 0.05$ ).

**Conclusions:** PRESIDIE was the first study that confirmed on a significant cohort and an adapted follow-up period the concordance between continuous pressure recording and clinical data. Such clinical data involved subjects SCI-specific information but also data describing everyday activities. The embedded device TexiCare could provide dynamic essential data to PwSCI and, consequently, the PRESIDIE team is now considering a larger-scale trial to validate feedback information from continuous recordings of pelvic pressures in our targeted population.

## 5.3

### Bacterial fluorescence imaging guides pressure ulcer wound assessment, wound bed preparation, and treatment plan in a multi-centre clinical trial

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**Introduction:** Wound assessment is paramount for understanding the wound bioburden and the decisions a clinician must make re: wound bed preparation and treatment plan. Point-of-care fluorescence imaging visualizes bacteria at moderate-to-heavy loads ( $\geq 104$  CFU/g) in real-time<sup>1</sup>. The potential of this imaging device\* to guide wound assessment and wound care decision making was assessed as part of a prospective, multi-center clinical trial (NCT03540004).

**Methods:** 350 chronic wounds (138 DFU/106 VLU/22 PU/60 SSI/24 other) were assessed by 20 clinicians across 14 trial sites. Patients  $\geq 18$  years of age presenting at an advanced outpatient wound care clinic with a wound of unknown infection status were eligible. This analysis highlights the subset of 22 patients that presented with a pressure ulcer (9 sites). Wounds were assessed for presence/absence of clinical signs and symptoms of infection (CSS+/CSS-) based on IWV guidelines<sup>2</sup> and a detailed treatment plan was recorded. Fluorescence images (FL) were then acquired and clinicians determined whether bacterial fluorescence was present (FL+) or absent (FL-). Treatment plan could then be modified based on fluorescence information. A questionnaire assessed whether fluorescence images guided wound assessment, wound bed preparation, and treatment plan.

**Results:** Only 9% (2/22) of pressure ulcers and 14% (48/351) of all study wounds were CSS+, yet fluorescence indicative of bacteria at moderate-to-heavy loads was identified in 68% (15/22) of pressure ulcers and 50% (176/351) of study wounds. Clinicians reported that fluorescence information was useful in 86% of pressure ulcer assessments. Fluorescence information changed the clinician's overall assessment in 39% of study wounds (59% of pressure ulcers (13/22)); this included 92% of CSS-/FL+ patients and 50% of CSS+/FL+ patients, demonstrating benefit of bacterial localization even in CSS+ wounds. Wound bed preparation was guided in 82% of pressure ulcers. Clinicians reported that fluorescence images guided sampling location (50% of wounds), debridement (55%), debridement (64%), treatment selection (82%), antimicrobial decision making (50%), and wound documentation (55%). These pressure ulcer data mirrored that of the larger 350-patient trial.

**Conclusions:** Results demonstrate widespread utility of fluorescence imaging in the assessment, wound bed preparation, and treatment of wounds. Utility was observed across fourteen sites, all study wound types, and multiple aspects of wound care. These data support incorporation of fluorescence imaging, and the information it provides on the presence and location of bacteria at moderate-to-heavy loads, into the standard of care for assessment of chronic wounds.

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\*Moleculight i:X

## 5.4

### Using pressure ulcer risk assessment linked monitoring tool to reduce hospital acquired pressure injuries

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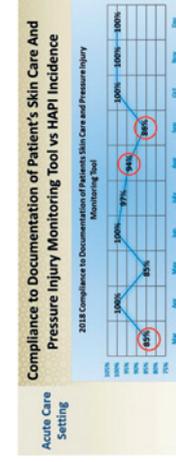
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**Introduction:** Various Pressure Ulcer Risk Assessment tools are now available and widely used to predict the patients' risk of developing pressure injuries. With the utilization of risk assessment tools, incidences of Hospital Acquired Pressure Injuries (HAPI) still exists. Three different tools according to patient's age group (Braden Scale, Braden Q and NSRAS) are used. We identified our challenges as how to link the assessed risk with preventive measures; how to ensure that continuous preventive measures are implemented to prevent HAPIs and how to engage the staffs towards accountability and liability regarding occurrence of HAPIs.

**Methods:** A tool (Patient's Skin Care and Pressure Injury Monitoring Tool) was developed in 2014 in a rehabilitation facility in Saudi Arabia initially with an aim to document interventions according to identified problem in the risk assessment tools sub-scale. Interventions per sub-scale that makes the patient risk requires documentation in the tool to provide information regarding preventive measures delivered. Revision was made after 3 months of piloting as risk assessment tools used cannot predict the pressure injury risk of patients with medical devices wherein some of our patients developed medical device related pressure injuries. By default, we consider patients with medical devices attached to skin as at risk and interventions for medical device skin care were added. To ensure that the patient's skin is condition is re-assessed and properly handed over between shifts and/or units during transfer, the tool requires acknowledgement of the receiving nurse regarding patient's skin condition.

**Results:** The tool was initially and is currently used in a rehab facility. It was also introduced in 2018 to an acute care setting in United Arab Emirates and has contributed to reduction of HAPIs in both facilities. During the piloting, compliance to its usage was monitored and compared with the occurrences of HAPI incidences. The result of non-compliance somehow correlates to occurrence of HAPI incidences in certain months. The tool is useful during document review when HAPI incidence occurs as it provides information regarding interventions provided and in which shift does it occurs. Therefore, strict compliance to its usage was emphasized in our pressure injury prevention and management policy and procedures.

**Conclusions:** Risk Assessment Tools alone cannot prevent the occurrence of pressure injuries. Careful assessment of its applicability in the clinical setting plus innovative steps on how to utilize the tool effectively are essential.



## 6.1

## Sex-specific differences in pressure ulcer prevention in hospitals: a secondary data analysis

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**Introduction:** Empirical evidence suggests that sex has major impacts on staying healthy, becoming ill, or care dependent. Gender and sex needs to be adequately taken into account while developing and implementing evidence-based medicine and healthcare. In institutional care settings, nurses are responsible for providing care to care dependent patients/residents (2). Evidence regarding possible sex differences in nursing care processes of nursing care receivers especially for pressure ulcer prevention strategies or care of subjects with pressure ulcers is lacking. The aim of this study was to investigate possible sex-specific differences in care in patients at pressure ulcer risk and with hospital-acquired pressure ulcers (HAPUs) category 2 to 4.

**Methods:** This was a secondary analysis of the data of the annual prevalence surveys of nursing care problems in patients in hospitals conducted in Germany. Nurses in the hospitals performed data collection after they were instructed using standardized data collection forms. Demographic, functional and health variables were documented and analyzed. Datasets from 2001 to 2016 were included and the individual files were merged into one single electronic file. Descriptive statistics were used to describe group differences.

Results: In total, n = 58,760 subjects were included in the final analysis. About 54% were females. The proportion of females at PU risk was higher compared to males (21% vs. 18%). Whereas more males were affected by hospital-acquired pressure ulcers (HAPUs) category 2 to 4 than females (2.3% vs. 2.0%). There were only minor sex-specific differences in preventive measures in subjects with PU-risk, but in subjects with HAPUs preventive measures were more often applied in males, e.g. positioning (40.8% vs. 44.5%), counseling of relatives (13.8% vs. 23.1%), heel protections (15.6% vs. 17.1%) and alternating pressure mattresses (24.3% vs. 29.4%).

**Conclusions:** This study used a large sample to describe sex differences in hospitals regarding pressure ulcer prevention and development. The results indicate that there are differences in nursing care between male and female care receivers. More females are at risk to develop pressure ulcers whereas more males develop HAPUs. These differences might be explained by sex related differences regarding pressure ulcer prevention.

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## 6.2

## The effect of standard training module on pressure injury classification and wound dressing decisions of health care professionals

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**Introduction:** It is an important problem of health care professionals to stage pressure injury (PI) correctly and to choose proper wound dressing. In this study, it was aimed to investigate the effect of standard training module on PI staging and wound dressing choices of health care professionals.

**Methods:** This descriptive study was conducted with health care professionals who participated "Wound Management Course" at Koç University Semahat Arsel Nursing Education and Research Center, which was accredited by American Nurses Credentialing Center between December 2017 and November 2018 (n=53). Data were collected with "identifying characteristics form", "questionnaire" examining participants' knowledge on PI, and "posters" which includes cases about PI staging and wound dressing choices. 2016 NPUAP Pressure Injury Staging System and 2014 NPUAP Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline were used to prepare questions and pictures in posters. Data collection forms were given the participants twice, one of which before the training module as a pre-test, and the other after completing the training as a post-test. Training module included PI staging, treatment, wound dressing, discussions about real cases chosen from clinical practice and demonstration of wound care dressings. Descriptive statistical methods were used to analyse data.

**Results:** Of the total, 75.5% of participants were nurses and 56.6% of them had bachelor's degree. Mean grade of participants' knowledge was 43.94±12.29 over 100 in pre-test, and 63.32±11.42 in post test (p<0.001). Participants correctly diagnosed PIs in posters with 50% accuracy in pre-test and with 92.0% in post-test (p<0.001). Participants chose correct dressings for PI with 17.0% in pre-test poster evaluation, while they chose correctly with 36.0% in post-test (p<0.001). 75.0% of participants correctly diagnosed Stage 1 PI and 92.0% of them misdiagnosed Unstageable PI in pre-test. 42.0% of participants confused Stage 3 and Stage 4 and misdiagnosed them as each other in pre-test. In pre-test, participants made the correct dressing choices for Deep Tissue PI with 42.0% accuracy while they made wrong dressing choices for Stage 3 with 94.0% error. In post-test, participants correctly diagnosed these three stages, Stage 1, Stage 4 and Deep Tissue PI with 98.0% accuracy. Participants misdiagnosed Stage 3 and Unstageable PI as each other with only 11.0% in post-test. Similar to pre-test results, 98.0% of participants failed to make correct dressing choices for Stage 3.

**Conclusions:** Standard training module improved knowledge and decision-making abilities of health care professionals with regard to PI staging and dressing choices.

## 6.3

## Atypical PU topography in pediatric disabilities and rare diseases. Customize and properly tailored prevention of pressure injuries

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**Introduction:** Topography of pressure ulcers is related to patient's anatomy. This is explained by the different directions of vectors representing forces as pressure and shear acting on skin. Anatomical distribution of pressure ulcers varies accordingly to growth due to the different body proportions typical of each age. In patients presenting changes of anatomical proportions and shapes, as those affected by congenital malformations, rare diseases or acquired disabilities, the expected topography of pressure injuries can be subverted and prevention protocols, result inapplicable or ineffective. Authors here suggest customized measures for patients at risk, to prevent the onset of atypically distributed pressure ulcers.

**Methods:** Since 2015, inpatients and outpatients aged 0-18 at our institution presenting with malformations, rare diseases or disabilities were included in the study. Anatomical peculiarities as skull abnormalities, variation of neck mobility, spinal curvatures, limbs shapes, muscular tone, mobility variation, obliged positions, hyposenstivity, muscular hypotrophy, BMI, fecal or urinary incontinence were considered as risk factors. Wheel chairs, casts and other supporting surfaces were periodically checked for conformity considering needs of a growing body/changes required by increasing or worsening deformities. After patient's assessment, caregivers and attending nurses were formed on patient's specific risk factors and tailored preventing program. Main pathologies, expected changes and surgical procedures discussed together with referring specialists and devices promptly readapted in collaboration with orthopedic technicians. Preliminary results on rates and outcome of pressure ulcers in patients at risk are evaluated.

**Results:** 698 patients have been included in the study in a 3 years period. In 2015, 97% of patients already presented at least one PU at the moment of enrolment, in 2018 the number of patients still preserving skin integrity raised to 23%. 88% of Patients presented macroscopic anatomical abnormalities, 93% presented impaired mobility at the moment of inclusion, 68% were scheduled during acute episode of disease, 43% of patients developed worsening conditions during the study, 95% of bodies were in contact with medical devices of whom 76% were considered inappropriate.

**Conclusions:** The prominent role of head-to-toe clinical examination as well as the multidisciplinary team is mandatory for a prompt identification, prevention and treatment of PU in children with a biometry impairment. The Team evaluation of the postural pattern and the counseling with parents are fundamental for early detection. Preventing atypical pressure injuries means to preserve a rehabilitative program without delays.

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## 7.1

## Improving prevention and treatment of incontinence associated dermatitis in onco/onco-haematological children

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**Introduction:** Incontinence-associated dermatitis (IAD) in pediatric population has a different etiology respect to adults. Incontinence is a physiologic issue up to 3 years of age, in older children is always related to comorbidities, disabilities or acute phase of diseases. We focalized our attention on a specific type of IAD, resulting from faecal alterations (diarrhea, coupled to fecal incontinence) due to chemotherapeutic treatment causing mucositis or microbiota alterations in onco-haematological children (OH). This project is aimed at improving knowledge, prevention, outcomes infectious complications of IAD in OH children.

**Methods:** Since 2017, children aged 0-18 affected by OH diseases at our institution, were enrolled in an observational study by a multidisciplinary team. Children were divided in different groups according to their diseases. Timing of chemotherapy administration and onset of stool alterations were recorded on a specific medical format. Before the onset of stool alterations, we applied to Perianal- genito perineal area (P-GP) an advanced skin protectant (ASP)\*. Children affected by a late stage of disease or already having a P-GP lesion at admission were considered not eligible. All children were screened for IAD by trained WOC nurses since admission, joined by plastic surgeon at day 4 after chemotherapy administration. A task force monitored P-GP area in OH patients undergoing chemotherapeutic treatments. Since admission, all caregivers were educated to prompt communicating any skin changes due to diarrhea. Faecal specimens, blood sample were collected and microbiologically analyzed.

**Results:** In 18 months, 1921 OH patients have been observed: 47 cases (2,4%), developed G-PG erythema without a spontaneous remission. Of these 96% completely responded to ASP prevention treatment, with a complete skin healing. In 84% of cases, ASP have been used for prevention. Data furnished by our microbiological monitoring center, reported as MDR infections (Pseudomonas A., Klebsiella P.) in OH patients decreased from 6.6% (2017) to 2.5% (2019).

**Conclusions:** ASP introduction improved IAD natural evolution: no wet necrosis, no deep enteric fistula, no surgical debridement required, nor IAD related sepsis reported. Preventing development and worsening of wounds affecting the P-GP area counteracted the dissemination of faecal bacteria into blood stream and septic consequences.

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\*CAVILLON ADVANCE 3M<sup>®</sup>

## 7.3

## Risk factors associated with the development of postoperative pressure ulcers in adult surgical patients: a systematic review and meta-analysis

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**Introduction:** This study originated from the awareness of a lack of a systematic approach to prevention and assessment of pressure ulcers in surgical patients in our practice. Patients undergoing surgery under general anesthesia are at increased risk of developing pressure ulcers, as they are immobile and unable to change positions. Pressure ulcers attributable to surgical procedures are therefore not uncommon and a threat to patient safety. In the perioperative environment, many factors are suspected to increase a patient's risk of developing perioperative pressure ulcers. In order to prevent surgical related pressure ulcers, it is important to identify these risk factors. To date, no published literature summarizing the risk factors related to pressure ulcer risk in adult patients undergoing surgery under general anesthesia has been published. This study aim to summarize the current published data on perioperative risk factors associated with developing pressure ulcers in adult patients undergoing surgery under general anesthesia.

**Methods:** A comprehensive data base search was performed. All studies reporting on risk factors associated with the development of surgery related pressure ulcers in adult patients undergoing surgery under general anesthesia were included. Data were extracted from all articles and meta-analysis was performed when three or more studies reported on a specific variable. Ten meta-analyses were performed

**Results:** The analyses identified six factors statistical significant associated with the development of pressure ulcers. These were: cardiovascular disease, respiratory disease; diabetes mellitus; longer duration of surgery; low hemoglobin and male sex. Factors not found to be associated were; low s-albumin; use of vasopressors during surgery; use of corticosteroids and older age.

**Conclusions:** We recommend that cardiovascular disease, respiratory disease, diabetes mellitus, hemoglobin and duration of surgery should be taken into consideration when trying to prevent pressure ulcers in surgical patients and that extra caution should be taken in relation to positioning these patients.

## 7.2

## Double prevention strategy: preventing skin breakdown in operative settings in children

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**Introduction:** Maintaining skin integrity in hospitalized complex children, undergoing surgical procedures is challenging but mandatory. We focused our attention on pressure ulcers related to operating settings and recovery in critical areas. Patients undergoing long-duration surgical procedures because of mandatory forced position, are more prone developing pressure ulcers and friction-shearing injuries. Added risks are represented by assisted mechanical ventilation coupled to a precarious metabolic balance, both in the operating room and in the ICU, likely to be altered by repositioning manoeuvres. Acquiring a pressure ulcers during the operating time will add comorbidities, limiting rehabilitation procedures, increasing Hospital length of stay and costs.

**Methods:** A cohort of pediatric inpatients aged 0-18, presenting any comorbidities and diseases, admitted to any department of our institution, undergoing long duration surgical procedures (LDSs)\* is included in this interdepartmental quality improvement project. Educational work team is created. The interventions consist in seriated skin checks, evaluation of patient/procedure's risk and application of the double preventing strategy (DPS): the combined use of a fluidized positioners and adherent foam placed to protect devices and risky areas previously detected. The control group is composed by a cohort of historical pediatric inpatients undergoing LDSs in a pre DPS era, homogenous in composition of diseases as percent and ages to study group. Very complex and unique patients are excluded from the final analysis when no historical corresponding is available. Stratification of patients is performed according to age, stage, comorbidities and duration of surgical procedures. Data are acquired during 3 different phases of hospitalization (pre-operative, intraoperative, post operative) and in 3 different settings (Sending pre-op Units, Operatory Blocks, Receiving post op Units). All the data are recorded on a dedicated chart that follows the child from hospitalization to discharge. The chart is filled by Team's WOC nurses belonging to all four Departments during the pre-op and post op phases, by OR nurses during surgery. OR risk is evaluated pre-operatively according to a Braden QD modified scale (OPBG OR risk scale).

**Results:** In 6 months of application, 67 children were considered eligible, average 6,2 years. The incidence of pressure injuries following LDSs passed from 19,5% (pre DPS era) to % 4,5% (DPS era).

Conclusions: Preliminary results state DPS application in children is effective on pressure ulcers prevention in surgical settings.

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Age	Surgery duration
<1	> 1 or 1½ hour
0-3 years	>3 hours
3-10 years	>5 hours
10-18 years	>8 hours

\*\*Patients presenting comorbidities as prematurity, very low or BMI (<16), obesity (>30), hemodynamical instability, very low saturation (< 90 pO2), ECMO, skin diseases (GVHD, HVGSD acquired post-septic skin disorders, pre-existing pressure ulcers, are considered at major risk if undergoing surgery lasting more than 1 or 1½ hour.

## 7.4

### Prevalence and associated factors of pressure injury in cardiology intensive care unit patients.

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**Introduction:** Pressure injury (PI) is one of the most prevalent adverse events in the intensive care unit (ICU) highlighted due to its multifactorial etiology<sup>1</sup>. Intrinsic and extrinsic factors are associated with the development of PI in critical patients<sup>1,2</sup>. Considering that critical patients are highly vulnerable to the development of PI and that these injuries involve specific risk factors, this study was conducted to identify the PI prevalence and associated factors in cardiology ICU patients.

**Methods:** This is a cross-sectional study held over in a single day (on May - 2018) in two public cardiology hospitals located in São Paulo, Brazil. The data were collected by skin inspection of patients and by consulting their medical records. A PI risk assessment was carried out using Braden scale<sup>3</sup>. The PI was classified according to NPUAP 2016 classification<sup>4</sup>. The data were analyzed using descriptive statistics, univariate and multivariate analyses (Classification and Regression Tree - CART). The study was approved by the Research Ethics Committee of the hospitals.

**Results:** The sample consisted of 123 patients, mean age 59.8 years old (SD 15.4), with predominance of male (123/52.1%). In total, 51 patients had PI, resulting in a global point prevalence of 41.46%. The mean score of the Braden Scale was 14.02 (SD 4.03), indicating a moderate risk for the PI development. Most of PI were in stage 2 (10/23.3%) and located in sacral (27/38.02%) and heels (12/16.9%). According to the CART analysis, three factors were observed that better identified the group with PI: patients using moisturizing creams, with a Braden score <17.5 and a systolic blood pressure <134 mmHg.

**Conclusions:** This study was related to the epidemiology of PI in cardiology critical patients. The found results can facilitate the planning of specific preventive care for these patients.

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## 7.5

### Reducing pressure ulcer (PU) incidence through introduction of new technology

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**Introduction:** PUs are costly, largely preventable "never events". Risk Assessment tools (RAT), and clinical strategies to prevent PUs have been developed however, preventable PUs still occur. RATs are reported to have low predictive value<sup>1</sup> and do not always lead to effective prevention<sup>2</sup>. A new device\* uses biocapacitance to alert to an increased risk of PUs 5 days (median) before changes are visible on the skin<sup>3</sup>. A PU reduction programme (PURP) was conducted to determine the impact in the real-world setting.

**Methods:** 15 facilities (14 Acute Care (AC), 1 Hospice Care (HC)) in 5 countries participated. PU incidence for comparison was extracted from historical records before the device\* was introduced, and from PURP records after introduction.

The device\* was used on 1014 patients in AC and 146 patients in HC. Patients were scanned daily on the heels and sacrum as an adjunct to standard of care; more than 46,000 data points were collected. Prevention in at-risk patients was implemented according to local practice without additional preventative equipment or staffing.

**Results:** Due to the differences in care objectives the AC data was analysed separately from the HC data.

In the AC cohort > 11,000 SEM assessments were taken, a 92% (weighted average) reduction in the incidence of hospital acquired pressure ulcers (HAPUs) was achieved.

- 79% of AC centres reported 0% HAPU during the PURP
- Daily use of the device\* alerted to risk of PUs in 56% of assessments (Delta reading >0.6)
- In 46% of assessments, patients were found to be at risk for PUs (Delta reading >0.6) but had no visual skin redness at that region
- Clinical decision-making was impacted in 52% of cases
- 63% of patients received additional interventions including increased mobilisation

In HC, a 47% reduction in HAPUs was achieved.

**Conclusions:** In the 15 centres where the device\* was used to alert to increased risk of PUs, the HAPU rate decreased by 92% through clinically effective management of at-risk patients. These results also demonstrate how clinicians incorporated an anatomy specific PU risk assessment device into local PU Prevention Pathways; the only change being the addition of the device\*. Two sites studied the Hawthorne effect, and determined no Hawthorne effect was present.

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- \* SEM Scanner 200:881 (Europe) Ltd

## 8.1

## Mechanobiology of adipose cells: implications for wound healing

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**Introduction:** The role of mesenchymal stem cells (MSCs), and especially adipose tissue derived MSCs has been established in regenerative medicine and wound healing, including as related to pressure ulceration. Wound healing by gap closure is accomplished primarily by the migratory cells within tissues, and secondary by proliferation. In fat tissue, the MSCs and specifically fat-committed pre-adipocytes are mobile. Preadipocytes typically migrate into the wound area, and may then differentiate into mature adipocytes to facilitate tissue repair and regeneration. During differentiation, cell morphology transitions from elongated to rounded, to allow efficient packing of spheroidal lipid droplets, but also eliminates their proliferative and migrate capacity. The cells' ability to close gaps and to populate wounds depends on their dynamic, mechanical interactions with their microenvironment, thus we evaluate the mechanical forces applied by the migrating preadipocytes and throughout the differentiation process as correlated with morphology changes.

**Methods:** We evaluated the speed and directionality of migrating preadipocytes, alongside the lateral forces applied on a 2.4 kPa stiffness gel; within the stiffness-range of animal abdominal and subcutaneous fat. Differentiating adipocytes were monitored over 14 days, showing changes in cell morphology and size, and in the direction and magnitude of adhesive, mechanical forces applied by the cells.

**Results:** Preadipocytes were elongated, fibroblast-like in morphology, and naturally migrated non-directionally along their long axis at rates of 0.27  $\mu\text{m}/\text{min}$  [1], similar to fibroblasts. Concurrently, applying low-level external stretching [2], locally aligned fibroblasts and accelerated their migration in gap closure. Preadipocytes applied a wide range of total traction forces (100-800 nN), typically concentrated at the elongated cells' poles and aligned with the direction of the applied principal mechanical, traction stresses. During adipocyte differentiation, forces became more uniformly distributed around the cell perimeter, as cells became rounded and with smoother surfaces. Interestingly, we observed that the total traction force per cell area (their "stress output") was preserved during the differentiation process [3].

**Conclusions:** We show differences in cell structure and force application of migratory preadipocytes and of differentiating adipocytes. The mechanobiology of the preadipocytes and adipocytes affects gap closure capacity and tissue remodelling in adipose-rich tissues. Hence, understanding the mechanobiology of pre-adipocytes is critical in the scientific context of tissue repair and pressure ulcer healing.

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## 7.6

## The effectiveness of two silicone dressings for sacral and heel pressure ulcer prevention in high risk intensive care unit patients: results of a randomized controlled parallel-group trial

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**Introduction:** Pressure ulcer incidence in intensive care unit patients remains high. In the latest Global Burden of Disease Study in 2010, pressure ulcers were assigned the highest disability index. There is emerging evidence that the application of dressings on pressure ulcer predilection sites may help to prevent pressure ulcer development. Therefore, the application of preventive dressings might potentially further reduce the incidence, but whether these dressings in very high risk intensive care unit (ICU) patients are effective is unclear. The objective of this study was to determine if preventive dressings applied to sacrum and heels in high risk patients on ICUs in addition to standard prevention procedures reduce the cumulative incidence of pressure ulcers.

**Methods:** A randomized, controlled, two arm, superiority pragmatic trial was performed with a 1:1 allocation to the intervention and control groups. Patients assigned to the intervention group received dressings applied to sacrum and both heels. Pressure ulcers were categorized according to the NPUAP/EPUAP 2014 classification system. All patients were followed up until discharge or the patient was no longer at high risk.

**Results:** In total 475 patients were included and randomized. Finally, n = 212 patients were analyzed in the intervention and n = 210 in the control group. Mean age was 63.5 (SD 15.4) years and the majority was male (65.4%). The cumulative incidence of pressure ulcer category II, III, IV, Unstageable, deep tissue injury at heels or sacrum was 6.9%. The absolute risk reduction due to the preventive dressings was 0.11 - 0.028 = 0.08 (95% CI 0.03 to 0.13). The number needed to treat was therefore 1/0.08 = 12.3 (95% CI 29.9 to 7.8) indicating that 13 patients need to be treated, to prevent one additional pressure ulcer case.

**Conclusions:** Our results show, that pressure ulcer prevention is an ongoing and an unnegotiable task in the care of critically ill ICU patients. Results indicate that the application of preventive dressings in addition to standard preventive procedures in high-risk ICU patients is effective to prevent pressure ulcers at the heels and sacrum. Compared to other pressure ulcer preventive measures the application of preventive dressings seems to be feasible and easy to be implemented in this setting. However, within this trial, one dressing was used only. Therefore, it is unclear whether the performance of other dressings is similar.

## 8.2

## External strain applied on SCI skin depletes calstabin I in paralyzed skeletal muscles underneath: a new insight on pressure injury etiology

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**Introduction:** Ca<sup>2+</sup> imbalance is related to PI1. The external strains applied to the still, atrophic muscles of SCI patients exacerbate the redox imbalance and further deregulate the intracellular Ca<sup>2+</sup>. Recently, the largest intracellular ion channel (RyR1) remodeling was reported in the paralyzed skeletal muscles of a rat model<sup>2</sup>. Therefore, the aim of this work is to investigate the link between an external strain, applied to the skin and the RyR1 post-translational modifications in the deep muscle tissues.

**Methods:** Muscle biopsies of SCI patients with an existing PU are biochemically analyzed. Just before sampling, the hemoglobin quantity (rHb) and the blood flow from the local micro-vascularization are assessed with the interface pressure (IFP). Each patient undergoes 3 biopsies, one on a paralyzed muscle (NI), one on a healthy muscle (I) and one near his existing PI requiring surgery (E).

**Results:** The local micro-vascularization of paralyzed muscles is significantly altered ( $p < 0.05$  for rHb I vs NI and  $p < 0.001$  for flow/PAS ratio NI vs I). In paralyzed muscle, RyR1 is hyper phosphorylated and hyper nitrified ( $p < 0.001$  and  $p < 0.05$  respectively, NI vs I) and the RyR1's chaperone protein: calstabin 1 is depleted ( $p < 0.05$ , NI vs I). Calstabin 1 dissociation is significantly correlated with the mean and peak IFP measured over the sacrum area ( $p = 0.023$ ). There is no correlation between post-translational RyR1 modification and the micro-vascularization or the time spend bedridden, emphasizing the importance of pressure intensity over the pressure duration.

**Conclusions:** RyR1 remodeling is doubly impacted in paralyzed skeletal muscle of SCI. At basal level, the oxidation state enhances redox post-translational modifications of the Ca<sup>2+</sup> channel. Furthermore, even a low external strain depletes the binding between RyR1 and calstabin1, leading to a leaky reticulum sarcoplasmic and a Ca<sup>2+</sup> homeostasis dysregulation which may create the first deep tissue lesion.

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## 8.3

## Mechanics of heel pressure ulcers and the influence of the calf and Haglund's deformity

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**Introduction:** Pressure ulcers are the consequence of localised areas of injury to the skin or underlying tissue; caused by external forces such as pressure and/or shear. The heel is a common site for pressure ulcer development due to the thin layer of soft tissue surrounding the calcaneus; making it vulnerable to high internal and external strains. In the UK alone, pressure ulcers are estimated to cost the NHS more than £1.4 million every day [1]. There is therefore a need for accurate and realistic biomechanical models that can predict these processes to enable the development of effective treatments (or prevention) and guide critical clinical decisions.

Existing computational models have focused predominantly on the heel/foot and negated the influence of the calf in relieving pressure on the heel. This study aimed to understand better the role of the calf in distributing load at the heel and assessed the optimum leg position when a patient is non-ambulatory in a clinical setting. To the authors' best knowledge, this is the first study to investigate the influence of the calf on the formation of heel ulcers.

**Methods:** Novel MRI techniques were developed to clearly identify anatomical geometry in the foot and calf. Healthy volunteers were recruited with and without Haglund's deformity. 3D subject-specific finite element models were created to investigate the internal strains in the soft tissue surrounding the heel and the influence of the calf when in contact with a support surface.

**Results:** Simulations show that the shape and size of the calf has an influence on the formation of heel pressure ulcers. Higher internal shear strains were observed in the soft tissues of the Haglund's foot compared to the healthy foot, with the strains greater in the heel as opposed to the calf. Furthermore, the models confirmed the influence of the support surface on which the calf is resting; a softer support results in lower strains in the heel, subsequently lessening the chance of a pressure ulcer forming.

**Conclusions:** This study is part of an ongoing project that will lead to improved clinical guidelines and test methods that can determine which products/methods are likely to be most effective in preventing injury. This will potentially aid clinicians and carers to ensure that patients receive the best possible care.

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## 8.4

## In vivo and in vitro detection of porphyrin-producing wound pathogens, planktonic and in biofilm, with real-time bacterial fluorescence imaging

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**Introduction:** Porphyrins are naturally occurring, red fluorescing intermediates of the heme synthesis pathway, essential to bacterial survival<sup>1</sup>. Fluorescence imaging is able to visualize polymicrobial populations in chronic wounds based on porphyrin fluorescence<sup>2</sup>. Prior work has demonstrated the utility of fluorescence images to guide pressure ulcer wound assessment, cleaning, debridement, and antimicrobial stewardship<sup>3</sup>. This study investigated prevalent chronic wound pathogens and their ability to produce detectable red fluorescence in vitro (planktonic and biofilm) and in vivo.

**Methods:** (In vitro) 30 bacterial pathogens and one yeast were plated on Remel Porphyrin Test Agar (containing required intrinsic substrates for porphyrin production) in triplicate. Cultures of *S. aureus*, *E. cloacae*, and *E. coli* were inoculated into two established biofilm models<sup>4-5</sup>. All were imaged for fluorescence at 24, 40 and/or 120 hours using a fluorescence imaging device<sup>2</sup>. (In vivo) Mice (n=3/group) were given full thickness wounds inoculated with one of three pathogens (*Staphylococcus*, *E. coli*, or *Streptococcus*, 10<sup>7</sup> CFU/wound) or vehicle control. Wounds were longitudinally imaged over 11 days.

**Results:** All known porphyrin producing bacterial species (28/30) exhibited red fluorescence by 40 hours in vitro (e.g. *Staphylococcus*, *Proteus*, *Acinetobacter*, *Klebsiella*, *Enterobacter*, *Bacteroides*, *Aeromonas*) and by day 2 post-inoculation in vivo. This includes aerobes and anaerobes. Red fluorescence was readily detected from biofilm models, both pre-wash and post-wash, indicating that fluorescence imaging can detect porphyrin-positive bacterial species in vitro encased within biofilm matrix in polymicrobial communities. Yeast and non-porphyrin producing bacteria (*Streptococcus*, *Enterococcus*) did not produce detectable red fluorescence in vitro, nor did *Streptococcus* in vivo. Interestingly, a 4:1 *Enterococcus*: *Staphylococcus* in vitro plating, mimicking clinical polymicrobial growth, fluoresced bright red.

**Conclusions:** Red bacterial fluorescence is specific to porphyrin-producing bacteria, which represents the vast majority of wound pathogens<sup>7</sup>. Plating 4:1 *Enterococcus*: *Staphylococcus* suggests that detectable red fluorescence would also be present in wounds with predominantly non-porphyrin producing species; these species exist monomicrobially in < 1% of chronic wounds<sup>5</sup>. Overall, results support the clinical rationale for using fluorescence imaging\* to detect a wide array of pathogenic bacteria, potentially including those encased within biofilm matrix.

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\*Moleculight:ix

## 9.1

## Enhancing SKIN health and safety in aged CARE (SKINCARE Trial): a study protocol for an exploratory cluster randomized pragmatic trial

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**Background:** Aged long-term care receivers are affected by various adverse skin conditions such as pressure ulcers, incontinence-associated dermatitis, dryness, intertrigo and many more. Prevention of these skin problems and the provision of general hygiene and skin care activities are key areas of nursing practice. Numerous condition specific recommendations are available and implemented separately. This may lead to fragmented practice neglecting shared aetiologies and prevention and treatment principles. On the other hand, there is a huge overlap in terms of aetiology, pathogenesis and prevention of these skin problems.

**Methods:** The overall aim of this trial is to test the feasibility and to estimate possible effects of the implementation of a comprehensive skin care and prevention strategy targeting main nursing relevant skin problems at the same time. A two-arm cluster-RCT will be performed in 20 nursing homes randomly selected from the population of nursing homes of the state of Berlin (Germany) comparing skin care according to the newly developed evidence-based skin care and prevention strategy with standard skin care.

**Discussion:** It is expected, that the implementation of this evidence-based skin care and prevention strategy will reduce the incidence of pressure ulcers, incontinence-associated dermatitis and other skin problems in long-term care. This trial will benefit individual patients and aged nursing home residents in general given the high prevalence and incidence of the addressed skin conditions. Findings of this exploratory trial may lay the foundation for a change in the development and evaluation of clinical standards and practices in general as it exemplarily moves the perspective from individual conditions to a more comprehensive view on overlapping or co-existing health problems, in this case common skin conditions in old-aged long-term care receivers.

## 9.2

### The use of pressure ulcer risk assessment instruments in clinical practice

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**Introduction:** Following the development of a new Pressure Ulcer Risk Assessment Instrument (RAI), the Pressure Ulcer Risk Primary Or Secondary Evaluation Tool - PURPOSE-T (PURPOSE: RP-PG-0407-10056), it was implemented in UK acute/community trusts and further clinical evaluation is needed. A review of evaluation methods for RAIs found studies predominantly consider predictive validity. Two inconclusive clinical effectiveness trials have methodological weaknesses and fail to consider RAIs as a complex intervention, providing little information about how RAIs are used in practice.

A realist evaluation is underway to increase our understanding of causality (how RAIs cause change) via consideration of programme theories (ideas and assumptions about how RAIs work/are used in practice) [1]. For this study we aim to understand how hospital ward teams use PURPOSE-T and a standard RAI in different contexts and how and to what extent they impact on care processes, interventions, communication and patient outcomes. The approach incorporates 4 steps: programme theory elicitation, prioritisation, testing and user guidance development. The elicitation step is the focus of this presentation.

**Methods:** The elicitation step incorporated a scoping review to identify prevailing programme theories associated with RAI use and exploration of these with nursing staff in semi-structured interviews. Twenty-two clinical nurses (specialist nurses and elderly care Sisters/Charge Nurses, Staff Nurses and Health Care Assistants) from 6 UK hospitals (3 PURPOSE-T; 3 standard RAI) were interviewed. Interviews were conducted using the teacher-learner cycle, whereby the interviewer teaches the interviewee about the theories under consideration and the interviewee provides their informed insight. Interviews were audio-recorded, transcribed verbatim and a narrative report was generated.

**Results:** Emerging candidate programme theories relate to nursing roles and accountabilities, competing demands on nursing time, knowledge and skills, clinical judgement, documentation and duplication, patient involvement, continuity of care, care planning and implementation, usability and organizational issues.

**Conclusions:** The study increases our understanding of how RAIs are used in practice and will inform subsequent stages of the realist evaluation allowing prioritised programme theories to be tested and refined. This will lead to RAI guidance development and inform future evaluation methods.

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This report is independent research arising from a Post-Doctoral Research Fellowship (PDF-2016-09-054) supported by the National Institute for Health Research. The views expressed in this publication are those of the author(s) and not necessarily those of the NHS, the National Institute for Health Research, Health Education England or the Department of Health.

## 9.3

### Biofilm differentially affects wound healing according to the bacterial community in pressure ulcers

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**Introduction:** Biofilm formation is an important factor that contributes to wound infection. However, little is known about the bacterial microbiota of pressure ulcers. Dysbiosis, a state of imbalance between skin commensal bacteria and anaerobes, helps in characterizing the wound microbiota because it disrupts human immune homeostasis. The objective of this study was to evaluate the effect of biofilm dysbiosis on wound healing in pressure ulcers.

**Methods:** In this prospective cohort study, 26 pressure ulcers were included at a long-term care hospital. The microbial samples were obtained from the wound. The wound microbiota was determined by sequencing the V3-V4 region of the 16S ribosomal RNA gene using scale short read sequencer\*. The sequences were clustered into operational taxonomic units at 97% sequence similarity. The dysbiosis ratio was calculated by dividing the relative abundance of anaerobes with that of skin commensal bacteria. Dysbiosis was determined based on the median dysbiosis ratio value. The presence of biofilm was determined by wound blotting, which involves collecting small molecules by attaching a nitrocellulose membrane to the wound, followed by alcian blue staining. The wound healing status was determined based on the change in DESIGN-R score from baseline to follow-up. The association between biofilm/dysbiosis and wound healing status (healing or non-healing) was assessed by multiple logistic regression analysis. The study protocol was approved by the local ethics committee.

**Results:** Among the 26 pressure ulcers, eight ulcers were considered as non-healing. The skin commensal bacteria accounted for 93.1% of the microbiota in the healing pressure ulcers and 47.1% in the non-healing pressure ulcers (P = 0.052). The dysbiosis ratio of the non-healing wounds was significantly higher than that of the healing wounds (P = 0.046). Seventy-five percent of the wound with positive biofilm and dysbiosis status represented non-healing status. The biofilm dysbiosis status of the wound was significantly associated with the wound non-healing status (P = 0.038).

**Conclusions:** Our findings supported the hypothesis that biofilm formation with the specific microbiota (such as dysbiosis status) has a negative effect on wound healing in pressure ulcers. Dysbiosis status could impair the host immune system homeostasis, causing excessive inflammation. Regulating the composition of wound microbiota by targeting the anaerobes might be a promising strategy for managing the non-healing pressure ulcers comprising bacterial biofilms.

\* Illumina Miseq

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## 9.4

## Predicting pressure injuries by "hackathon": the use of artificial intelligence and machine learning in the development of risk assessment tools for pediatric pressure injury prevention

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**Introduction:** Prevention of pediatric pressure injuries, historically associated with substantial morbidity and increased resource utilization, is a priority at our hospital. Instruments to assess pediatric pressure injury risk remain limited. We set out to establish a valid age-appropriate tool for the entire pediatric population. Our goal is to develop a tool with the capacity to identify patients at risk of pressure injuries prior to any clinically noticeable change.

**Methods:** To develop this tool, we are engaging nearly 200 Artificial Intelligence (AI) teams in Silicon Valley; providing them with de-identified electronic medical record (EMR) data for all inpatients at our hospital over the last decade. The rich data from thousands of patients will serve as the basis for our planned "hackathon." "Hackathons" have been leveraged to promote medical advancements in myriad arenas including neonatal resuscitation and the early identification of sepsis. Operating in the established framework of a "hackathon" teams will apply AI and machine learning techniques to find patterns in EMR data that contribute to the development of pressure injuries. Unlike a typical hackathon event which lasts only a few days, the time frame for assessing data in this project will span 6 months. These patterns will be used to develop predictive algorithms well before the risk of injury can be identified by current tools.

**Results:** Pilot analyses performed on subsets of our data have demonstrated promising statistical trends that will serve to focus our efforts at elucidating and establishing the relative risk factors for pressure injuries in this population, including monitoring devices, comorbidities and nutritional status.

**Conclusions:** A more precise prediction tool will advance pediatric providers toward the long-term goal of eliminating hospital-acquired pressure injuries.

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*J Med Syst.* 2016; 40: 177.

## 9.5

## Telemedicine in the prevention and management of pressure injuries: Do you see what I see?

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**Introduction:** For medically complex patients, the effective prevention and treatment of pressure injuries often requires diligent surveillance, accurate assessment, and immediate intervention. Achieving this level of effectiveness for patients in resource-scarce and geographically remote healthcare facilities or in the homecare setting remains an elusive goal. The expertise required to identify patients at risk of impending pressure injury, or to effectively treat early pressure injuries is often at a premium. The result of which is all too frequently preventable pressure injuries and/or increased morbidity for these patients. In an effort to extend our resources and expertise in pressure injury prevention and management, our children's hospital set about to establish an effective and scalable telemedicine solution for our community.

**Methods:** Hospital-based computers and tablets were equipped with secure video conferencing software. Using an on-call wound care team practitioner, nursing and medical staff were invited to use this interface to address real-time concerns for pressure injury prevention and management. Using the secure telemedicine interface, the wound care provider is empowered to prescribe an appropriate and timely preventative and/or treatment regimen. The same technology was made available to homecare providers and parents through use of enabled and secure smart phones.

**Results:** While in its early stages, recipient providers and family have confirmed improved satisfaction with care. While we have a reduction in time to intervention, analysis of morbidity and pressure injury occurrence remains a positive trend but not statistically significant at this time.

**Conclusions:** The use of telemedicine in the prevention and management of pressure injuries to extend the resources and expertise of our institution's wound care team is a promising modality in the overall care of medically complex patients outside of our advanced tertiary care facility.

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## 10.1

Comment améliorer le dépistage du risque d'escarres et la mise en oeuvre d'actions de prévention, associant toute l'équipe professionnelle, le patient et son entourage?

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**Introduction:** A la suite de la campagne « Sauve ma peau » initiée par l'ARS d'Ile-de-France auprès des établissements sanitaires et médico-sociaux entre 2013 et 2017, notre équipe mobile Plaies et Cicatrisation a souhaité pérenniser cette démarche au moyen d'un serious-game permettant d'effectuer des simulations courtes afin de former les professionnels et les aidants ; une partie est dédiée aux spécificités du patient diabétique.

En effet, notre expérience nous a conduits à constater que l'escarre évitable existe toujours. Pourquoi la prévention n'est-elle pas optimale ? Manque de moyens humains et matériels ? Manque de formation ? Manque de prise de conscience ? Comment réussir à changer les pratiques professionnelles ? Une formation efficace devrait être adaptée au niveau de chacun, concerner toute l'équipe et bénéficier du soutien de la hiérarchie. La réalité de terrain diffère de cet idéal : peu de soignants s'intéressent à cette formation, peu de cadres la demandent pour leurs soignants, peu de temps de formation est accordé. Proposer des formations courtes sous forme de jeu sérieux permettra de contourner ces obstacles.

**Méthode:** Nous avons répondu à un appel à projet de l'ARS d'Ile de France, puis recruté une entreprise spécialisée, CCCP, à la suite d'un appel d'offres, afin de réaliser ensemble cet outil de formation ; nous associations ainsi notre expertise métier aux compétences spécifiques nécessaires au développement d'un environnement virtuel avec des chemins pédagogiques, en collaboration avec l'ARS. Lors de la création d'un compte, un score est attribué par une évaluation du niveau de maîtrise de la prévention d'escarres. La simulation insiste sur les points faibles du joueur pour qu'il puisse s'améliorer. Cet outil peut être utilisé lors de micro-formations dans les services qui seront ainsi suivies par une plus grande partie de l'équipe. Une moment d'explication avant sera organisé et un débriefing complète l'enseignement dans un deuxième temps.

### Résultats:



**Conclusions:** Le serious game sera disponible en libre accès à partir du mois de septembre via un lien sur le site de l'ARS Ile de France.

## 10.2

Prévention et traitement des escarres : résultats positifs d'une démarche d'amélioration continue de la qualité

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**Introduction:** Le Centre L'Espoir est un centre de rééducation et de réadaptation fonctionnelle spécialisé qui accueille des patients souffrant d'affection du système nerveux et de l'appareil locomoteur. En 2008, la Direction a décidé de créer un poste d'infirmière spécialisée. Formée grâce à un DU, elle bénéficie d'un mi-temps dédié à la prise en charge des escarres. Un comité de pilotage a été créé avec un groupe de travail chargé de la mise en place de la démarche.

**Methods:** Ce groupe a sélectionné une échelle de risque « escarre » : l'échelle de Braden assortie d'une évaluation personnalisée intégrant notre jugement clinique (recommandations HAS). Celle-ci répertorie les différents facteurs intrinsèques retrouvés couramment chez les patients. Une conclusion diagnostique est établie en équipe et permet de mettre en place les mesures de prévention adaptées.

Afin de maintenir à jour les connaissances des professionnels, une formation interne sur la prise en charge des escarres a été mise en place en 2016. Un « point escarre » mensuel est réalisé pour tous par l'infirmière référente.

Ce dispositif est complété par la création d'une « CREX escarres » (Commission de Retour d'Expérience). Toute escarre acquise est déclarée via une fiche de signalement d'évènement indésirable. Celle-ci est systématiquement étudiée par l'infirmière référente pour actions immédiates puis analysée en CREX semestrielle afin de comprendre le mécanisme qui a permis l'acquisition de l'escarre et de mettre en oeuvre les démarches d'améliorations adéquates, préventives ou correctives.

**Results:** En complément, des enquêtes annuelles de prévalence sont réalisées pour lesquelles tous les patients avec escarres sont diagnostiqués « à risques ». En 2010, le taux global de prévalence était de 26% dont 12 % d'escarres acquises ; en 2014 et 2015, celui-ci a diminué jusqu'à 0,9% pour ré-augmenter à 4,5 % en 2018. Après analyse, nous avons axé notre travail sur l'amélioration de la traçabilité de l'état cutané, exigé une fois par poste. L'indicateur IPAQSS « traçabilité du risques d'escarres » est calculé chaque trimestre lors d'un audit dossier patient en présence des infirmiers. De façon pédagogique, une restitution systématique des résultats est faite en réunion d'équipe.

**Conclusions:** L'infirmière référente impulse, au travers de ce dispositif, une dynamique de travail et de réflexion à tous les professionnels y compris par le développement de l'éducation thérapeutique et de la formation des aidants.

### References:

Conférence de consensus : Prévention et Traitement des Escarres de l'Adulte et du Sujet Agé, ANAES, 2001.

## 10.4

## Les équipes mobiles : une réponse au traitement personnalisé des escarres

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**Introduction:** De retour au domicile ou dans les EHPAD, en particulier lorsque l'état général de la personne s'est dégradé, un terrain propice à l'apparition des escarres se crée. En 2018, nous avons ainsi comptabilisé 54 escarres en EPHAD et 30 à domicile pour lesquelles notre intervention s'est avérée utile. L'objet de cette présentation est de mettre en évidence l'intérêt d'un travail collaboratif tripartite : l'équipe soignante de la structure (EHPAD, HAD, SSIAD) ; l'équipe mobile plaie et cicatrisation et l'équipe mobile rééducation adaptation. Nous pouvons ainsi développer une prise en charge personnalisée des escarres. En effet, notre force d'action est d'associer les compétences d'une IDE « plaies et cicatrisation » diplômée avec celle d'un ergothérapeute, non seulement formé aux atteintes neurologiques centrales mais également, au positionnement du sujet au fauteuil ou au lit.

**Methods:** En outre, l'esprit de ces deux équipes mobiles est d'intervenir au lieu de vie du sujet et d'adapter l'intervention aux moyens disponibles sur place et/ou de promouvoir l'acquisition « justifiée » d'un matériel plus adéquat à la situation. C'est aussi l'occasion de mettre en lien les divers intervenants autour du patient (Équipe mobile soins palliatif, médecins libéraux, IDE libéraux, famille si nécessaire).

En conséquence, comme ce n'est pas le patient qui se rend sur un lieu de soins mais les soins qui viennent à lui, cela modifie considérablement la perception qu'il a de la situation. Cette intervention personnalisée favorise la compliance de ce dernier vis-à-vis des conseils prodigués.

**Results:** Pour l'équipe soignante, l'échange de compétences et d'informations est très souvent perçu comme un soutien à l'action menée. Après les premiers contacts interprofessionnels, nous pouvons constater que les équipes font plus volontiers appel à nous et dans des délais de plus en plus courts. Cela permet une prise en charge encore plus efficiente.

Comme cela se fait régulièrement en télémédecine, nous faisons aussi un suivi au cas par cas : soit uniquement par téléphone ; soit, en cas de nécessité, en vis-à-vis. Un compte-rendu est adressé aux différents acteurs (patients et professionnels).

**Conclusions:** Le modèle présenté est pertinent. Nous notons des améliorations de la qualité de vie, une limitation des consultations externes et un délai d'intervention plus rapide.

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BARCOS, I., GAUTIER, Y., JOUSSELIN, C., BENBRICK, M., BARATEAU, M. (2015). *Rôle et missions de l'équipe mobile plaies et cicatrisation*. Soins. N°798. Elsevier/Masson.

## 10.3

## Le programme d'amélioration de la qualité et de la sécurité des soins "escarre" aux Hospices Civils de Lyon, 10 ans déjà

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**Introduction:** Les HCL constitués de 4 Groupements Hospitaliers (GH) regroupent 14 établissements. Une des priorités de la Direction Centrale des Soins : la prévention de l'escarre aux HCL repose sur les actions de 2 groupes de travail institutionnels :

- Le groupe Har-PM2\* « Escarre et plaie chronique » pérenne depuis 1999, constitué d'experts pluri professionnels (paramédicaux-médecins-pharmaciens) travaille en interface de la direction des achats (pansements, supports). Il rédige le référentiel documentaire.
- Le Groupe PAQSS escarre « Améliorer la prévention et le traitement de l'escarre dans les secteurs de soins » créé en 2009 s'appuie sur les mêmes experts. Il travaille sur 5 axes : les acteurs, le développement des compétences, l'application du référentiel documentaire, le bon usage des équipements, l'évaluation.

**Methods:**

- les acteurs : Groupe de « correspondants escarre » formés et reconnus dans chaque GH, décline dans les unités de soins les actions du projet en autonomie sous forme de « flash escarre » (affichettes, jeux, ateliers,...)
- les compétences : Formation institutionnelle DPC mensuelle, centrée sur le développement du raisonnement clinique paramédical et la synergie pluriprofessionnelle.
- le référentiel documentaire : une quarantaine de fiches techniques et modes opératoires, disponibles dans l'espace GED qualité.
- les équipements : Actions visant le bon usage des matelas et dispositifs de positionnement (intérets et limites).

**Results:** Indicateurs de résultats et de suivis : Actions menées par les correspondants escarre ; utilisation fiche informatisée de suivi de plaie ; nombre de professionnels formés (2500 depuis 2009); suivi des achats d'équipements ; suivi des statistiques cliniques pour les locations de matelas dynamique,

**Conclusions:** Les évaluations montrent une imprégnation certaine des pratiques attendues, mais la nécessité de « faire vivre » de dynamiser et de poursuivre :

- le développement harmonisé des compétences sur tous les sites (outils pédagogiques adaptés et référentiel documentaire réactualisés)
- l'accompagnement des GH dans la mise en œuvre d'actions d'améliorations

**References:**

Paqss "prevention escarre aux HCL"

## 11.5

## Sclérose en plaques et escarre

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**Introduction:** La Sclérose en plaques est une maladie inflammatoire démyélinisante du système nerveux centrale, touchant le plus souvent le sujet jeune et particulièrement les femmes. Le mode évolutif est variable de forme rémittente par poussée, ou de forme progressive secondaire ou primitive. Le handicap induit est très polymorphe associant atteinte motrice, sensorielle, sensitive, mais aussi cognitive. Les troubles sphinctériens sont également très fréquents. Cette situation de handicap expose à des risques de complications notamment d'escarre.

**Methods:** A partir d'une revue de la littérature nous avons réalisé une synthèse sur la prévalence et les facteurs de risques des escarres dans ce contexte.

**Results:** Peu d'études sont consacrées à la prévalence des escarres dans la SEP. Les patients concernés sont ceux dont le handicap est le plus important le plus souvent supérieur ou égal à 7 sur l'échelle EDSS. On retient une prévalence entre 20 et 30%. L'escarre est une cause d'hospitalisation significativement plus fréquente dans la population SEP que dans la population générale. La SEP est souvent retrouvé comme comorbidité associée lors du décès consécutif à une escarre.

Les facteurs favorisants sont un EDSS supérieur à 7, une dénutrition, favorisée par les troubles de déglutitions et les troubles cognitifs, les troubles sphinctériens.

**Conclusions:** L'escarre reste une complication fréquente dans la SEP à un stade évolué, il faut donc être particulièrement attentif chez les patients dont l'EDSS est supérieur à 7 (perte de la marche) présentant des troubles sphinctériens mal équilibrés et une dénutrition en rapport avec les troubles de déglutitions. Ce risque d'escarre doit être pris en compte dans le parcours de soins pour anticiper et limiter les facteurs de risques.

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## 11.1

## Phantom testing of a sub-epidermal moisture measurement device

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**Introduction:** The majority of pressure ulcers (PUs) including deep tissue injuries (DTIs) are preventable and reversible if detected timely. At the early phase, when a forming PU is still microscopic and limited to a relatively small number of cells, there is local increase in extracellular fluid contents which is called sub-epidermal moisture (SEM). Large-scale clinical trials established that spatial and temporal SEM value changes indicate early-stage PUs and DTIs [1,2], however, underlying pathophysiological principles need further investigation.

**Methods:** We conducted laboratory tests to determine sensitivity and precision of the SEM measurement device described in [3] in identifying small (1ml) water content changes in phantoms of human heel and skull/face, which simulated common PU development scenarios. We evaluated whether there is a statistically significant difference between SEM- $\Delta$  readings ( $\Delta$  defined as difference between SEM value at target site and SEM at a reference site of the phantom) associated with certain localized fluid contents in a phantom region.

**Results:** For both phantom configurations, a local increase in water contents resulted in consistent, statistically significant elevated SEM readings demonstrating that the SEM device is able to detect fluid content changes that are as small as 1ml. In agreement with a simplified theoretical (mathematical) SEM model for predicting these effects [3], laboratory-induced changes in water contents had a consistent trend of effect on SEM- $\Delta$  values which increased with each 1ml increment in intra-tissue-substitute water contents.

**Conclusions:** This work demonstrated that the SEM device is sensitive and robust enough to detect as small as 1ml variations in fluid contents within tissue substitutes in phantoms of human anatomy simulating clinical use. These laboratory findings complement and support the published clinical efficacy evidence [1,2].

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## 11.2

## A novel phantom for efficacy research of therapeutic pressure ulcer dressing performances

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**Introduction:** Pressure ulcers (PUs) at the sacrum and heels are a common complication of chronic stay in bed. Open PUs produce exudate containing serum, neutrophils and proteins. A mildly moist wound environment is needed for the repair of PUs; however, excessive exudate may disrupt the healing cycle and be toxic or infectious to adjacent tissues. Wound exudate should therefore be absorbed or retained in therapeutic dressings to support healing. Gelling fiber dressings are designed for these purposes. While a number of laboratory tests are used to gauge fluid management properties of dressings, they may not necessarily reflect the impact of factors such as the clinical positioning of patients on the functionality of different technologies. We, therefore, set out to develop a new methodology that allows direct comparisons of different technologies, while taking into consideration these factors.

**Methods:** We have designed, developed and produced a laboratory phantom of an exuding sacral PU simulating an active wound environment in an anatomically- and pathophysiologically-realistic form. The phantom includes a plastic replica of the pelvis bones and soft tissue substitutes, made of silicone casted in the shape of an adult male buttocks. A cylindrical wound geometry has been carved into the sacral region, into which disposable sponge components are inserted to simulate different wound beds. To simulate exudate leakage, we embedded a tubing system within the silicone, connected to a syringe pump, allowing the release of exudate substitutes at controlled, pre-determined flow volumes and rates. Synthetic replica fluid can be produced at a range of viscosities and pH levels which resemble those of real exudate. Five thermocouples are embedded around the simulated wound to monitor spatial temperatures, while an infrared lamp stationed above the phantom acts as a heat source.

**Results:** A phantom of an active exuding sacral wound has been built to facilitate, for the first time, experiments that expose dressings to exudate-like fluids at the mechanical, thermodynamic and use conditions which duplicate real-world settings. Moreover, pre-use and post-use physical and mechanical studies of products and simulated wound beds, e.g. measurements of ratio of dressing-retained over returned-to-wound-bed exudate volumes, or tensile and confined compression testing of the used dressings, generate fundamental new efficacy data.

**Conclusions:** The above laboratory approach paves the way for objective, quantitative and standardized testing in all aspects of exudate management, e.g. efficacy research and product evaluation for dressings, wound filler materials and negative pressure wound therapy systems.

## 11.3

## A miniature incubator for cell stretching reveals the mechanobiology for delivering better negative pressure therapy

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**Introduction:** Cyclic stretch stimulations (CSS) are the crux of negative pressure therapy (NPT). The CSS are considered to enhance cell migration and proliferation which contributes to tissue repair. We developed a novel laboratory apparatus for experimentally evaluating the influence of specific CSS regimes on cell proliferation and migration en-mass, in culture models of wounds, towards improvement of NPT technologies and protocols used in pressure ulcer (PU) treatment. We foresee vast potential in the above laboratory approach, which generates deeper understanding of the mechanobiology of the relevant NPT-aided repair processes, in optimizing NPT to be science-based rather than trial-and-error driven.

**Methods:** Our apparatus, known as the miniature incubator for cell stretching (MICS), has been developed for applying controlled CSS to cell cultures over periods of hours, days or weeks. The MICS system integrates hardware and software. The hardware includes a custom-made incubator with temperature and CO2 control which is mountable on a digital phase-contrast microscope equipped with a custom-made, computer-operated dynamic cell stretching system. The above hardware is complemented by Matlab software codes, all developed in-house as well, which facilitate high-throughput data analysis, including for example codes for measuring individual cell morphology, culture confluency and cell group migration at specific areas or the entire field of view. We typically use the MICS apparatus for creating circular "wounds" in a fully confluent culture of fibroblasts or pre-adipocytes under various culture conditions simulating e.g. ischemic PUs and then monitor en-mass proliferation and migration until closure under pre-set CSS regime conditions. The outcome of cell proliferation and migration can therefore be correlated directly with the CSS regime, which can be adjusted to enhance repair.

**Results:** Numerous mechanobiological experiments can be conducted by means of the MICS to reveal the mechanobiology of NPT. For example, a CSS regime of an intermittent deformation waveform, peaking at 12% substrate strain, produced statistically significantly 16% more confluency in 3T3 fibroblasts after 3 days compared to non-stretched (control) cells cultured for the same duration.

**Conclusions:** The MICS hardware-software system is a powerful platform for revealing the mechanobiology of repair of the cell damage occurring in PUs and will inform development and improvement of NPT systems to optimize them for treating these wounds.

## 11.4

## An exploratory randomized controlled trial to evaluate the effect of a basic skin care product on the structural strength of the dermo-epidermal junction

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**Introduction:** Due to the ageing-related loss of functional capacity, the skin becomes susceptible to adverse skin conditions and dermatological diseases. Especially old aged, care depended and severely ill individuals are at high risk for developing severe skin injuries and wounds (e.g. pressure ulcer, skin tears) with high social and economic impact. Empirical evidence indicates that the reduced adhesion of the dermal-epidermal junction may play a role especially for skin tear development.

The suction blister model is an artificial and controlled technique for dermal-epidermal separation. Empirical evidence suggests that the time of the dermal-epidermal separation (blistering time) is a measure of the dermo-epidermal adhesion. It has been proposed that the blistering time might be a clinically relevant parameter reflecting the mechanical integrity/stability of the dermo-epidermal junction.

The objective of this study was to investigate in a suction blister model, whether the use of a basic skin care intervention increases the mechanical adhesion of the dermo-epidermal junction.

**Methods:** An exploratory randomized controlled study with a split body design on two investigational areas of the anterior side of both forearms was performed in 12 females. One forearm of every subject was randomly allocated to the intervention and subjects were instructed to apply a basic skin care product (petrolatum) to this forearm. The other forearm remained untreated (control). The application of the skin care product took place twice a day. After 4 respectively 8 weeks suction blisters were raised at the investigational areas. The blistering times were used as outcomes to measure possible treatment effects.

**Results:** In total, 12 females (mean age 70.3; SD 2.1) participated in this study. After 4 weeks treatment, the blistering time was 62.75 minutes (IQR 56.13 to 78.63) in the intervention group and 55.25 minutes (IQR 46.5 to 71.25) in the control group. After 8 weeks treatment, the blistering time was 59.25 minutes (IQR 50.5 to 70.38) in the intervention group and 58.5 minutes (IQR 44.5 to 67.25) in the control group.

**Conclusions:** Our results indicate that the blistering time seems to be longer after the use of a basic skin care formulation. This may indicate that the use has a positive effect on the structural strength of the dermo-epidermal junction. This might be one underlying mechanism to explain the protective effects of basic skin care interventions.

## 11.5

## What is best practice for reducing the incidence and severity of incontinence-associated dermatitis in critically ill patients? a systematic review

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**Introduction:** Incontinence-associated dermatitis (IAD) is skin damage related to wound care that causes patients considerable discomfort. Patients with critical illnesses are considered the high-risk groups of developing IAD, and subsequently IAD is more likely to cause PI. There are many prevention and treatment methods for IAD. However, no standardised nursing system has been systematically reviewed for skin protection products and programmes in critically ill patients. This systematic review is to evaluate the effectiveness of interventions to reduce the incidence and severity of incontinence-associated dermatitis (IAD) in critically ill patients and determine best practice.

**Methods:** Using a PICO framework, the research question was developed. Five medical databases were searched, supplemented by hand and grey literature searching. Predetermined inclusion and exclusion criteria were applied to the 2,048 articles retrieved. From this a total of twelve included studies for data synthesis were determined through the PRISMA application: five from China, three from the United States, and two from South Korea, while the other two studies were conducted in Australia and Turkey, respectively. Quality assessment of the twelve papers was conducted using the Joanna Briggs Institute tools.

**Results:** On appraisal, six randomised controlled trials and six quasi-experimental studies were included for data synthesis. Skin care regimes like INSPIRE care, structured care, evidence-based nursing and bundles of care are more effective than the routine care to prevent IAD. An additional programme of care is more effective in preventing and treating IAD than the original routine or standard care. Wipe product, EB nursing, and internal faecal methods all proved to be cost-effective, while the use of internal faecal devices or bowel management systems improved the satisfaction of clinicians. In addition, the increased frequency of product use can effectively prevent and treat IAD.

**Conclusions:** The best practice for the prevention and treatment of IAD in critically ill patients needs to be based on evidence, including the assessment of the skin, mild cleansing and application of skin barriers, using containment devices mainly focusing on removing stools and taking consideration of the difference between prevention and treatment for the damaged skin and the secondary infections, and paying attention to cost according to different national conditions. Higher quality researches are needed to enhance valuable conclusions about the effectiveness of IAD products and procedures for the prevention and treatment of critically ill patients.

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## 12.1

## Modelling an adult human head on a donut-shaped head positioner for pressure ulcer prevention

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**Introduction:** Frequent repositioning has been shown to reduce the risk of pressure ulcers, but it can be challenging to perform during surgery where patients under anaesthesia endure prolonged deformations and shear stresses at contact areas between their body and the support surface, and sustained deformations in their weight-bearing soft tissues. Donut-shaped gel head positioners are commonly used in adult surgery to protect the occiput by moving the forces from the bony prominence. This research compares their effectiveness in alleviating scalp tissue loads to that of a fluidised positioner which instead conforms to the shape of the patient's head.

**Methods:** To determine magnitudes and distributions of occipital soft tissue loads while using head positioners, we employed a three-dimensional anatomically-realistic finite element model of an adult head and related computational methodology of analysis reported in our previous work [1]. The head applied its weight (approximately 4 kg) in simulations where it was resting on (i) donut-shaped positioner, (ii) fluidised positioner [2], and (iii) standard medical foam. Scalp stresses were calculated for each positioner and compared across positioners.

**Results:** Stresses in skin and fat tissues of the head resting on the donut-shaped positioner formed a focal circular distribution around the occiput and peaked at the inferior head/neck region. The donut-shaped positioner considerably increased the exposure of these scalp tissues to elevated stresses compared to a fluidised positioner, and also, although less profoundly, with respect to foam.

**Conclusions:** Donut-shaped positioners off-load a central region at the back of the head but shift loads to a ring of scalp tissues which is highly deformed, especially in the inferior head/neck area. A medical foam is more successful than a donut positioner in dispersing scalp loads but is still limited in conformability relative to a fluidised positioner which maximizes head envelopment, and hence, the contact area [1,2].

**References:**

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## 12.2

## Integrated experimental-computational analysis of sacral soft tissue stresses during patient migration in bed

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**Introduction:** Elevating the head of bed (HOB) is common hospital practice for reducing ventilator-associated pneumonia risks. However, HOB elevation generates reaction forces against the patient's back that together with gravity cause the patient to slide down, a phenomenon termed 'migration in bed' (MIB). This MIB is likely to result in soft tissue shearing near the rigid and sharp sacrum, which may, in turn, add to the risk of developing a sacral pressure ulcer (PU) [1,2]. A new migration reduction technology (MRT) has been introduced by which the head section of the bedframe and bed surface are extended in unison as the HOB elevates. Although MRT has been shown to reduce MIB, the effect of reducing MIB on tissue shear during HOB elevation has not been evaluated. Here, we analyse the relationships between MIB and the resulting sacral soft tissue stresses by combining motion analysis and three-dimensional (3D) anatomically realistic biomechanical computer modelling.

**Methods:** A novel 3D finite element (FE) model of the buttocks which included the pelvic bones and soft tissues has been developed from an MRI scan of an adult healthy woman. Based on motion capture studies of supine subjects which provided MIB data simultaneously with HOB elevation for different hospital beds, we prescribed displacement boundary conditions to the modelling. Stress exposures in a volume of interest (VOI) of sacral soft tissues were calculated for the bed and HOB conditions, including the MRT case.

**Results:** The farther the MIB, the greater the volumetric stress exposures in the sacral soft tissues. For example, transitioning from a standard bed (MIB= 12cm) to an MRT bedframe (MIB= 4cm) resulted in a considerable reduction in FE-calculated tissue stress exposures. In the upper tertile of the stress distribution, these exposures reduced by 32% and 38% for shear and effective stresses in the VOI, respectively.

**Conclusions:** We developed a novel experimental-computational methodology for determining the effects of minimizing MIB on the extent of alleviation of sacral soft tissue stresses. This new integrated quantitative method points to the value in minimizing MIB using MRT embedded in the bedframe.

**References:**

1. Kotowski SE, et al. *Human Factors* 55:36-47, 2013.
2. Wiggemann N et al. *Nursing Research* 64:221-5, 2015.

## 12.3

## The risk for a lip pressure ulcer caused by an endotracheal tube: biomechanical modeling of the effect of tube positioning

Golan Amrani<sup>1</sup>, Amit Gefen<sup>1</sup><sup>1</sup> Tel Aviv University, Department of Biomedical Engineering, Faculty of Engineering, Tel Aviv, Israel

**Introduction:** The most common anatomical site for a medical device-related pressure ulcer (MDRPU) is the head and neck. Facial pressure ulcers (PUs) associated with ventilation equipment are a considerable portion of these MDRPUs. Ventilation-associated facial PUs are by-definition hospital-acquired ones which expose the medical facility to litigation acts. Facial PUs are also known to compromise the quality of life and cause psychological long-term effects. An endotracheal tube (ETT) which is required for any mechanical ventilation procedure involves a risk for lip PUs, a frequently seen MDRPU. No work has been done so far to assess the biomechanical effects of application of an ETT on the lips and surrounding soft tissues. Here we computationally evaluated these effects, focusing on the positioning of the ETT in the mouth.

**Methods:** To investigate the biomechanical effects of the presence and positioning of an ETT in the mouth on lip and surrounding soft tissue loads, two finite element (FE) model variants were developed, representing two possible locations of the ETT - at the center or right side of the mouth. A downward/horizontal displacement of the ETT towards the lips was applied based on real-world ETT curvature data determined from photographs of ventilated patients. Outcome measures were effective stresses, maximal shear stresses and strain energy density (SED) in a volume of interest (VOI) containing the lips and surrounding facial fat and skin.

**Results:** Stress concentrations at the contact regions between the ETT and lips which diffused to deep lip and facial tissues were observed for both the central and side ETT locations, but were greater for the side position. Specifically, the effective stresses, maximal shear stresses and SED values for lip tissues in the VOI were 11%, 13% and 13% greater for the side location, respectively.

**Conclusions:** We found that a side location of the ETT is associated with an increased risk for a lip PU, which is not surprising given the more curved lateral lip geometry compared to the central lip segment. The present FE modeling framework allows, for the first time, to quantitatively assess these biomechanical states of soft tissues for different ETT conditions such as location, and in the future, use of protective measures. This modeling can therefore aid in the prevention of ETT-caused MDRPUs.

## 12.4

## Multiphysics modeling studies of the microclimate under a polymeric membrane dressing

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**Introduction:** Pressure ulcers (PUs) are localized tissue damage sites due to sustained exposure to mechanical forces and deformations. The biomechanical and biothermal conditions in skin and deeper tissues are physically and physiologically coupled; knowledge of these conditions is important in prevention and treatment of PUs. As an example damage spiral, consider excessive inflammation following deformation-inflamed cell death, which may cause secondary tissue damage and therefore needs to be mitigated [1,2]. Inflammation is associated with tissue heating that raises the metabolic demand and activates perspiration, both of which may, in turn, further compromise skin tolerance to the sustained loading [3]. Here, we aimed to evaluate the coupled contribution of thermal and mechanical dressing design, focusing on a polymeric membrane dressing (PMD) which was reported to contain and manage PU-resulted inflammation [1-3].

**Methods:** By means of a novel multi-physics finite element (FE) modeling framework, we have determined the thermal-structural coupling for a PMD versus a simple foam dressing, after measuring the thermal conductivity of the aforementioned dressing materials using an original testing apparatus and conducting infrared thermography measurements of skin temperatures while dressings were in simulated preventative use [2]. The above innovative integrative experimental-computational analysis of the multiphysics (structural/thermal) function of dressings is the first to identify thermal properties of dressings as an important factor affecting their biomechanical efficacy.

**Results:** Laboratory testing showed that PMDs conduct heat 1.5-times more and statistically significantly better than standard foam, which is critical in managing inflammation and minimizing inflammation-related damage as explained above. The FE modeling further demonstrated that the superior heat conductance improves the biomechanical function of PMDs applied to the body.

**Conclusions:** Multi-functional PMDs are effective in clearing thermal energy away from the body, to the environment. This is the first work to experimentally determine heat conductance properties of dressings, which are fundamental in characterizing the biothermal environment needed to support prevention and promote healing of PUs. This study therefore adds scientific value to the 'microclimate' concept, which so far has been used mostly in qualitative contexts [4].

**References:**

- [1] Gefen, A. *Wounds International* 9:22-28, 2018.
- [2] Gefen, A. *EJWMA Journal* 19:7-13, 2018.
- [3] Gefen, A. et al. *Wounds International* 10:8-15, 2019.
- [4] Kottner, J. et al. *Clinical Biomechanics* 59:62-70, 2018.

## 12.5 Impact of diabetes on CGRP signaling pathway in pressure ulcer healing process

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**Introduction:** Diabetes is one of the most worsening factors for skin ulcer healing; however only few studies looked at the wound closure time and neuropeptides kinetic. The present study aims to determine the influence of diabetes on skin pressure ulcer healing and especially the regulation of CGRP signaling pathway.

**Methods:** C57Bl6 male mice were randomly assigned to vehicle (control mice) or streptozotocin (STZ) injection. Tail Flick latency and sciatic nerve conduction velocity were measured to establish a moderate peripheral neuropathy with only small nerve fiber impairment (4wk diabetes). Corneometer and cutometer were used to assess skin properties. We performed repetitive cycles of skin compression using magnets to induce, in STZ and aged-matched control mice, a pressure ulcer mimicking a diabetic foot ulcer wound in humans. The healing process until wound closure was followed using skin imaging and histology; and CGRP signaling pathway kinetic was analyzed by immunofluorescence, western blot and immunoprecipitation.

**Results:** Epidermal thickness was decreased in diabetic group compared to control group, along with decrease in skin hydration and viscoelasticity. After induction of skin pressure ulcer, maximal lesion area was reached at day 5. Histological analysis revealed cutaneous muscle degradation by inflammatory cells, and dermis and epidermis damage in all groups, indicating a grade 3-ulcer formation. Maximal lesion surface was 1.8 fold increased in 4wk-diabetic mice compared to controls (Fig. 1). Wound closure was reached at day 19 in control group and delayed at day 23 in diabetic mice. Surprisingly, proCGRP level did not differ during healing process between diabetic and control mice. Results showed that CGRP receptor subunits RAMP1 and CLR are predominantly expressed in epidermis during healing, and highlighted that both proteins are reduced in diabetic compared to control mice skin, with a delay in functional CGRP receptor complex formation in diabetic mice.

**Conclusions:** This study suggests that skin resistance to pressure and healing process with diabetes are impaired as soon as small nerve fiber are damaged. We showed for the first time the kinetic of CGRP signaling pathway during skin pressure ulcer healing, and demonstrated that it may play a role in delayed healing process observed with diabetes. Further experimentation are in progress to decipher the mechanisms.



Figure 1: Skin pressure ulcer 5 days after induction by magnets application in 4-week diabetic and age-matched control mice

# POSTER PRESENTATIONS OVERVIEW

## Poster Presentations A

Wednesday 18 September, 12:45-13:45, Poster area

- P1** Positioning for a patient with an existing pressure ulcer: experimental analyses using a deformable model of pressure ulcer mounted on a phantom; *Makiko Tanaka*
- P2** Reducing hospital acquired pressure ulcers - the effect of employing a nurse facilitating learning and reflection on preventing and treating pressure ulcers; *Camilla Leerskov Sorensen*
- P3** Basic concepts of intraoperative acquired pressure injury prevention measures for the park bench position and Relton-Hall frame prone position in the operating room; *Norihiko Ohura*
- P4** Multi-Centre evaluation of an advanced extracellular matrix technology for the management of chronic wounds including pressure injuries - a Canadian experience; *Rosemary Hill*
- P5** A prospective multi-site observational study incorporating bacterial fluorescence information into the Upper/Lower infection checklists; *Rosemary Hill*
- P6** How effective is your wound cleanser? An evaluation using bacterial fluorescence imaging; *Rosemary Hill*
- P7** Laboratory evaluation of two pressure redistributing mattress overlays; *Michael Clark*
- P8** Patient participation in pressure ulcer prevention; *Britt Hansen*
- P9** Improving compliance to repositioning protocols for pressure ulcer prevention by posture monitoring: a pilot study; *Marijn Mostert*
- P10** Validity and reliability of the Norton, Braden and Waterlow risk assessment scales, in pressure ulcer risk assessment among surgical patients: a systematic review; *Ana Lúcia Martins de Oliveira*
- P11** Preventing pressure injuries in hospitalized children: a patient safety and quality improvement project; *Knaerke Soegaard*
- P12** Developing objective methods to assess pressure ulcers risk in individuals with mental illness; *Luciana Bostan*
- P13** It's all about the base: a comparison of mattress ticking base materials to explore implications for pooling; *Claire Williams*
- P14** Pressure ulcer risk assessment in Portuguese hospitalized patients; *Susana Gaspar*
- P15** Hospital-acquired pressure ulcer prevention: What is more effective?; *Susana Gaspar*
- P16** Negative Pressure Wound Therapy in cavity pressure ulcers treated at home: clinical case; *Paulo Alves*
- P17** Pulsated irrigation to clean and debride cavity pressure ulcer in community: clinical case; *Paulo Alves*
- P18** Using the Ottawa model of research use to implement a pressure ulcer prevention bundle on intensive care; *Nahla Tayyib*
- P19** Maintenance of the 30 degree side lying lateral tilt position in bed: an observational study; *Suzanne Kapp*
- P20** The clinical effectiveness of a turning and positioning system compared to usual care devices for preventing pressure injuries in the ICU: RCT Protocol; *Suzanne Kapp*
- P21** Caregivers overload of patients with pressure ulcers in a community care setting of Portugal; *Paulo Ramos*
- P22** Supporting the implementation of a pressure redistribution product to reduce patient harm whilst being cost neutral and demonstrating how a business case supported this both clinically and financially; *Sarah Charlton*
- P23** An analysis of property risk factors of Intraoperatively acquired pressure injury in the park bench position by propensity score and machine learning; *Mine Yoshimura*
- P24** Clinical experience of managing pressure ulcers in our center; *Ho Yun Chung*
- P25** Risk factors of pressure injury development in an acute care facility in Korea; *Kyu-won Baek*
- P26** Adaptation of the evidence based nursing practice guideline: prevention and management of moisture associated skin damage; *Kyu-won Baek*
- P27** Investigating the dissemination of microbiota between pressure ulcer and bed environment; *Mao Kunimitsu*
- P28** Medical device related pressure injuries to children in the intensive care unit; *Hye Jeong Jung*
- P29** Teaching of pressure injury prevention using a virtual learning environment for spinal cord injuries patients and caregiver; *Paula Nogueira*

- P30** Investigation of the buttock soft tissue stiffness at the ischial tuberosity in healthy volunteers using an ultrasound instrumented chair set-up; *Pierre-Yves Rohan*
- P31** Routine assessment of chronic wounds with a handheld imaging device can efficiently incorporate wound area and bacterial fluorescence information at the point-of-care: a 50-patient clinical trial; *Monique Y. Rennie*
- P32** Levine technique is inadequate for bacterial recovery in the sampling of wounds; *Monique Y. Rennie*
- P33** Dermis micro-grafting in the management of chronic wounds; *Marino Ciliberti*
- P34** Dermal regeneration template in regenerative surgery: our experience in RART center ASL Napoli 3 Sud; *Marino Ciliberti*
- P35** Topical oxygen wound therapy : a breakthrough in the management of non healing vascular leg ulcer; *Marino Ciliberti*

## Poster Presentations B

Thursday 19 September, 12:45-13:45, Poster area

- P36** The effect of three sessions of radial shock waves on pressure ulcers - a preliminary histomorphological and immunohistochemical analysis; *Mirosław Sopol*
- P37** Intelligent system for the monitoring of pressure ulcers (PU); *Edna Rocio Bernal Monroy*
- P38** Implementing an educational programme to reduce the risk of pressure ulcers; *Michelle Wilkinson*
- P39** The biomechanical protective effects of a treatment dressing on the soft tissues surrounding a non-offloaded sacral pressure ulcer; *Dafna Schwartz*
- P40** Evaluation of novel sub-epidermal moisture technology in early pressure ulcer detection versus conventional therapies; *Pat McCluskey*
- P41** Sustaining pressure ulcers to zero and extending to the community; *Helen Strapp*
- P42** Hospital based pressure injury competence group and knowledge transfer; *Ingebjørg Irgens*
- P43** Process + product = prevention; *Heather Hodgson*
- P44** Sacral pressure sore management, an interdisciplinary approach; *Kannan Prema*
- P45** Danish national clinical guideline for pressure ulcer prevention for adults; *Birgitte Skovgaard*
- P46** Clinical evaluation of radial shock waves in management of pressure ulcers - a prospective, clinical and preliminary study; *Robert Dymarek*
- P47** Developing individualized pressure ulcer prevention plans for spinal cord injured using pressure monitoring technologies; *Sarah Fryer*
- P48** Potential adverse effects during the treatment of pressure ulcers with radial shock waves - clinical challenge and management opportunities; *Izabela Kuberka*
- P49** A novel infrared thermography method for evaluation of dressing-induced skin microclimate conditions; *Golan Amrani*
- P50** Medical grade honey for the treatment of pressure ulcers - a case series; *Niels Cremers*
- P51** Use of a nutrition support protocol contributed to improving pressure ulcer healing; *Eunae Won*
- P52** User experiences of a powered pressure area care support surface in a university hospital in Finland; *Richard Forder*
- P53** Effectiveness of case-centered education program for pressure injury treatment; *Okkyoung Park*
- P54** Incontinence-related dermatitis and pressure ulcers : How to distinguish?; *Nathalie Faucher*
- P55** Preventing pressure injuries during prone positioning for acute respiratory distress syndrome; *Patrick Ryan*
- P56** A "time & cost saver" technology to treat pressure ulcers; *Roberto Cassino*
- P57** An antimicrobial spray\*: an added value for a quicker bedsores healing; *Roberto Cassino*
- P58** The effect of prophylactic dressings for the prevention of sacral pressure injuries among high risk patients; *Hyunjung Yeo*
- P59** Easing the burden of choice: a concept to map the relative performance characteristics of product combinations in clinical practice; *David Newton*
- P60** Heel offloading: connecting ergonomic design to clinical practice; *David Newton*
- P61** Assisted patient turning at eight to twelve hour interval using new device; *Sonny Wilson Merioles*
- P62** Effect of a dressing (sucrose octasulfate, metalloproteinase inhibitor) in the local management of pressure ulcers: results of a clinical study; *Serge Bohbot*

## French Poster Presentations

Thursday 19 September, 12:45-13:45, Poster area

- P70** Evaluation des pratiques professionnelles sur la prise en charge des plaies chroniques infectées en EHPAD: définition et place du prélèvement; *Catherine Dunyach-Remy*
- P71** Comment le CHU de Montpellier s'est organisé pour sa campagne stop escarre au sein de son ght; *Sylvie Palmier*
- P72** Deux outils pédagogiques pour optimiser la prévention et le traitement de l'escarre; *Sylvie Palmier*
- P73** Retours d'expériences de soignants sur l'acceptation d'un pansement hydrocellulaire siliconé multicouches en adjuvant des protocoles de prévention des escarres; *Amandine Sarrazin*
- P74** Enseignement Escarre dans les EPHAD de Seine et Marne en France; *Caroline Van Wijk*
- P75** Evaluation clinique d'un nouveau pansement en fibres poly-absorbantes imprégnées de la technologie\* dans la prise en charge locale des ulcères de jambes, aux différentes phases du processus cicatriciel.; *Fanny Baune*
- P76** Interroger et repenser les pratiques de soins dans la pertinence d'utilisation du matelas à air pour la prévention des escarres; *Cécile Rougier*
- P77** Action d'un pansement hydrocellulaire forme sacrum, posé en préventif, sur la prévalence mensuelle des escarres localisées au siège en médecine intensive-réanimation; *Denis Béduneau*
- P78** Retour d'expérience d'une équipe mobile plaies et cicatrisation d'un CHU sur la prévention des escarres; *Maria Benbrik*
- P79** Ulcères de jambe veineux traités par un système de compression multitype multicouche et suivis en ville; *Vincent Crebassa*
- P80** Réinjection de graisse selon la technique de Coleman dans le traitement de l'escarre neurologique. Création d'un livret d'information dans le cadre d'une équipe d'éducation thérapeutique.; *Célia Rech*
- P81** Démarche d'efficience médico-économique au centre hospitalier de Salon-de-Provence; *Cathy Lecomte*
- P82** Prevalence des escarres au CHU de Yopougon à Abidjan (Cote d'Ivoire); *Joseph Kouakou*
- P83** Outil d'aide à la prévention des escarres par les auxiliaires de vie de patients dépendants pris en charge en hospitalisation à domicile; *Célia Minvielle*

## POSTER PRESENTATIONS

P2

## Reducing hospital acquired pressure ulcers - the effect of employing a nurse facilitating learning and reflection on preventing and treating pressure ulcers

**Camilla Leerskov Sorensen**<sup>1</sup>

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**Introduction:** Pressure ulcers (PU) causes considerable physical and psychosocial morbidity and increases mortality.

Treatment of PU require both staff and economically resources. In Denmark, the estimated costs of treating a pressure ulcer range from €1643 to €22,591. The annual cost of PU is estimated to €174.5 million in the Danish healthcare system. <sup>1</sup>

Since 2013, the hospital has performed PU prevalence up to 4 times/year. From August 2013 to January 2018, the median for the prevalence was 5.8%, fluctuating in the interval from 3.4% to 8.6%. The goal is a prevalence of  $\leq$  5%. Risk assessment, observations and interventions are all parts of the patient centered nursing - Fundamentals of Care. To facilitate the process a nurse specialized in prevention and treatment of pressure ulcers (PU nurse) was employed March 1st, 2018.

**Aim:** To evaluate if a nurse specialized in prevention and treatment of pressure ulcers, can maintain, and preferably reduce prevalence of hospital acquired pressure ulcers (HAPU).

**Methods:** The PU nurse supports prevalence 4 times/year, support the staff in timely risk assessment, preventing and treating pressure ulcers. Educating staff and establish a network of staff particularly interested in pressure ulcers from each ward. Mediate and implement evidence-based knowledge and research regarding PU – treatment and prevention.

**Results:** From April 2018 to January 2019, the median of HAPU has fallen to 3.1 in the prevalence results. HAPU has decreased from 39 to 20 in the same period.

On average, the wards have requested 20 bedside supervisions/month from the PU nurse.

The number of inadvertent PU have enlarged from 63 to 74 /year, indicating increased attention and emphasis on PU prevention and observation.

Positive feedback from staff indicate that, the preferred method of improving skills and knowledge on PU prevention and treatment, is bed-side supervision. The presence of the PU nurse has increased their focus on pressure ulcer prevention, and contributed to knowledge and experience shared between wards.

**Conclusions:** The stable level of HAPU prevalence may indicate that the PU nurse has a positive effect. The PU nurse has been able to maintain the staffs focus on PU preventions in nursing. She contributes to reflections in nursing. However, to maintain and improve the results, a continuous focus is required.

### References:

1: Mathiesen, Anne S.W, et al.: Are labour-intensive efforts to prevent pressure ulcers cost-effective? *Journal of Medical Economics*, Volume 16, 2013 - Issue 10

<https://www.tandfonline.com/doi/full/10.3111/13696998.2013.832256>

P1

## Positioning for a patient with an existing pressure ulcer: experimental analyses using a deformable model of pressure ulcer mounted on a phantom

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<sup>2</sup> National Center for Geriatrics and Gerontology, Hospital, Obu-City, Japan

**Introduction:** Appropriate positioning alleviates excessive external force on specific bony prominences, and is an essential nursing skill for the prevention of pressure ulcers. However, positioning for patients with existing pressure ulcers has not been systematically studied.

**Methods:** To clarify the issue, a deformable model of urethane was made to recreate the physical properties of a pressure ulcer. The model was mounted to a phantom and laid on a bed. The relationship between the positioning of the phantom and wound deformity was examined during backrest elevation. Backrest elevation was performed continuously up to 60° without releasing the force exerted on the wound model. The procedure of backrest elevation was performed manually, with brief (~10 s) stops at every 15° (15, 30, 45, and 60°) for taking photographs. The angle was measure using a protractor. The shape of the model was photographed by the camera.

**Results:** The backrest elevation of the bed induced deformities of the ulcer model attached to the phantom.

**Conclusions:** The phenomenon was logically explained by three factors: deformable wound, anatomical location, and uneven transmission of external forces. A new concept "different action points on an individual wound" recapitulate the wound deformity. Thus, positioning changes such as backrest elevation can affect the shape of an existing ulcer, correlating with the elevated angle. This experimental finding highlights the importance of positioning for patients with existing pressure ulcers.

Clinical relevance: Being able to visualize the wound deformity related with bed elevations gives many suggestions when positioning in clinical practice.

P3

Basic concepts of intraoperative acquired pressure injury prevention measures for the park bench position and Relton-Hall frame prone position in the operating room

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- 3 University of Melbourne, Department of Nursing, Parkville, Australia
- 4 Tel Aviv University, Department of Biomedical Engineering, Tel Aviv-Yafo, Israel

**Introduction:** Intraoperative acquired pressure injury (IAP) is an acute, accidental injury, and preventative steps need to be established. However, few reports have described the concept of PI prevention in the operating room (OR), and measures for preventing PI in the OR are completely different from those that should be applied in general wards. We systematically obtained measurements in two positions known to have a high incidence rate of IAP based on data from six of our previous studies.

**Methods:** The patients underwent surgery in 2 positions associated with a high IAP incidence (park bench position in 441 patients, Relton-Hall frame prone position in 199 patients) at 2 centers from April 2010 to February 2016.

**Results:** The IAP incidence in the park bench position was 22.2%, 30.3%, 11% and 24.1% in the 4 studies that used this position, whereas that in the Relton-Hall frame prone position in the 2 studies that used this position was 11% and 7.1%. The predictors of IAP in the park bench position were the length of surgery, core temperature, skin temperature and interface pressure. The predictors of IAP in the Relton-Hall frame prone position were the length of surgery, body mass index, diastolic blood pressure and film dressing.

**Conclusions:** Conventional IAP risk factor studies have been performed in populations with a mix of two or three body positions and surgical procedures. Because each surgical procedure and body position creates a unique environment, it is important to examine the incidence and risk factors for each surgical procedure and in each body position, or else the results are of little use. In the figure we present a conceptual diagram of predictors for Pressure Injury in OR. Two positions were considered separately. The park bench position was associated with four predictors of PI: high pressure, high shear and high temperature and a long length of surgery (>6 h). The Relton-Hall frame prone position was associated with two predictors of PI: high pressure and high shear by the four supporting pads. This position is not likely to increase the body temperature.

IAP measurements

1. Make sure to fix the body position to prevent table tilt.
2. Use a prophylactic multi-layered silicone foam dressing for shear, not a film.
3. Use urethane foam to increase the contact area on top of the table or pad for interface pressure.
4. Maintain normothermia using a temperature control system (park bench position).

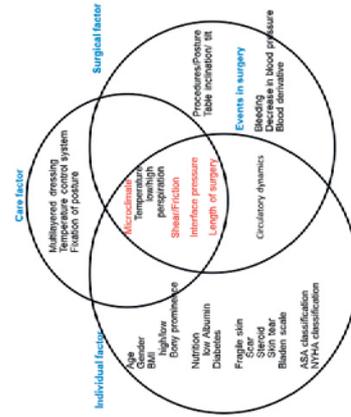


Fig. Conceptual diagram of predictors for Pressure Injury in OR.

P4

Multi-Centre evaluation of an advanced extracellular matrix technology for the management of chronic wounds including pressure injuries - a Canadian experience

**Rosemary Hill<sup>1</sup>**, Kevin Woo<sup>2</sup>, Rose Raizman<sup>3</sup>

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- 2 Queen's University, School of Nursing, School of Rehabilitation Therapy, Ontario, Canada
- 3 Ontario, Professional Practice Scarborough Health Network, Scarborough, Canada

**Introduction:** Clinically evaluate an advanced extracellular matrix (ECM) technology across different Canadian care settings for the management of chronic wounds.

**Methods:** Participants (n=33) aged 18-98 were recruited from three sites. Wound types included DFU's (n=10), PI's (n=8), skin tear (n=1), pilonidal sinus (n=2), necrotizing fasciitis (n=1), venous leg ulcers (n=6), dehisced surgical (n=4) and donor site (n=1). Wound management was undertaken across various care settings, including in-patient, out-patient and home health. All wounds were managed with best practice, including debridement, maintenance of a moist wound environment and appropriate compression and off-loading as standard of care. At some point of care wounds were managed with an ECM, applied daily-7 days (mostly once or twice a week) to the wound bed. Wounds were visually inspected, imaged and measured over the course of management with ECM.

**Results:** Most wounds showed improved healing rates and decreased frequency of dressing changes when managed with ECM compared to standard of care. Times to wound closure ranged from 7 to 65 days, with an average of 35 days. The ECM technology was easy to apply to wounds and once hydrated in the wound bed the ECM conformed to the wound bed and could be cut and packed as required by the specific wound. No adverse events observed. 3 wounds were removed from evaluation due to identified infection and three patients failed to follow up.

**Conclusions:** This represents the first Canadian evaluation of ECM for the management of wounds. As previously described for this product, improvements to the granulation tissue were observed, and otherwise stalled chronic wounds began to resolve[1, 2]. [R1] The availability of this advanced technology to Canadian wound specialists provides another tool for the management of these complex pathologies.

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2. Bohm, G.A., et al. Proactive and Early Aggressive Wound Management: A Shift in Strategy. Developed by a Consensus Panel Examining the Current Science, Prevention, and Management of Acute and Chronic Wounds. *Wounds*, 2017, 29(11); p. 537-542.

## POSTER PRESENTATIONS

P5

## A prospective multi-site observational study incorporating bacterial fluorescence information into the Upper/Lower infection checklists

**Rosemary Hill<sup>1</sup>**, Kevin Woo<sup>2</sup>

- 1 Vancouver Coastal Health - Lions Gate Hospital, Wound ostomy Continence Ambulatory, North Van, Canada
- 2 Kingston, School of Nursing, School of Rehabilitation Therapy, Kingston, Canada

**Introduction:** The UPPER/LOWER infection checklists look for signs and symptoms of local/superficial infection (UPPER) and deep infection (LOWER) to assist clinicians in identifying and distinguishing between these infection levels, facilitating appropriate treat with topicals vs. systemic antibiotics<sup>1</sup>. All checklist items are possible host responses to high levels of bacteria. This case series evaluated the utility of incorporating real-time information on high bacteria loads, via real-time bacterial fluorescence imaging<sup>2,3</sup>, into these checklists.

**Methods:** This was a prospective, multi-site observational study of 26 chronic wounds, including 9 pressure ulcers (PUs). Wound patients being seen by study clinicians for the first time were assessed with the checklists to look for signs or symptoms of local/superficial infection (UPPER) and deep infection (LOWER); three symptoms present from either checklist was the threshold for infection-positive. Fluorescence images of their wound were then acquired to look for regions of bacteria, which uniquely fluoresce red or cyan under the violet light of the imaging device<sup>2,3</sup>.

**Results:** 14 wounds (54%), including 7/9 PUs, were considered infected based on UPPER/LOWER checklists. Fluorescence images were positive for bacterial presence in each of these wounds. In 8 wounds (31%), including 2/9 PUs, adding bacterial fluorescence information brought the wound past the UPPER checklist threshold, greatly influencing treatment decisions. Culture results later confirmed fluorescence findings. In the remaining four wounds, three checks were not obtained even with fluorescence positive images. Interestingly, two of these wounds exhibited bacterial (red) fluorescence that was entirely removed with cleaning or debridement; post-debridement swabs were also negative, suggesting surface bacteria only and supporting the lack of UPPER/LOWER signs and symptoms in these patients.

**Conclusions:** These cases suggest that the UPPER/LOWER checklists and fluorescence images work in a complementary manner, with each providing additional, unique information not captured by the other. Therefore, incorporation of a bacteria-specific component into these infection checklists had high utility in pressure ulcers and other chronic wounds, identifying additional patients in need of topical antimicrobials, antibiotics, additional cleaning/debridement, and other and other bacterial targeted treatments.

### References:

1. Woo KY et al. Topical antimicrobial toolkit for wound infection. *Surg Technol Int* (2014).
2. Rennie MY et al. Point-of-care fluorescence imaging predicts the presence of pathogenic bacteria in wounds: a clinical study. *J Wound Care* (2017).
3. Hill R et al. Using Bacterial Fluorescence Imaging and Antimicrobial Stewardship to Guide Wound Management Practices: A Case Series. *Ostomy Wound Manage* (2018).

P6

## How effective is your wound cleanser? An evaluation using bacterial fluorescence imaging

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**Introduction:** Wound cleansing to remove surface bacteria is an essential component of wound bed preparation<sup>1</sup>. Most cleansers are cytotoxic, therefore our provincial authority mandates that only normal saline can be used<sup>2</sup>. The province recently conducted an evaluation across six sites of two novel, non-cytotoxic, tissue-compatible wound cleansers: a hypochlorous acid solution, and a modified sodium hypochlorite solution. Our site was uniquely able to assess relative product effectiveness due to our real-time bacterial fluorescence imaging device.

**Methods:** Wounds (n=15 including 5 pressure ulcers) were cleansed with normal saline, as per standard practice, after which a fluorescence image was acquired to visualize any concerning levels of bacteria remaining within and around the wound. Wounds were then soaked with hypochlorous acid for at least 5 minutes (per manufacturer guidelines), cleansed, and re-imaged. Lastly, wounds were then cleansed with a modified sodium hypochlorite solution and immediately re-imaged.

**Results:** Pseudomonas aeruginosa, which fluoresces cyan, was rampant in this patient series. Fluorescence images demonstrated that: (1) Pseudomonas and other bacteria often extend into peri-wound tissues, (2) saline cleansing left behind widespread bioburden in all wounds, and (3) modified sodium hypochlorite solution was superior to hypochlorous acid in removing Pseudomonas and other bacteria. In all wounds that were cultured (5/9) microbiology confirmed bacterial presence at moderate/heavy loads. Patients reported no product-related irritation or pain.

**Conclusions:** Our evaluation found that a modified sodium hypochlorite solution is superior to normal saline in cleansing a wound, and just as fast. Based on these results, we recommend that wounds exhibiting heavy bioburden be cleaned with modified sodium hypochlorite solution. These wounds can be identified from bacterial fluorescence images, without which this real-time evaluation of cleansing effectiveness would not have been possible and regions of concern could not have been specifically targeted.

### References:

1. Pilcher M. *Wound Cleansing: a key player in the implementation of the TIME paradigm*. *J Wound Care* (2016)
2. *British Columbia Provincial Nursing Skin & Wound Committee Procedure: Wound Cleansing* (2017)

**P7** Laboratory evaluation of two pressure redistributing mattress overlays

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**Introduction:** This study compared sacral and heel contact pressures while healthy volunteers rested upon two pressure redistributing mattress overlays, heel skin temperature was also recorded upon both overlays as one aspect of skin microclimate where elevated skin temperature may predispose individuals towards pressure ulcer development.

**Methods:** Ten adult volunteers (aged over 18 years, no upper limit) were invited to rest upon the support surfaces. Subjects were asked to wear loose fitting clothing during the measurement period and to lie upon each overlay in a supine position. The order of presentation of the support surfaces was made using a pre-determined randomisation schedule.

Contact pressure was measured using a pressure measurement mat\* (44cm by 44cm). Body contact area was measured with a special pressure mat\*\* with surface dimensions of 203 cm by 86 cm. Contact pressures were recorded for 20 minutes at the sacrum or heel. Both pressure mats were calibrated according to manufacturer guidance prior to data collection. Skin temperature was measured using an infrared temperature scanner while the subjects rested in a lateral position with no load applied to the heel. Five measurements of skin temperature were recorded at the point of insertion of the Achilles tendon into the right heel. The subjects then rested supine upon each mattress overlay for 30 minutes after which the temperature measurements were repeated.

**Results:** Table 1. Mean contact pressures measured upon the two mattress overlays: all peak and gradient pressures in mmHg, contact area in cm<sup>2</sup>.

Mattress Overlay	Sacrum			Heel		
	Peak (SD)	Gradient (SD)	Contact area (SD)	Peak (SD)	Gradient (SD)	Contact area (SD)
A	46.7 (7.6)	23.9 (14.7)	3215.5 (473.2)	106.7 (36.1)	78.2 (32.4)	3215.5 (473.2)
B	59.7 (16.9)	31.2 (17.2)	3175.4 (322.2)	103.3 (41.9)	84.7 (37.1)	3175.4 (322.2)

Table 2. Skin temperature in oC before and after 30 minutes rest upon the two mattress overlays.

Mattress Overlay	Right Heel	
	Before loading (SD)	After loading (SD)
A	25.6 (2.4)	25.9 (2.3)
B	25.5 (2.4)	25.9 (2.2)

The sacral peak pressure was higher upon overlay B (t=-2.80, df=8, p=0.02) while the change in skin temperature pre- and post- loading was greater upon overlay A (t=-2.46, df=p, p=0.04). No other comparisons achieved statistical significance.

**Conclusions:** The peak pressure at the sacrum was higher upon overlay B with skin surface temperature after 30 minutes similar upon both overlays. These findings indicate that two overlays were only differentiated using the peak pressure applied to the sacrum.

\* XSensor 3.0  
\*\* FSA BodiTrak

**P8** Patient participation in pressure ulcer prevention

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**Introduction/Background:** There is a focus on patient involvement in clinical practice. The health professionals are responsible for preventing pressure ulcer, and several guiding regional documents dictate this.

Despite that, many patients are still suffering from pressure ulcer during their hospital stay, and the experiences are that patients are not involved in pressure ulcer prevention.

The literature shows that patients don't get information of actions to prevent pressure ulcer, and that their options to gain participation in prevention of pressure ulcer, depends on the patients previous experiences with pressure ulcer<sup>1, 2</sup>

The aim of the study is to investigate whether patients who have contracted a pressure ulcer during hospitalization, find themselves involved in the prevention of pressure ulcer, and if so, in what way the patients feel involved in the prevention of pressure ulcer.

**Method:** Three interviews were conducted with patients who have contracted a pressure ulcer during hospitalization. The interviews were transcribed and themed, based on thematic analysis.

**Results:** The patients do not feel involved in the prevention of pressure ulcer, and they call for close contact and interaction with the health professionals. Patients must themselves ask for preventative measures to avoid pressure ulcer.

**Conclusion:** Patients experience nursing, where the values in the overall strategy at the hospital about patient involvement, are not included. The results show furthermore that the staff at the hospital do not works to prevent pressure ulcers. The regional guideline for prevention of pressure ulcer is not rooted in clinical practice.

**References:**

- LATIMER, S., CHABOYER, W. & GILLESPIE, B. 2014. Patient participation in pressure injury prevention: giving patients a voice. *Scandinavian Journal of Caring Sciences*, 28, 648-656.
- MCINNES, E., CHABOYER, W., MURRAY, E., ALLEN, T. & JONES, P. 2014. The role of patients in pressure injury prevention: a survey of acute care patients. *BMC Nursing*, 13, 1-15.

## POSTER PRESENTATIONS

## PIO

## Validity and reliability of the Norton, Braden and Waterlow risk assessment scales, in pressure ulcer risk assessment among surgical patients: a systematic review

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**Introduction:** Pressure ulcer incidence in the surgical setting is as high as 54.8%<sup>1</sup>, this raises questions pertaining to the sensitivity and specificity of commonly used risk assessment scales within the surgical care setting. The challenge with risk assessment scales might be related to the risk factors included in these, which do not actually reflect surgical risk. Additionally, undertaking a risk assessment before and after surgery may not accurately capture the risk experienced by the patient during the perioperative period. Thus, it is important to understand whether the most common risk assessment scales used, in particular Norton, Braden and Waterlow, measure risk in the surgical population in a reliable and valid way.

**Methods:** Systematic review, following the guidance of PRISMA. Cochrane Wounds Group Specialised Register, EBSCO CINAHL, MEDLINE and Web of Science were searched between May and April 2017. Data was extracted using a pre-designed data extraction tool. Data analysis consisted of a narrative synthesis and quality appraisal of the included studies was based on the EBL Critical Appraisal Checklist.

**Results:** 18 quantitative studies and 3 systematic reviews were identified, reporting the validity and reliability of the Norton, Braden and Waterlow scales, either individually, or in comparison to each other. The studies identified different sensitivities, specificities, positive and negative predictive values, that varied according to the cut-off score, type of care setting and population. Furthermore, most of the studies presented with methodological issues, questioning the certainty of the evidence. No studies focussed specifically on the surgical setting, particularly identifying risk during surgery, thus from the evidence reviewed here, the most commonly used risk assessment scales, Braden, Waterlow and Norton, may have limited applicability among surgical patients. Compounding the challenges with the current tools is that from the literature analysed, at least 130 risk factors were identified as being associated with the development of pressure ulcers in the surgical population.

**Conclusions:** Risk assessment is an important auxiliary process that can help identify those that present with risk factors for the development of pressure ulcers. However, the plethora of risk factors identified in the literature and the lack of a consensus on which is the most valid and reliable scale among the surgical population, makes it difficult to recommend any specific scale for use in this population.

**References:**

Karadag, M. and Gümmüşkaya, N. (2006) The incidence of pressure ulcers in surgical patients: a sample hospital in Turkey. *Journal of Clinical Nursing*, 15, 413-421.

## PIO

## Improving compliance to repositioning protocols for pressure ulcer prevention by posture monitoring: a pilot study

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**Introduction:** Pressure ulcers (PU) are among the most common conditions encountered in both acutely hospitalized patients and patients in need of long-term institutional care. Repositioning patients is a fundamental aspect of PU prevention [1]. Patients at risk are generally repositioned within a time interval ranging from two to four hours. Compliance to the repositioning protocols, however, is generally sub-optimal, ranging between 26% and 69% [2 - 4].

The objective of this pilot study is to investigate if continuous posture change monitoring with a novel, contactless sensor, and notifying caregivers when repositioning according to protocol is overdue, increases the compliance to a pre-existing repositioning protocol.

**Methods:** A single site, two phase, non-parallel, observational study was conducted at an internal medicine unit from March 2018 to November 2018. In the baseline phase the sensor measured patient posture changes while standard practice of care was performed. In the effect measurement phase, posture changes were measured while time since last posture change was visualized and caregivers were notified when repositioning was overdue. Compliance rates to the standard 3-hour repositioning protocol were calculated for both phases. A Student's t-test was performed to compare both compliance rates.

**Results:** Data from 25 patients was collected in the baseline measurement (N=3718 hr measuring with patient present in bed). In the effect measurement, data from 8 patients was collected (N=625 hr measuring with patient present in bed). Compliance to the repositioning protocol was significantly different between baseline (73%) and effect measurement (90%) (p=0.0346).

**Conclusions:** This study showed a positive effect in increasing the compliance to a pre-existing repositioning protocol when using a continuous posture monitoring device that visualizes time since last posture change and notifies caregivers when time for repositioning is overdue.

**References:**

1. Natalie K Bradford. "Repositioning for pressure ulcer prevention in adults: A Cochrane re-view". In: *International journal of nursing practice* 22.1 (2016), pp. 108-109.
2. Debra Saliba et al. "Adherence to pressure ulcer prevention guidelines: Implications for nursing home quality". In: *Journal of the American Geriatrics Society* 51.1 (2003), pp. 56-62.
3. Shayna E Rich et al. "Frequent manual repositioning and incidence of pressure ulcers among bed-bound elderly hip fracture patients". In: *Wound Repair and Regeneration* 19.1 (2011), pp. 10-18.
4. Barbara M Bates-Jensen et al. "Standardized quality-assessment system to evaluate pressure ulcer care in the nursing home". In: *Journal of the American Geriatrics Society* 51.9 (2003), pp. 1194-1202

## PII

### Preventing pressure injuries in hospitalized children: a patient safety and quality improvement project

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**Introduction:** A patient safety and quality improvement nurse at Children's Hospital got concerned about what she saw as an increase in Hospital Acquired Pressure Injuries (HAPI) among children at the hospital, especially related to medical devices and vascular devices in particular. They started monitoring the pressure injuries including blanchable erythema and in collaboration with the pressure ulcer specialist nurse and a quality consultant at the hospital a pressure injury prevention effort was planned. The intervention started in September 2018 with the aim to achieve a reduction of 50% and no pressure injuries at stage 3 or more within the first year of our effort.

**Methods:** We continued monitoring HAPI's including blanchable erythema at Children's Hospital by simple lists at every department and are presenting the data for leaders and clinicians. The quality consultant was visiting all departments as an 'outside eyes-colleague' to discuss pressure injury prevention in daily care with clinicians. The Children's Hospital is revising the clinical guidelines to make it shorter and more precise. We are changing the way we secure vascular devices and finally: We are establishing education and systematic training for clinicians in prevention and assessment of HAPI's starting with the dedicated pressure ulcer nurses and nurse assistants at the departments.

**Results:** In a period of more than one year there has been between 2 and 16 pressure injury's (including blanchable erythema) at the Children's Hospital every month, mostly blanchable erythema but also more severe pressure injuries. The patient safety and quality improvement project is ongoing and in September 2019 we will see our results after one year.

**Conclusions:** The project is ongoing but monitoring helps us to see where to focus our effort. In September 2019 we will see if we achieved our goal for the first year.

#### References:

- Murray JS, Noonan C, Quigley S, Curley MAQ (2013). Medical Device-Related Pressure Ulcers in Children: An Integrative Review. *Journal of Pediatric Nursing*. 2013, Vol. 28; pp. 585-595.
- National Pressure Ulcer Advisory Panel (NPUAP). *European Pressure Ulcer Advisory Panel (2014). Prevention and treatment of pressure ulcers: clinical practice guidelines. Second edition 2014.*
- Visscher M, King A, Me AM, Schaffner P, Taylor T, Pruitt D, Giaccone MJ, Ashby M, Keswani S (2018). A Quality-Improvement Collaborative Project to Reduce Pressure Ulcers in PICU's. *Pediatrics*, 2013; 13; e1950.

## PI2

### Developing objective methods to assess pressure ulcers risk in individuals with mental illness

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**Introduction:** Pressure ulcers (PUs) can develop if an individual spends too long sitting or lying in one position and commonly occur in individuals who may have both physical and mental health conditions. A relatively high PUs prevalence was reported in individuals with dementia and restricted mobility [1], although limited research has been conducted on these individuals to date. This study was designed to examine the feasibility of using bioengineering technologies to objectively monitor the risk of PUs in individuals with dementia.

**Methods:** The study included three distinct cohorts of participants namely: young adults (YA, 29-53 years); elderly able-bodied adults (OA, 60-77 years) and dementia participants (DEM, 71-98 years) recruited from a local care home. Two distinct approaches were used to monitor PUs risk, namely: collection of biomarkers [2] non-invasively from skin sites (left/right sacrum and wrist) using thin lipid absorbent surface\* and actimetry using a sensor\*\* at both the wrist and ankle. The magnitude and duration of activity was estimated using the Signal Vector Magnitude (SVM). These measures were conducted during prolonged sitting or lying postures (90 min) and ambulation (5 min walking).

**Results:** To match the daily routine of the DEM group, the test protocol was adapted and foreshortened from 90 min lying to 30 min sitting. Concentrations of the inflammatory biomarker, IL-1 $\alpha$ , were within the limits of detection (8-1000 pg/ml) for the three cohorts, although considerable inter-participant variability was observed in each sub-group (Fig.1).

Up-regulation of inflammatory biomarkers were observed at the wrist after extended wearing (120 min) of the accelerometer (Fig.1c), particularly in the DEM cohort (6/7). There was no evident effects in lying or sitting postures. Accelerometer data revealed high levels of activity for both able-bodied cohorts. By contrast, the DEM group revealed limited changes in SVM, with the ankle-mounted sensor providing the most representative data (Fig.2).

**Conclusions:** The study revealed that it was feasible to use both non-invasive biomarker sampling and actimetry to monitor PUs risk in healthy individuals and those with dementia. Some adaptation to the protocol was required to fit into the daily routine of the latter cohort. The location of actimetry devices was critical for accurate assessment of activity, distinguishing the DEM cohort from the able-bodied cohorts. An extended study is required to investigate the level of PUs risk for individuals with varying degrees of dementia.

\* Sebatape™ \*\* Activity AX3

#### References:

- [1] Jaul et al. (2017) *J Wound Care* 26(7):400-403. [2] Perkins et al. (2001) *Skin Res Technol* 7(4):227-37.

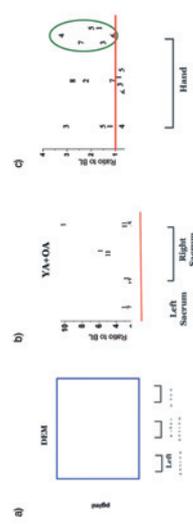


Figure 1. a) Concentrations of inflammatory biomarker, IL-1 $\alpha$ , for early dementia cohort collected from different sites (sacrum and hand) at baseline (B), and after loading the sacrum (S0) and the hand (L120). Individual data from each cohort for inflammatory biomarker ratios to baseline collected at the sacrum (b) and hand (c).

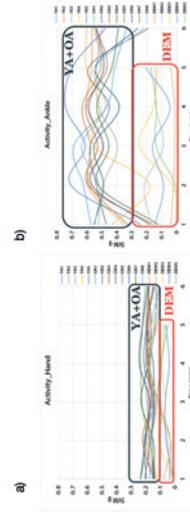


Figure 2. SVM data during ambulatory sessions for YA, OA and DEM cohorts when the accelerometers sensors are positioned at the a) wrist and b) ankle.

## POSTER PRESENTATIONS

## P13

## It's all about the base: a comparison of mattress ticking base materials to explore implications for pooling

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**Introduction:** A study by Haxby et al (2019)<sup>1</sup> demonstrated that using breathable material for the top of mattress tickings, can help reduce pressure ulcers; by wicking the moisture away from the patients, but there is little research into the choice of base material.

PVC is often used in the healthcare sector for base material on mattress tickings. PVC is not breathable, which can lead to moisture damage inside the mattress as moisture vapor from the patient passes through the mattress and cannot escape through the PVC causing a 'pooling' effect. There is little research available into the effects of pooling in medical mattresses.

This paper aims to explore the difference in temperature and humidity levels seen inside the mattress when using different materials for the base of mattress tickings.

**Methods:** Using temperature and humidity sensors, the microclimate of a mattress base was monitored to see how different PVC and polyurethane coated (PU) fabrics impacted the temperature and humidity levels inside the cover.

Using a castellated foam core mattress, sensors were placed throughout the layers of the mattress construction, a sweating torso was placed on top of the mattress to replicate a human body. Data was collected using a specific system\*. The test was run for 27.5 hours, with the Torso operational for the first 20 hours.

**Results:** It was found that when the base of the mattress ticking used a PVC coated fabric, the humidity at bottom of the mattress core rose quicker than with the PU coated fabric (191% / 9.2g/kg compared to 133% / 3.3g/kg).

Using a PU coated fabric keeps humidity levels lower at the mattress base and therefore could reduce the likelihood of 'pooling' occurring.

**Conclusions:** When specifying mattress tickings in a medical environment, it is important to consider the choice of fabric for the base as well as the top ticking, especially when teamed with a highly breathable top ticking.

A breathable base fabric with a higher MVP will allow more moisture within the mattress core to pass through, reducing the occurrence of pooling, and increasing the lifetime of the mattress.

**References:**

1) Haxby R, Pearce K, Scott J, Tittershall C, Turton T, Williams C. Support Surface Cover and Core: Working Together in Sweet Harmony: Presented at National Pressure Ulcer Advisory Panel (NPUAP) Annual Conference, St Louis, MO, USA 2019

\*Body View system supplied by Inside Climate

## P14

## Pressure ulcer risk assessment in Portuguese hospitalized patients

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**Introduction:** Despite all advances in healthcare, pressure ulcers (PUs) remain an old worldwide public health problem related to patient safety<sup>1</sup>. Hospital-acquired pressure ulcers are one of the most harmful events in the clinical context<sup>1</sup>. Therefore, this study aimed to analyze the relations with risk assessment (RA) according to the Braden Scale (BS) in hospitalized patients on first and last RA during the Portuguese National Program of Patient Safety 2015-2020<sup>2</sup>.

**Methods:** A retrospective cohort analysis of an electronic health record database of patients admitted to medical, general surgery and orthopedic wards (randomly selected) in 2016 was analyzed. A sample of 3904 patients was obtained following ethical approval and the inclusion criteria were: age  $\geq 18$  years and a minimum stay of 48h.

**Results:** On both risk assessments (first and last) high risk of develop a PU (score  $\leq 16$ , according to Portuguese validation of Braden Scale)<sup>3</sup> is related with admission way, previous hospital stays, living with, speciality ward admission, medical diagnosis according to ICD9 classification and had a PU on admission. On first risk assessment, high risk of develop a PU is also related with sex. It was found a relation with being female, live on a nursing home/long-term care, being admitted by the emergency department and the ICD9 diagnosis related with circulatory system; neoplasms; digestive system; musculoskeletal and connective tissue; endocrine, nutritional and metabolic; and hematologic diagnosis. On last risk assessment, high risk of develop a PU is also related with age, length of stay and patient discharge. It was found a relation with lived on a nursing home/long-term care, being admitted by the emergency department and the ICD9 diagnosis related with injury and poisoning; respiratory system; and genitourinary system.

**Conclusions:** the relations with high risk of develop a PU is not the same on first and last RA. The use of 'low risk' concept, which may induce staff to not consider those patients as an at-risk group and, therefore, do not implement prevention properly.

**References:**

1) Slawomirski, L., A. Aauraen and N. Klazinga (2017). The economics of patient safety: Strengthening a value-based approach to reducing patient harm at national level. Working Papers, No. 96, OECD Publishing. <https://doi.org/10.1787/5a9858cd-en>. 2) DGS. (2015). Plano Nacional para a Segurança dos Doentes 2015-2020. Diário da República Retrieved from [https://dre.pt/application/file/66457154\\_3](https://dre.pt/application/file/66457154_3) DGS. (2017). Escala de Braden: Versão Adulto e Pediátrica Retrieved from [https://www.dgs.pt/departamento-da-qualidade-na-saude/ficheiros-anexos/orientacao\\_ulceraspdf.pdf.aspx](https://www.dgs.pt/departamento-da-qualidade-na-saude/ficheiros-anexos/orientacao_ulceraspdf.pdf.aspx)

## PI 5

## Hospital-acquired pressure ulcer prevention: What is more effective?

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**Introduction:** Despite all advances in healthcare, pressure ulcers (PUs) remain an old worldwide public health problem related to patient safety<sup>1</sup>. Hospital-acquired pressure ulcers are one of the most harmful events in the clinical context<sup>1</sup>. Therefore, this study aimed to evaluate the evidence available regarding effective approaches to PUs prevention in hospitalised adults, using the range of decreasing incidence to measure effectiveness.

**Methods:** This systematic review was performed and recorded in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines. Studies were identified from searches in EBSCO, PubMed and Web of Science databases from 2009 (regarding the 1st edition of international guidelines – (NPUAP/EPUAP/PPPIA, 2014)<sup>2</sup> up to December 2018. Studies were selected if they were prospective original studies published in English, French, Portuguese, or Spanish; the incidence of PUs was the primary outcome; participants were adults (≥ 18 years) admitted in hospital wards and/or units. The studies' appraisal was performed using the EBL Critical Appraisal checklist.

**Results:** Were included 26 studies. Studies related to prophylactic dressings applied in the sacrum, trochanters and/or heels, education for healthcare professionals, preventive skin care and system reminders on-screen in-patient care plan, were statistically significant to effective to decrease PUs. Most of the studies related to multiples interventions programmes were effective to decrease PUs occurrence. Single interventions namely support surfaces and repositioning, were not always effective to prevent PUs. Repositioning only was effective when supported by technological pressure mapping feedback or by a patient positioning system. Risk-assessment tools are not effective to prevent PUs.

**Conclusions:** PUs in the hospital context are still a worldwide issue related to patient safety. Multiple interventions programmes in compliance with advanced practice wound care nurse's regulation was more effective to decrease PUs occurrence than single interventions in isolation. When single interventions (prophylactic dressings, support surfaces, repositioning, preventive skin care, system reminders, education for healthcare professionals) were effective to decrease PUs, was always in compliance with other preventive measures. These results provide an evidence-based guide to hospital healthcare professionals and administrators for clinical practice effective to prevent PUs.

**References:**

- 1 Slawomirski, L., A. Aaraaen and N. Klazinga (2017). *The economics of patient safety: Strengthening a value-based approach to reducing patient harm at national level*. Working Papers, No. 96. OECD Publishing. <https://doi.org/10.1787/5a9858dad-en>. 2) National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance (2014). *Prevention and Treatment of Pressure Ulcers: Quick Reference Guide*. Emily Haesler (Ed.), Australia

## PI 6

## Negative Pressure Wound Therapy in cavity pressure ulcers treated at home: clinical case

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**Aim:** Pressure ulcers (PU) constitute a constant challenge for all health professionals all over the globe. NPWT treatment for Pressure Ulcers facilitates quicker healing rates, which will provide health economic benefits for the organisation and quality of life benefits for the patient. Aim: Describe strategy of treatment of Cavity pressure ulcers in a cavity on the Sacral area.

**Methods:** Female, 76 years, Cavity pressure ulcer with 4 months of evolution, actually at home after admission at the hospital per acute disease and infection were the PU developed. Total dependency of daily life activities. NPWT was used to prepare the wound bed and later to increase granulation tissue was carried out in the community setting. It was treated for four weeks (= 6 dressing changes) with NPWT.

**Results / Discussion:** Cavity pressure ulcer category IV. Wound Area of 370 cm<sup>2</sup>. More than 50% area with necrosis, undermining and tunnelling present, huge amount of exudation and some maceration of the perilesional skin. There was an improvement in terms of reduction in wound size and/or reduction in necrotic/slough tissue and increase in granulation tissue. With a 150ml capacity canister and weighing only 250g it is ideal for providing discreet, lifestyle compatible NPWT. The exudation and odour were immediately controlled in two sessions for this product

**Conclusion:** Clinical evidence of the superiority of NPWT over conventional wound dressing techniques for all wound types has not been totally proven. However, there is a lot of clinical evidence of its superiority over conventional wound dressing specially when we talk about odour and highly exudation wounds. This technology reduces the healing time and increases the possibility of success of treating a complex, cavity wound.

## POSTER PRESENTATIONS

P17

## Pulsated irrigation to clean and debride cavity pressure ulcer in community: clinical case

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**Aim:** Pressure ulcers (PU) are considered to an adverse event and constitute a constant challenge for all health professionals and institutions. Closed Pulse Irrigation (CPI) offers an innovative and safe pulse irrigation system to provide selective hydro-mechanical debridement to chronic non-healing wounds. Aim: Describe strategy of treatment of Cavity pressure ulcers in several anatomic areas, evaluating safety and efficacy of a pulsated irrigation to clean and debride the wound bed, providing conditions to advanced dressings, Negative Pressure Therapy or surgery.

**Method:** Male, 46 years; Cavity pressure ulcer with 6 months of evolution, admission at the hospital per acute disease and infection. Total dependency of daily life activities, well nourished. CPI was carried out both in the hospital and community setting. In all cases wounds were treated for four weeks (=4sessions) with CPI.

**Results / Discussion:** Cavity pressure ulcer category IV. Wound Area of 270 cm<sup>2</sup>. Initially more than 50% area with necrosis, undermining and tunnelling present, moderate exudation and some maceration of the perilesional skin. There was an improvement in terms of reduction in wound size and/or reduction in necrotic/sloughy tissue and increase in granulation tissue. CPI uses low pressure irrigation (8–15psi) with volumes 3000ml of saline. The area was prepared for Surgical intervention or conventional treatments

**Conclusion:** Pulsated Irrigation has demonstrated excellent ability to clean and debride the wound bed surface creating the conditions to a more advanced intervention as NWPT in the community, with safety on the infection control regarding the use of irrigation bags, providing the ideal environment for healing ensuring the quality of life of the patient / family. This technology reduces the healing time and increases the possibility of success of treating a complex, cavity wound at the patient's home.

P18

## Using the Ottawa model of research use to implement a pressure ulcer prevention bundle on intensive care

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A pressure ulcer (PU) prevention bundle aimed to improve skin integrity of critically ill patients in intensive care (ICU), was tested through a randomized control trial (Tayyib et al., 2015). This study explores whether using a knowledge translation framework, the Ottawa Model of Research Use (OMRU), can assist the advanced practice nurse to implement new evidence (the PU prevention bundle) appropriately and successfully into practice. The use of new evidence should enable patients to receive the most up to date, evidence based care, improve the quality of care the patient receives, and enhance patient safety. Evaluation of the PU prevention bundle implementation process demonstrated significant reduction in PU incidence and improvements in patient skin care clinical practice with high registered nurse compliance. Consequently, the promotion of patient safety and improved quality of patient care in the ICU were achieved. Moreover, the OMRU model provided a successful consolidated framework for implementation of evidence based care in an effective, efficient, and consistent manner into daily clinical practice nursing (Hogan & Logan, 2004; Tayyib & Coyer, 2016).

**References:**

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**P19**

Maintenance of the 30 degree side lying lateral tilt position in bed: an observational study

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**Introduction:** Turning and positioning of immobile patients who are in bed can assist to prevent pressure injuries (1) however to be effective this intervention must keep the body in the desired position until the next scheduled position change. This is particularly the case when a side lying lateral tilt position is used to prevent sacral pressure injuries among residential aged care (long stay or nursing home) patients.

**Methods:** An observational study was conducted in a residential aged care facility in Australia. Participants were over 18 years of age, at high risk of developing pressure injuries, and needed full assistance to move and position when in bed. Participants were monitored during positioning under two conditions, with pillows and with a fluidized positioner. Body angle measurements were taken with an iPhone digital gravity inclinometer application at three time points (baseline, one hour and two hours) on ten occasions (a total of 324 observation measurements). Repeated measures analysis assessed the difference in the degree of the angle of the body.

**Results:** The sample (n=12) was 83 years of age on average and immobile when in bed. The average angle with the pillow condition was 26.7° at baseline, 21.5° at one hour, and 16.6° at two hours. The average angle with the fluidized positioner condition was 30.7° at baseline, 29.3° at one hour, and 26.8° at two hours. The main effects for Condition and Time were significant; Condition:  $F(1,11) = 14.378, p < 0.001$ , Time:  $F(2,22) = 45.858, p < 0.001$ . There was a statistically significant interaction between the effects of Condition and Time on the average lateral tilt position,  $F(2,22) = 15.574, p < 0.001$ .

**Conclusions:** The study found that the difference in the measurements between the pillow and fluidized positioner conditions became larger as time increased, and that the difference was smaller for the fluidized positioner condition compared to the pillow condition between the three time points. The use of the purpose-designed fluidized positioner therefore was associated with better maintenance of the side-lying body position when compared to use of the pillow. Further research is required to determine the effectiveness of the fluidized positioner for pressure injury prevention.

**References:**

1. National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel, Pan Pacific Pressure Injury Alliance. *Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline*. Osborne Park, Australia: Cambridge Media; 2014.

**P20**

The clinical effectiveness of a turning and positioning system compared to usual care devices for preventing pressure injuries in the ICU: RCT Protocol

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**Introduction:** Practice guidelines recommend turning and positioning of the body to prevent pressure related skin damage (1), however evidence of the effectiveness of turning and positioning systems for preventing pressure injuries is lacking. The aim of the study is to determine the clinical effectiveness of a system for turning and positioning ICU patients, when compared to usual care turning and positioning devices, for preventing pressure injuries.

**Methods:** The study is an investigator initiated, prospective, multi centre, two group, non-blinded, randomised controlled trial. The study setting is a large ICU in Australia. The primary outcome is the incidence of pressure injuries in both intervention and control groups during the study period. Study participants will be >18 years of age, admitted to the ICU, and at high risk of pressure injury development. Participants will be randomised to the intervention group (to receive care with a turning and positioning system) or the control group (to receive care with the usual care slide sheet and pillows) for the duration of their ICU stay. The sample size is n=215 per group (n=430 total). Data collection includes demographics, ICU stay characteristics, diagnosis and treatment, adherence to treatment, and pressure injury development. The analysis will be based on intention to treat protocol.

**Results:** This presentation will consider the background to the research, the current evidence for turning and positioning systems, and the study protocol of this prospectively registered clinical trial.

**Conclusions:** This study is the first identified randomised controlled trial to determine the clinical effectiveness of a system for turning and positioning ICU patients, when compared to usual care turning and positioning devices, for preventing pressure injuries. The results will inform the evidence base for best practice in pressure injury prevention in the ICU setting.

**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*. 2014. Cambridge Media: Osborne Park, Australia.

## P21

## Caregivers overload of patients with pressure ulcers in a community care setting of Portugal

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**Introduction:** Caregiver burden has been recognized as a problem for over 30 years; nonetheless, the studies regarding this issue, in the informal caregivers of pressure ulcer (PU) primary care patients, are almost nonexistent.

Our aim was to assess the burden experienced by the caregivers of PU patients and the possible factors that might contribute to its existence.

**Methods:** This cross-sectional study enrolled 54 primary care patients and their caregivers. The study was approved by the Local Ethics Committee. To access the burden experienced by the caregivers it was used the Zarit Burden Interview (1-2), Short Form version (ZBI) that was self-applied by the caregiver. We assessed pressure ulcer status and demographic variables of the patients from their medical and nursing records. All tests used were previously validated for the Portuguese population and available for public use (1).

We used SPSS vs. 25.0 for Windows 10 for statistical analysis. Kolmogorov-Smirnov test was used to assess normality and Spearman test to assess the correlation between variables.

**Results:** Patients (n=54) were elderly, mean age 82 ± 9.92 years, mainly female (64.8%), with an average of 1.47±0.73 pressure ulcers. The informal caregivers (n=46) were primarily female (85.4%), average age 56± 11.59 years, 80.4% with only basic scholarship, 20.8% unemployed, 14.6% retired, 60.4% were the patient offspring and 14.8% their spouses, on average they reported that they spent 10.20± 8.1 hours taking care of the patients. ZBI score of the caregivers (n=46) was on average of 14.63±9.59, 37.0% reported high burden. We didn't find any correlations between caregiver burden and number of pressure ulcers (p=0.55), number of hours spent taking care of the patient (p=0.22), age (p=0.17) and sex (p=0.86) of the caregiver.

**Conclusions:** Over 1/3 of the caregivers of the PU patients report high burden, we didn't find any correlation with the variables analyzed probably due to the small sample.

**References:**

- 1) Bédard M. et al. *The Zarit Burden Interview: A new Short Version and Screening Version. The Gerontologist*, 41 (5): 652-657, 2001.
- 2) Ferreira F. et al. *Validação da escala de Zarit: sobrecarga do cuidador em cuidados paliativos domiciliares, para a população portuguesa. Cadernos de Saúde*, 3(2):13-19, 2010.

## P22

## Supporting the implementation of a pressure redistribution product to reduce patient harm whilst being cost neutral and demonstrating how a business case supported this both clinically and financially

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**Introduction:** In the UK pressure ulcers represent a significant patient harm, and can cause pain and distress to patients and their families. They are expensive to local health economies with reported daily care costs ranging from £43 to £3741. Length of hospital stay is known to increase significantly for patients with a pressure ulcer<sup>2</sup>. For nursing teams who are working in an extremely challenging and demanding environment caring for patients with pressure damage is challenging and labour intensive.

**Methods:** Despite the high profile around pressure ulcer care and prevention, and introduction of different national and local initiatives over recent years, e.g Stop the Pressure day, educational days, pressure ulcer champions and root cause analysis investigations, the prevalence of hospital-acquired heel pressure ulcers in one NHS Trust remains persistently high. Heels are the second most common site for pressure ulcers<sup>3</sup>. Complete removal of pressure is central to their prevention and management<sup>4</sup>. Heel offloading devices can be used to provide additional protection to the heels. Whilst there is debate on the merits of different types of heel offloading devices, international guidelines<sup>6</sup> suggest that heels with category 1 and 2 damage can be elevated on pillows and other devices should be used for managing category 3 and 4 heel pressure ulcers.

To support the reduction of prevalence rates of hospital-acquired heel pressure ulcers within the Trust, the Tissue Viability Team undertook a project to implement the use of heel lift devices in line with best practice guidelines. The particular heel products being considered were reusable and available as a heel offloading boot and a wedge.

**Results:** To secure senior management agreement for the project, a business case was presented. Using data from the Safety Thermometer, the case showed the Trust had above national average pressure ulcer prevalence and presented prevalence data for hospital-acquired heel pressure ulcers over two years 2017 and 2018. Costs for treating these pressure ulcers were provided via the pressure ulcer productivity calculator

**Conclusions:** The case sets out the cost of purchasing the Heel offloading device, products and showed that purchase and implementation of the product was financially cost neutral whilst delivering pressure area care in line with best practice guidelines.

**References:**

1. NHS Improvement, 2017; Bennett, Dealey and Posnett, 2012
2. Theisen, 2012.
3. Clark et al 2004; Ousey 2009
4. EPUAP 2014; Ousey 2009
5. Ousey 2009; EPUAP 2014
6. EPUAP 2014

**P23**

**An analysis of property risk factors of intraoperatively acquired pressure injury in the park bench position by propensity score and machine learning**

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**Introduction:** The park bench position is the position most likely to induce pressure injury during surgery. We examined causes of intraoperative acquired pressure injury (IAP) in the park bench position in three studies and identified surgery duration, interface pressure, and microclimate as risk factors. However, it is practically impossible to shorten the operation time to prevent IAPA or to perform intervention to reduce the interface pressure during surgery. Therefore, after a statistical analysis using propensity scores, we re-analyzed the data from those three studies in detail using LightGBM model, a machine learning method.

**Methods:** We conducted a retrospective study of 344 patients from a single center who underwent neurosurgery under general anesthesia in the park bench position between April 2010 and September in 2012. Twenty-nine items were examined. We compared the presence of IAPI as the dependent variable using propensity scores calculated by matching age, gender, and surgery duration. The cut-off value of the core temperature at the end of surgery was calculated from the receiver operating characteristics curve. We also created a model using the LightGBM and evaluated the relationship between the explanatory variables (above) and objective variables (with Plvs. without PI) using partial dependence plotting. In addition, we analyzed the interaction risk between multiple explanatory variables.

**Results:** IAPI developing in 50 of the 343 patients (incidence: 14.6%). After matching, 212 patients were analyzed and IAPI developed in 41 patients. The average values for age, body mass index (BMI), surgery duration, and core temperature at the end of surgery were  $44.2 \pm 13.7$  years old,  $22.5 \pm 3.5$ ,  $6.5 \pm 1.2$  h, and  $37.9 \pm 0.6$  °C, respectively. A core temperature  $\geq 38.1$  °C was significantly associated with IAPI development (odds ratio: 5.65, 95% confidence interval: 2.94-11.30,  $P < 0.0001$ ). In the analysis by LightGBM model, a core temperature  $\leq 37.4$  °C carried the lowest risk, while that of  $37.6$ - $37.9$  °C carried the second lowest risk. A core temperature  $\geq 38.1$  °C had the highest risk of IAPI development. In addition, the BMI was extracted as a factor associated with risk. The risk of IAPI was lowest for a BMI of 17-22, and both high and low BMI values carried an increased risk of IAPI. There was no association between the core temperature and BMI. Conclusions: Maintaining normothermia below  $37.4$  °C has been shown to be important for IAPI prevention.

**P24**

**Clinical experience of managing pressure ulcers in our center**

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**Introduction:** The management of pressure ulcers is a challenge in many medical institutions. Pressure ulcers have a significant impact on emotional and physical health, quality of life and health care costs. In this study, our department would try to help pressure ulcers management by analyzing the clinical data of pressure ulcers patients.

**Methods:** From January 2011 to December 2018, 74 cases of pressure ulcer patient admitted to our department through outpatient clinic and emergency department of the hospital. Clinical data including pressure ulcer location, underline disease, reconstructive surgery methods, complications, and so on were analyzed. The recurrence was aimed at those who were re-admitted to the hospital after having discharged from the hospital.

**Results:** The mean age of patients with pressure ulcers was 55.9 years old. The locations of pressure ulcers are in the coccygeal area (n=40), great trochanter (n=20), and buttock (n=13). The risk factors are immobility (n=38), Paraplegia (n=27), DM (n=25) and CVA (n=10). The surgical reconstruction methods were local flaps (n=51), regional flaps (n=32), STSG (n=15), and free flaps (n=5). Complications during hospitalization were infection (n=37), osteomyelitis (n=13), fistula (n=10) and sepsis (n=2). The overall relapse rate is 29.7%.

**Conclusions:** It occurs at the highest frequency in the coccygeal area where pressure and shearing stress was applied. Immobility (32%), Paraplegia (40.9%) patients had higher recurrence rate. The free flap patients had no recurrence and could be discharged early. Pressure ulcers should be understood and managed with more care.

**References:**

- Review of the Current Management of Pressure Ulcers. Boyko TV, Longaker MT, Yang GP. *Adv Wound Care*. 2018 Feb 1;7(2):57-67
- Prevention and management of pressure ulcers. Dini V, Bertone M, Romanelli M. *Dermatol Ther*. 2006 Nov-Dec;19(6):356-64
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## POSTER PRESENTATIONS

P25

## Risk factors of pressure injury development in an acute care facility in Korea

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**Introduction:** To identify risk factors independently predictive of pressure injury development in adult patients in an acute care unit. To analyze risk factors of pressure injury patients, we will expand the meaningful high risk group for prevention.

**Methods:** we analyzed with pressure injury data that occurred between January 1, 2016, and November 31, 2016, regarding Pressure injury status and risk factors to influence pressure injury occurring. Educate to nurses about pressure injury high risk and preventive care for pre pressure ulcer state.

**Results:** Most of the high-risk patients with pressure injury was identified by Braden-scale scoring, but some patients with high scores also developed pressure injury. If fasting is more than 3 days or albumin level is less than 3.0. And those with edema were managed at high risk. Nurses are aware not only high-risk patients, is based on EPUAP & NPUA guideline, but also the high-risk patients of general wards suitable for the characteristics. It reduces the Pressure injury occurrence by more active intervention on the prevention of Pressure injury. It became an important factor.

**Conclusions:** By analyzing the root causes of pressure ulcers occur, we expanded high-risk group with the patient's general condition. In general wards, it is necessary to prevent pressure injury by enlarging the high risk group of pressure injury. In addition to the Braden scale, additional risk factors associated with the patient's general condition should be identified.

**References:**

Webster, J., Coleman, K., Mudge, A., Marquart, L., Gardner, G., & Stankiewicz, M. (2010). Pressure ulcers: effectiveness of risk-assessment tools. A randomised controlled trial (the ULCER trial). *BMJ Qual Saf* 2011; 20 (4): 297-306.

P26

## Adaptation of the evidence based nursing practice guideline: prevention and management of moisture associated skin damage

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**Introduction:** This study was done to develop an evidence-based nursing clinical practice guideline for Moisture associated skin damage (MASD) prevention and management in Korea.

**Methods:** The guideline adaptation process was used and conducted according to the guideline adaptation manual developed by the Korean hospital nurses association. It consists of three main phases and 9 modules including a total of 24 steps.

**Results:** The adapted MASD clinical practice guideline was consisted of 4 sections: 8 domains and 28 recommendations. The numbers of recommendations in each section was: 7 on MASD assessment, 14 on MASD prevention and management, 4 on education, and 3 on organizational policy. There were 3.6% of the recommendations marked as A grade, 28.6% of B grade, and 67.8% of C grade.

**Conclusions:** This MASD clinical practice guidelines is first developed in Korea. The developed guideline will contribute to standardized and consistent MASD prevention and management. The guidelines can be recommended for dissemination and utilization by nurses nationwide to improve the quality of MASD prevention and management. Regular revision is recommended.

**References:**

British Columbia Provincial Nursing Skin & Wound Committee (2017). *Guideline: Assessment, Prevention and Treatment of Moisture-Associated Skin Damage (MASD) in Adults & Children.*

**P27**

Investigating the dissemination of microbiota between pressure ulcer and bed environment

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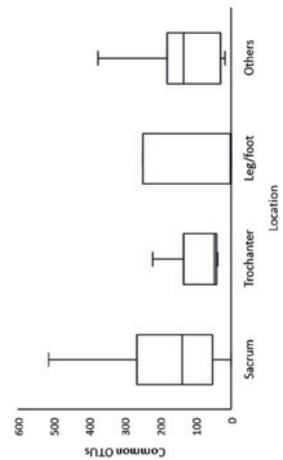
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**Introduction:** Pressure ulcer infection is an extremely serious complication which can be life-threatening. To prevent pressure ulcer infection, clinicians need to eliminate the source of bacterial bioburden. We focused on the bed environment, especially sheets as the hotbed for bacteria because many patients with pressure ulcers are immobile and spend all of their time in bed. The purpose of this study was to explore whether there is dissemination of microbiota between wound and bed environment as the first step toward the development of a new preventive care for wound infection.

**Methods:** A cross-sectional study was conducted at a long-term care hospital between October and November of 2018. The participants were hospitalized patients aged ≥65 years with pressure ulcers. Microbiota samples were obtained from three regions: wounds, skin, and sheets near the buttock area as the bed environment sample. Microbiotas were determined by 16S ribosomal RNA gene sequencing. Sequences were clustered into operational taxonomic units (OTUs) at 100% sequence similarity. This method can track the bacteria at the strain level at a low cost compared to whole genome sequence analysis. Common OTUs among the wound, skin, and bed environment sample within every individual were investigated. Study ulcers were divided into four groups according to the wound location: sacrum, greater trochanter, leg/foot, and others. The number of OTUs were compared among each group. The study protocol was approved by the ethics committee.

**Results:** Twenty-two pressure ulcers were analyzed in this study. The sacrum region (9 wounds, 40.9%) was the most common location, followed by the greater trochanter (3 wounds, 13.6%). The number of OTUs identified from all of the microbiota samples were 1,385,008. Twenty-one wounds (95.5%) had common OTUs among wound, skin, and bed environment samples. The median number of common OTUs was 98 (IQR: 30-249). The median number of common OTUs of ulcers located in the sacrum, greater trochanter, leg/foot, and others regions were 137, 48, 2, and 135, respectively. There was no significant difference in the number of common OTUs between each group.

**Conclusions:** This study suggested that there is bacterial dissemination across the bed environment of patients with pressure ulcers regardless of wound location. The bed environment might be important as a target for infection control. Further study will be needed to investigate the impact microbiota in the bed environment have on pressure ulcer infection.



**P28**

Medical device related pressure injuries to children in the intensive care unit

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**Introduction:** Medical devices that are attached to children put pressure on their skin or mucous membranes, and the devices can lead to injuries. This pilot study was conducted to investigate the incidence and characteristics and factors associated with the development of medical device related pressure injury (MDRPI) in pediatric intensive care unit (PICU).

**Methods:** For this pilot study, we analyzed consultations to the WOCN for pressure injury management from the pediatric intensive care unit between January 1 and December 31, 2018. Data related to patient were collected through the electronic medical record. Pressure injuries were staged according to the American National Pressure Ulcer Advisory Panel Consensus Development Conference recommendations.

**Results:** Of the consultations from pediatrics department, forty-seven pediatric patients developed 75 hospital-acquired pressure injuries. Among these, 47(62%) cases were caused by MDRPI in 26 (68%) patients. The demographic characteristics of MDRPI were boy 58%(15), mean age 3 years and age range from 1 month to 16years. Medical devices that caused pressure injuries on respondents were electroencephalography(30%), Levin tube(6%), orthotics(6%), A-line(4%) and etc(8%). 15 (32%) were Stage I, 15 (32%) were Stage II, 8 (17%) were suspected deep tissue pressure injury, and 9(19%) were unstageable. Of the 47MDRPI, 41(87%) involved the head.

**Conclusions:** PICU patients at risk include those supported on medical device. This study provides data for the general PICU population from which pediatric interventional studies can be designed to reduce the incidence of pressure ulcers in this vulnerable patient population. Further research is recommended to improve the power of related research and development in risk assessment of pressure injuries caused by medical devices in children.

**References:**

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- Jackson D, Sarki AM, Bettenridge R, Brooke J. Medical device-related pressure ulcers: A systematic review and meta-analysis. *Int J Nurs Stud.* 2019 Apr;92:109-120.

## POSTER PRESENTATIONS

P30

## Investigation of the buttock soft tissue stiffness at the ischial tuberosity in healthy volunteers using an ultrasound instrumented chair set-up

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**Introduction:** In the field of Pressure Ulcer Prevention (PU), several Finite Element models of the buttock have been proposed based on the rationale that estimating the internal mechanical conditions within loaded soft tissues has the potential of improving the management and prevention of PU. These studies have considerably advanced the analysis and understanding of the potential internal risks of the seated individual. Yet, several barriers exist to the clinical translation of these tools. Amongst these, most of the studies in the literature used data obtained from animal experiments, cadaver specimens even though it has been established that uncertainty of material properties has a significant impact on localized soft-tissue strains. This is highly challenging bottleneck for the whole community today.

**Methods:** In this contribution, a custom-made chair equipped (figure 1) with a 6-component force-torque sensor\* and ultrasound probe\*\* was custom-made for investigating inter-individual variability of soft-tissue stiffness at the ischial tuberosity. Force-displacement data were collected in 4 healthy volunteers (3 men and 1 woman) in both the frontal and the sagittal planes. Assuming the indentation of an infinite elastic layer bonded to a rigid boundary as a model of the experiment, the effective Young's modulus of the subcutaneous tissue was computed using an analytical solution.

**Results:** Experimental curves of the force-displacement response in both frontal and sagittal planes during unloading are provided in figure 2. The average ratio of the initial (maximum) load measured by the sensor and the total weight of the individual was 73% (84%, 66%, 75%, and 69% respectively). The effective Young's modulus of the subcutaneous tissue was on average 170 kPa (208 kPa, 139 kPa, 207 kPa, 128 kPa respectively).

**Conclusions:** Preliminary results demonstrate the proof-of-concept for investigating inter-individual variability of soft-tissue stiffness at the ischial tuberosity in strain domains compatible with DTI prevention. The results also highlight the high individual variability stressing on the need for individualizing the mechanical properties. One main challenge consists in the reliable and effective detection of the ischium in the US images. The feasibility of using this protocol for assessing inter-individual variability of soft-tissue stiffness in the SCI population will also be explored.

\*model: SH100D1002A2, resolution: 0.1 N, Sensix, Poitiers, France

\*\*SL15-4 Aixplorer, SuperSonic Imagine



Figure 1: Custom-made chair equipped with a 6-component force-torque sensor and ultrasound probe  
Figure 2: Force displacement response obtained in 4 healthy volunteers in both the frontal and the sagittal planes

P29

## Teaching of pressure injury prevention using a virtual learning environment for spinal cord injuries patients and caregiver

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**Introduction:** In 2013, a virtual learning environment (VLE) was developed, based on internet access, about prevention of pressure injury (PI) for the education of individuals with spinal cord injuries (SCI) and their caregivers. To update the VLE content, this study was proposed with the following objectives: To review and adapt the VLE "Pressure ulcer prevention" content according to the new guidelines from NPUAP 2016<sup>2,3</sup> and to format and publish updated content on PI prevention in VLE.

**Methods:** This is an applied methodological technological production research, descriptive and exploratory. The two phases were used: Phase 1 - Review and description of the new terminology and classification of PI according to NPUAP 2016<sup>2,3</sup> and to guidelines for PI prevention<sup>4</sup>. Phase 2 - Formatting and publishing updated content in VLE.

**Results:** Phase 1: Update according to Guidelines. According to the publication of the NPUAP 2016, the nomenclature "Pressure ulcer" was replaced by PI and the stages were classified only with arabic numerals. Two new categories were added: Medical Device Related PI and Mucosal Membrane PI. Phase 2: Formatting and publishing updated content. All updated content was evaluated and appropriate language and image resources were used for a better understanding of the target population. After that, the update content was formatted and published in VLE.

**Conclusions:** The VLE update content has become necessary to teach individuals with SCI and caregivers on PI prevention, providing quality knowledge and autonomy of care.

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**P31**

Routine assessment of chronic wounds with a handheld imaging device can efficiently incorporate wound area and bacterial fluorescence information at the point-of-care: a 50-patient clinical trial

Liis Teene<sup>1</sup>, Laura Jones<sup>1</sup>, Stephanie Fedorov<sup>1</sup>, Monique Y. Rennie<sup>1</sup>, Kim Tapang<sup>2</sup>, Ron Linden<sup>2</sup>

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**Introduction:** Real-time knowledge of a wound's size and bacterial status during routine wound assessment could facilitate more rapid treatment decision making. A handheld imaging device\* with wound measurement and bacterial fluorescence (FL) detection capabilities<sup>1</sup> was evaluated as part of a clinical trial (#NCT03754426).

**Methods:** 50 wounds (36 DFUs/4 VLU/3 arterial ulcers/7 other types) were imaged. Two wound measurement stickers were placed around the wound for calibration and a standard photo was taken, from which the device measurement software recorded wound area (cm<sup>2</sup>) as well as the maximum length and width of the wound. Stickers were removed, the room was made dark, and the device's safe violet light was used to illuminate the wound for fluorescence imaging. Wounds exhibiting red/pink/blush or cyan fluorescence were considered bacterial fluorescence positive<sup>1</sup> and swab cultures were obtained for validation.

**Results:** Capturing images required approximately one minute of time. 48/50 wounds (96%) were easily measured using the device software. The remaining two wounds failed to measure due to inappropriate sticker placement, preventing sticker detection. The average wound area, based on wound circumference, was 5.1 cm<sup>2</sup> (range: 0.3 – 43.4 cm<sup>2</sup>). In contrast, computing wound area based on conventional maximum length and width calculations resulted in a 70% overestimation compared to circumference-based measurements. 36/50 wound images (72%) were positive for red/pink/blush or cyan fluorescence. Cultures confirmed that red and cyan on fluorescence images was associated with moderate-to-heavy bacterial loads. Predominant species included *Staphylococcus aureus* and *Pseudomonas aeruginosa*.

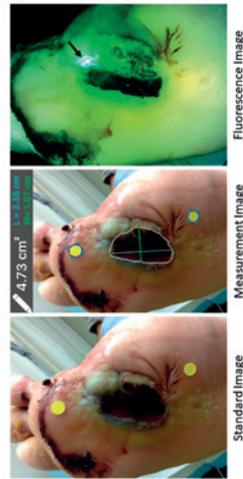


Figure 1. Diabetic foot ulcer, with wound area measured as 4.73 cm<sup>2</sup>, exhibiting cyan fluorescence (arrow) confirmed as heavy growth of *P. aeruginosa*.

**Conclusions:** The handheld wound imaging device immediately documented wound area, length, width, and the presence and location(s) of bacterial fluorescence across diverse wound types. Microbiological cultures confirmed bacterial status approximately 3 days later. Results suggest easy incorporation of this technology into routine wound assessments, providing real-time wound size and bacterial information for documentation that could assist clinicians during routine wound care.

- References:**  
 1 Rennie MY, J Wound Care (2017)  
 \*MolecuLight iX

**P32**

Levine technique is inadequate for bacterial recovery in the sampling of wounds

Monique Y. Rennie<sup>1</sup>, Liis Teene<sup>1</sup>, Laura Jones<sup>1</sup>, Stephanie Fedorov<sup>1</sup>, Kim Tapang<sup>2</sup>, Ron Linden<sup>2</sup>

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**Introduction:** Levine technique is the current gold standard for swab-based wound sampling<sup>1</sup>. Punch biopsies more accurately sample subsurface tissues, but many clinicians prefer Levine to alleviate concerns of invasiveness, delaying healing or causing pain<sup>2</sup>. Alternatively, subsurface tissues can be assessed in a less invasive manner via curettage sampling<sup>1,3</sup>, which scrapes regions of interest during curettage debridement. Fluorescence imaging\* has been shown to identify at the point-of-care regions with moderate-to-heavy bacterial loads; these regions uniquely appear red or cyan on the images and can be used to target sampling<sup>3</sup>. This study compared microbial recovery between Levine technique and fluorescence-guided curettage sampling.

**Methods:** Fifteen wounds were imaged in real-time for bacterial fluorescence as part of a single-site clinical trial (#NCT03754426) and sampled in the wound centre with Levine technique. Clinicians deemed curettage sampling appropriate in 11/15 wounds; curettage sampling was targeted to regions positive for bacterial fluorescence on images (if present) during routine debridement. The remaining 4 wounds were not debrided (e.g. fresh surgical sites, almost healed wounds). The 26 samples collected were analyzed via semi-quantitative cultures.

**Results:** Curettage samples were targeted to regions positive for bacterial fluorescence (red or cyan on images) in 8/11 wounds. Of those eight wounds, curettage cultures revealed higher bacterial loads (relative to Levine cultures) in 6/8 (75%) and higher numbers of bacterial species in 5/8 (63%). Three wounds which Levine technique deemed 'light growth' came back as 'heavy growth' on curettage-cultures and one wound negative on Levine cultures had moderate growth from fluorescence-targeted curettage. In the three wounds negative for bacterial fluorescence all cultures confirmed, at most, only light bacterial growth.

**Conclusions:** These data suggest that Levine swabs routinely underestimate wound bacterial loads and under-report bacterial species present, causing the culture data to be unreliable. Bacterial fluorescence imaging enabled targeted sampling to regions highly suspect for bacterial presence<sup>3</sup> while curettage sampling of these regions facilitated a surface and subsurface sample, revealing higher bacterial loads without causing any additional pain or damage to the wound.

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 3. Rennie J Wound Care (2017).  
 \*MolecuLight iX

## POSTER PRESENTATIONS

P33

## Dermis micro-grafting in the management of chronic wounds

Marino Ciliberti<sup>1</sup>, Cristina D'Esposito<sup>1</sup><sup>1</sup> Rete Aziendale di Riparazione Tissutale, Gagnano, Italy

**Introduction:** Normal wound healing usually takes 3 to 14 days to complete and has three phases, inflammation, proliferation, and remodeling with wound contraction. Several factors can delay wound healing, such as chronic disease, vascular insufficiency, diabetes, advanced age, local factors such as pressure, infection or edema, and many other. Chronic wounds represent a major health care burden with an expected global wound care expenditures amount to \$13 to \$15 billion annually. The micrografting technology is a clinical approach to obtain autologous micrografts ready to use and able to promote derma and bone regeneration, as already reported in previous studies.

**Methods:** Autologous micrografts were obtained by skin biopsy punch that were mechanically disaggregate using Rigeneracons medical device. This device allows to obtain micrograft, containing high viable cells not bigger than 80 µm, ready to use alone or in combination with common scaffolds such as collagen sponge

**Results:** we reported clinical evidences on the use of dermis autologous micrografts in the treatment of ulcers in a total of 50 patients belonging to different clinical records in which has been reported a mean healing after 8 weeks from micrografts application. Additionally, all patients treated with micrografts referred pain reduction after few hours from micrografts application and in general an improvement of the quality of life and recovery of daily activities.

**Conclusions:** The simplicity of the approach, its minimal invasive nature and the good quality of healed wounds makes the micrograft technology an useful tool for the management of complex or chronic wounds.

**References:**

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A New Medical Device Rigeneracons Allows to Obtain Viable Micro-Grafts From Mechanical Disaggregation of Human Tissues *Journal of Cellular Physiology* 230(10) • February 2015  
DOI: 10.1002/jcp.24973.

P34

## Dermal regeneration template in regenerative surgery: our experience in RART center ASLNAPOLISUD

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**Introduction:** Dermal substitute has a wide spectrum of use in regenerative surgery. Since 2017, it has been a part of surgical treatment of patients with acute and chronic wound treated at our center of excellence.

**Methods:** Dermal substitute was used in xxx patients whit chronic wound ulcers lower limbs. In this group there average age of wound is 4 years. The evolution of the wounds was assessed including photography and general indicators of patient wellness.

**Results:** All skin wound are closed in two months after use of Dermal substitute and epidermal graft.

Moreover our clinical results shows that the use of Dermal substitute improve the elasticity, the pliability and the softness of the new tissue, according to the thickness of the derma rebuild, in acute burn wounds as well as in post-burn contracting scars. Subjective assessment of functional and cosmetic quality of scars by patients was better in all cases in comparison to DE grafting. Notable differences were found between scars following Dermal substitute application and those after DE grafting on histological assessment, namely in the organization and quality of collagen and elastin fibres as well as in tissue revascularization.

**Conclusions:** Dermal substitute skin is part of the regenerative strategy surgery. The wound are all brought, very important is the application of TIME with a good preparation of the bed of wound. Furthermore the quality of the resulting scar when using a bi-layer skin replacement\* is better with the consequent restoration of the functionality of the anatomical site concerned.

**References:**

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C Philiandrianos, L Andrac-Meyer, S Mordon... - *Burns*, 2012 - Elsevier  
... in this pre-clinical model, and these results question whether artificial dermis has beneficial ...:373-376. [7] AT Trunog Comparison of dermal substitute in wounds healing utilizing a nude mouse ...I. Montano, M. Meulli, E. Reichmann, et al.  
\*Integra®

**P35**

**Topical oxygen wound therapy : a breakthrough in the management of non healing vascular leg ulcer**

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<sup>1</sup> Rete Aziendale di Riparazione Tissutale, Gragnano, Italy

**Introduction:** To assess the efficacy of an innovative topical oxygen therapy device in patients with challenging non-healing vascular leg ulcers

**Methods:** Topical Oxygen wound therapy was evaluated in 22 patients with VLU present for over 6 months. The wounds were treated with dressing change every 4/5 days up to complete healing. The evolution of the wounds was assessed including measurements, photography and general indicators of patient wellness

**Results:** A healing trajectory was seen in 80% of ulcers. The therapy was extremely well tolerated by patients with significant reduction in pain over the course of the treatment, associated with an improvement in the patient's quality of life. The mean wound treatment was 6 weeks. However, optimal wound healing occurred when the device was used for 30 days, with an 73% wound area reduction and 70% wound closure rate

**Conclusions:** For this particular group of patients Topical Oxygen wound therapy was an extremely effective therapy option. Not only did it heal 75% of the wounds (that had been previously been deemed non healing), it was also relatively easy to adopt into everyday practice within our busy wound care clinic and it appears to be a realistic and cost effective solution to the problems experienced with traditional wounds dressings

**References:** Topical oxygen therapy results in complete wound healing in diabetic foot ulcers Janelle Yu BSc Suzanne Lu MScCH Ann-Marie McLaren MCISC Julie A. Perry PhD Karen M. Cross MD, PhD First published: 12 October 2016

**P36**

**The effect of three sessions of radial shock waves on pressure ulcers - a preliminary histomorphological and immunohistochemical analysis**

**Mirosław Sopol<sup>1</sup>, Robert Dymarek<sup>1</sup>, Izabela Kuberk<sup>2</sup>, Magdalena Milan<sup>2</sup>, Joanna Rosinczuk<sup>1</sup>, Jakub Taradaj<sup>3,4</sup>**

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<sup>2</sup> Wrocław Medical University, Department of Surgical Specialties, Wrocław, Poland  
<sup>3</sup> Academy of Physical Education, Department of Physiotherapy Basics, Katowice, Poland  
<sup>4</sup> University of Manitoba, College of Rehabilitation Sciences, Winnipeg, Canada

**Introduction:** Extracorporeal shock wave therapy (ESWT) shows a positive effect to accelerate healing of chronic wounds. ESWT promotes the activation of biological mechanisms improving blood microcirculation, activation of the anti-inflammatory response, as well as increase efficiency of the tissue regeneration in an animal model of wound healing. However, the mechanism of ESWT action on the chronic wound is poorly investigated. This study aimed to evaluate the mechanisms of ESWT during the treatment of human pressure ulcer (PU) based on in vivo study using the immunohistological and histopathological analyzes.

**Methods:** A representative group of 10 patients with the PU received three sessions of ESWT with 300 + 100/cm2 impulses with the pressure of 2.5 bars, the energy flux density of 0.15 mJ/mm2 and impulses frequency of 5 Hz. The biopsy specimens were collected from the edges of the wound at baseline (M0), and 24 hours (M1) after the last ESWT. The histomorphological features of the biopsy specimens were examined microscopically with hematoxylin and eosin stain before and after ESWT sessions. The Ki-67, α-smooth muscle actin, A-type lamin, and YAP were analyzed with immunohistochemical staining. Microvessel density was assessed microscopically by expression of CD31 antigen in the dermis.

**Results:** On immunohistochemical analysis demonstrated significant morphological changes, increased cell proliferation (index Ki-67) and fibroblast-myofibroblast transdifferentiation (high level of α-smooth muscle actin expressed by the fibroblasts) after ESWT applications. Also, a significant increase in the expression of A-type lamin and YAP with a nuclear location was observed. Moreover, microvessel density was significantly higher after ESWT.

**Conclusions:** This evidence indicated that treatment of ESWT significantly enhanced healing of PU associated with increased neovascularization and tissue regeneration.

**References:**

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## POSTER PRESENTATIONS

P37

## Intelligent system for the monitoring of pressure ulcers (PU)

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<sup>2</sup> Jaen University, Student of PhD, Jaén, Spain

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**Introduction:** An important statistic of indication about Pressure ulcers (PU) is reported by GNEAUPP of Spain, which in 2013 reported an increase in people with this condition, going from 7.9% to 9.1 % in home care programs and from 12.6% to 14.2% in social health centers.

In order to enable new alternatives to mitigate the mentioned complication, this paper presents results of a research funded by the Andalusian Health Service of the Region of Andalusia (Spain), where is developing an intelligent system of monitoring in real time, composed of non-invasive wearables for the detection and calculation of body posture using Machine Learning techniques, based on recommendations given by rehabilitation programs. Time lapses and body positions of each patient may be configurable following a care protocol, alerting medical staff and caregivers if any situation. All the information is registered in an intelligent system that continuously monitor the care process at a preventive level, trying to avoid the appearance of PU in patients.

**Methods:** The intelligent monitoring system in elderly people, is currently developing the following activities: 1) Use of inertial wearable devices in non-invasive areas of the body, in charge of recording the time in which the user has remained in the same position, 2) Data collection of different body positions in real patients. 3) Learning postures through Machine Learning. Calculation of the positions integrated within an intelligent system will help caregivers to reduce stress, by knowing time lapses and positions in an objective way, allowing to customize their treatment according to the needs of each patient.

**Results:** This intelligent system using trained data calculates the posture of the person in real time using non-invasive devices in a percentage greater than 90%, with this solution is intended to minimize the risk of occurrence of PU in elderly significantly.

**Conclusions:** Health care supported by technology has enabled new alternatives to reduce risks associated with medical complications, as in the case of PU, which in some cases seem inevitable. Thanks to an intelligent monitoring system with IoT devices, such as the one proposed, these lesions can be reduced and even completely controlled if the proposed medical protocol is followed.

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P38

## Implementing an educational programme to reduce the risk of pressure ulcers

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**Introduction:** The Scottish Patient Safety Programme (SPSP), Scottish care and the care inspectorate aimed to reduce the incidence of pressure ulcers by 50%, particularly in care homes. To support the implementation of the Scottish Patient Safety Programme initiative, an educational programme for nurses and carers was developed. The aim was to, raise awareness while improving education surrounding the prevention and management of pressure ulcers, improving integration within health and social care teams.

**Methods:** An educational package was developed for carers to highlight the importance of pressure ulcer prevention, while supporting community nursing teams to conduct an audit of clinical practice, in relation to pressure ulcer prevention. This consisted of a presentation for carers and community nurses, followed by a group discussion, which looked at sharing clinical practice.

**Results:** Over 100 care home staff attended pressure ulcer prevention training, which was delivered locally which improved healthcare integration team working and knowledge. Community nursing teams completed an audit of clinical practice surrounding pressure ulcer prevention, which identified areas for improvement.

**Conclusions:** Following the clinical audits, areas for improvement were identified and tested. The need for ongoing education was identified through feedback and evaluation forms completed. Education for nurses included a session on pressure ulcer classification and how to differentiate between pressure ulcers and moisture damage. The pressure ulcer safety cross was introduced within community nursing teams, as part of ongoing audits. With the risk of pressure ulcers and prevention highlighted, patients are now assessed sooner with appropriate risk assessment and measures completed to reduce the risk of pressure ulcers.

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**P39**

The biomechanical protective effects of a treatment dressing on the soft tissues surrounding a non-offloaded sacral pressure ulcer

**Dafna Schwartz<sup>1</sup>, Amit Gefen<sup>1</sup>**

<sup>1</sup> Tel Aviv University, Department of Biomedical Engineering, Faculty of Engineering, Tel Aviv-Yafo, Israel

**Introduction:** Patients who are immobile endure prolonged bodyweight-related compressive, tensional and shear loads at their body-support contact areas which, over time, may lead to the onset of pressure ulcers (PUs). Approximately one-third of common sacral PUs are severe and classified as category 3/4. If a PU occurs, off-loading is the basic, commonly accepted clinical intervention; however, in many situations, complete off-loading of sacral PUs is not possible. Minimising the exposure of wounds and peri-wound regions to elevated mechanical loads is crucial for healing.

**Methods:** In this study, we aimed to investigate the biomechanical effects of the structural and mechanical properties of different treatment dressings on stresses in soft tissues surrounding a non-offloaded sacral PU in a supine patient. Using a novel three-dimensional, anatomically-realistic finite element (FE) modeling framework, we compared performances of 3 dressing designs: (i) Anisotropic multilayer dressing which is stiffer in the spinal direction compared to its hip-to-hip stiffness [1], (ii) Isotropic stiff dressing, and (iii) Isotropic flexible dressing.

**Results:** Using our newly developed protective efficacy index (PEI) and aggravation index (AI) for assessing prophylactic and treatment dressings [1], we found that the anisotropic multilayer dressing consistently demonstrated a superior biomechanical protective effect for both superficial and deep tissues surrounding the wound, compared to the stiff and flexible isotropic dressings.

**Conclusions:** We found that the anisotropic multilayer dressing structure is remarkably effective in alleviating tissue stresses superficially and deeply around the wound bed in supine patients for whom complete off-loading of the sacral wound is unmanageable [1]. We specifically identified the anisotropic stiffness feature of the above dressing as the key design element providing effective redistribution of bodyweight and frictional loads.

**References:**

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**P40**

Evaluation of novel sub-epidermal moisture technology in early pressure ulcer detection versus conventional therapies

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**Introduction:** Traditional skin assessment relies on subjective clinical judgement of the clinician to visually assess the skin for the presence of Hospital Acquired Pressure Ulcers (HAPUs). Documented visual skin assessments vary between staff resulting in a lack of a consistent method of measuring tissue damage. Increasing sub-epidermal moisture (SEM) levels are reported to be a sign of impending tissue damage culminating in a PU (1). The SEM scanner device was developed to objectively alert clinicians to increased risk for pressure ulceration by providing an objective quantifiable reading (SEM Δ Delta).

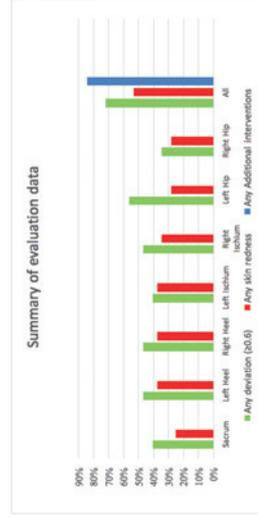
**Study aim:** To compare the clinical utility of using a SEM scanning device versus subjective visual skin inspection in the early detection of category 1 Pressure ulcers.

**Objectives:** To observe whether SEM data triggers the allocation of preventative interventions. To compare the rate of HAPUs before and during the SEM scanner evaluation. To obtain objective quantifiable data measuring tissue health at the bedside.

**Methods:** Design: An exploratory study over 12 weeks. Sample size n=32

**Inclusion criteria:** male and female patients over 18 years of age and a Waterlow ≥10. Anatomical sites scanned: sacrum, heels, hips and ischia. SEM Δ scores of ≥0.6 indicated increased risk of a PU prior to becoming visible on the skin surface. Once tissue damage was diagnosed, targeted interventions such as repositioning, mobilisation and dynamic air mattresses were introduced.

**Results:** Over the 12 weeks SEM Scanner evaluation, there was 0% PU incidence reported in the patients scanned. The prior HAPU rate was 12.2%. As illustrated by the graph results (table 1) (all anatomical sites scanned), the SEM Scanner alerted to increased risk of tissue damage at 72% (n=23) compared with nurses' visual skin assessment at 53% (n=17).



**Conclusions:** The SEM Scanner alerted the clinicians to increased risk for tissue damage on scanned anatomical sites that was not detected during clinicians' visual skin assessment thereby preventing the development of problematic PUs. The SEM scanner provided real-time, objective data at the bedside that triggered targeted interventions to the right patient at the right time. As a measurable biophysical marker, small differences in SEM readings can be quantified, compared and recorded over time using non-invasive technology.

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## POSTER PRESENTATIONS

P41

## Sustaining pressure ulcers to zero and extending to the community

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- <sup>2</sup> Tallaght university hospital, Nurse practice development, Dublin, Ireland

**Introduction:** The Pressure Ulcer to Zero initiative was rolled across Tallaght University Hospital in 2018. The aim of PUTZ is to reduce the number of hospital acquired pressure ulcers. PUTZ is rolled out and sustained on all wards and now we are extending to the community in collaboration with the Public Health Nurses to reduce the number of community acquired pressure ulcers. This is in line with strategic action 5 in the Slaintecare Implementation Strategy: Develop and modernise the acute care system to address current capacity challenges and increase integration between the hospital sector and community-based care.

**Methods:** Within Tallaght University Hospital bespoke PUTZ boards are in place on all wards by the nurses' station, this allows for daily measurement using the safety cross and monthly monitoring using run charts. The pressure ulcer prevention strategies i.e. PUTZ Flag, Patient Information Leaflet, including PUTZ as part of the nursing handover and PUTZ Staff Engagement Teams have been established to educate and assist in reducing hospital acquired pressure ulcers. The PUTZ results will be added to the monthly NIQA Report so that all wards are aware of their PUTZ statistics.

**Results:** Overall the number of hospital acquired pressure ulcers have reduced however, there is still a number of patients admitted who have pressure ulcers. Subsequently this has an added cost for the patient and cost for the hospital.

**Conclusions:** A collaborative approach to pressure ulcer prevention has been effective in developing pressure ulcer prevention strategies and pressure ulcer monitoring strategies. Staff engagement has enabled the success of PUTZ and led to increased awareness and monitoring to prevent hospital acquired pressure ulcers. As a result of the positive PUTZ results that have been achieved in TUH we are now collaborating with the Public Health Nurses to extend PUTZ to the community.

P42

## Hospital based pressure injury competence group and knowledge transfer

Ingebjørg Irgens<sup>1</sup>

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**Introduction:** Measures facilitating prevention and best practice treatment are crucial in the follow-up of persons with pressure injury (PI)1. To facilitate the follow-up of vulnerable persons in constant risk of developing PI, the hospital established a competence group focusing on best practice prevention, education and treatment both inpatient and outpatient and concerning caregivers as well as care receivers with the aim to systematize the right offer to the right patient at the right time, and to include the patients in the follow-up2.

**Methods:** By systematize the offer in a competence group with a defined mandate for the follow-up, the hospital managed to achieve a well-organized group focusing on developing easy understandable information materials for both the staff, the next of kin, the local caregivers and the care receivers. Innovative virtual health care solutions have been established to facilitate the cooperation, and innovative quality improvement projects relating to the prevention of skin breakdown and treatment of damaged skin have been performed3.

**Results:** The educational materials consists of written guidelines, leaflets, information cards, e-learning courses, videoconference courses, webinars and teaching at the ulcer education. The follow-up program consisting of both short inpatient stays and the outpatient follow-up program, using virtual technology, has shown good results both in the prevention and in the treatment of PI, as well as in reducing the health economic costs4.

**Conclusions:** A systematic approach facilitates the follow-up concerning prevention and treatment of PI in a population that is vulnerable when it comes to receiving the right treatment at the right time.

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P41

## Sustaining pressure ulcers to zero and extending to the community

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**Introduction:** The Pressure Ulcer to Zero initiative was rolled across Tallaght University Hospital in 2018. The aim of PUTZ is to reduce the number of hospital acquired pressure ulcers. PUTZ is rolled out and sustained on all wards and now we are extending to the community in collaboration with the Public Health Nurses to reduce the number of community acquired pressure ulcers. This is in line with strategic action 5 in the Slaintecare Implementation Strategy: Develop and modernise the acute care system to address current capacity challenges and increase integration between the hospital sector and community-based care.

**Methods:** Within Tallaght University Hospital bespoke PUTZ boards are in place on all wards by the nurses' station, this allows for daily measurement using the safety cross and monthly monitoring using run charts. The pressure ulcer prevention strategies i.e. PUTZ Flag, Patient Information Leaflet, including PUTZ as part of the nursing handover and PUTZ Staff Engagement Teams have been established to educate and assist in reducing hospital acquired pressure ulcers. The PUTZ results will be added to the monthly NIQA Report so that all wards are aware of their PUTZ statistics.

**Results:** Overall the number of hospital acquired pressure ulcers have reduced however, there is still a number of patients admitted who have pressure ulcers. Subsequently this has an added cost for the patient and cost for the hospital.

**Conclusions:** A collaborative approach to pressure ulcer prevention has been effective in developing pressure ulcer prevention strategies and pressure ulcer monitoring strategies. Staff engagement has enabled the success of PUTZ and led to increased awareness and monitoring to prevent hospital acquired pressure ulcers. As a result of the positive PUTZ results that have been achieved in TUH we are now collaborating with the Public Health Nurses to extend PUTZ to the community.

P43

## Process + product = prevention

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**Introduction:** In 2016 NHS Greater Glasgow and Clyde stopped using Waterlow and introduced PUDRA – Pressure Ulcer Daily Risk Assessment. PUDRA is built on the SSKINS care bundle and comprises of three elements:

1. Daily risk assessment of all six SSKINS bundle elements
2. Patient Centred Care Plan on all six SSKINS bundle elements
3. Guidance around pressure damage interventions

Post PUDRA implementation there was a statistically significant reduction in avoidable pressure ulcers ( $p < 0.001$ ).

However there were a few clinical areas where avoidable pressure damage was still an issue and identified as a 'hotspot'. An area was considered as being a hotspot if there were more than one pressure ulcer develop in a single month or if a pressure ulcer developed in two consecutive months. Additional support from senior nurse management and tissue viability was offered to these clinical areas.

**Methods:** In one hotspot a decision to pre-equip the entire ward with a pressure redistributing mattress to address the 'Surface' element of the SSKINS bundle.

The mattress selected was a non-powered gel therapeutic support surface which redistributes pressure by buckling and absorbing the patient's weight, allowing immersion and envelopment to take place. It manages shearing forces by the layer moving with the patient and assists in microclimate management. It was anticipated that by getting the SSKINS bundle process right every time for every patient and utilising the mattress to ensure the patients were being nursed on a surface commensurate with risk that the pressure ulcer incidence of avoidable pressure damage would decrease.

**Results:** Reduction of pressure ulcer incidence by 86%. Reduction of costs from 75k to 8K this equates to a reduction of 89% in one ward in one year.

**Conclusions:** Pressure ulcer prevention remains a clinical and health economic challenge for all patient care settings. Prevention of pressure damage is multi-faceted and no single element on its own will prevent damage occurring. A simple, user friendly tool like PUDRA that facilitates risk assessment, guidance and patient centred care planning to deliver an evidence based bundle is a major step forward. This can be further supported by taking additional steps to address the individual elements for example pre-equipping high risk areas with equipment to redistribute pressure. This year long study had demonstrated that the combination of getting the process right and using additional products to support the process has patient and health economic benefits.

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## Sacral pressure sore management, an interdisciplinary approach

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**Introduction:** Sacrum pressure sore is a difficult treatment to the patient. This is quite common in bedridden patients due to various medical and surgical reasons. The sore in this area requires multidisciplinary team approach consisting of General Physician Plastic Surgeon Infectious Disease consultant a Nutritionist Physiotherapist and dedicated Nursing Staffs and psychologist and family counsellor.

**Methods:** In our study of 32 patients with sacral pressure sore involving all stages as in the EPUAP guideline staging system were treated by multidisciplinary approach along with the treatment of their co morbid conditions. The management included, physiotherapy to the limbs, avoiding the maceration along with frequent change of posture, attending nutrition, medical conservative management for grade 1/2, surgical or medical for grade 3, surgical for grade four and further categories, along with appropriate antibiotics in infected wounds and osteomyelitis of sacrum bone. Psychologist and family counsellor played significant role in overall mental wellbeing of the conscious patient and their families.

**Results:** we had reliable reasonable results with our team approach of curing the patient from significant satisfactory results to 90 to 100%

**Conclusions:** Sacral pressure sore is a complex medical problem, which requires comprehensive multidisciplinary approach for better acceptable result for the doctor, patient and family

**References:**

European Pressure Ulcer Advisory Panel. *Pressure Ulcer Treatment Guidelines*. Oxford, England: EPUAP; 1998. Available from: <http://www.epuap.org/gltreatment.html>  
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## POSTER PRESENTATIONS

P46

## Danish national clinical guideline for pressure ulcer prevention for adults

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**Introduction:** National Clinical Guidelines (NCG) in Denmark are professional recommendations to ensure consistent treatment and prevention options with high professional quality across the country. The NCG for Pressure Ulcer Prevention for Adults addresses selected five points of impacts: Clinical judgment using The Braden Scale, Shared Decision Making, individual analysis of pressure exposure, individual reposition turning regimes and protein intake. These are based on scientific knowledge on the GRADE method. Professionals with different expertise were pointed out by different scientific societies and a governing body was formed. The secretariat coordinates the process and the specialist consultant writes the NCG. The purpose of the NCG is to identify a Pressure Ulcer Prevention Programme for implementation in Denmark.

**Method:** Using the GRADE system rates the quality of evidence for each outcome of the five points of impacts, from a rating of high to very low. A baseline rating will be adjusted (downgraded or, less commonly, upgraded) after considering 8 assessment criteria and making a judgement about quality based on these. In the decisions to down- or up-grade are not all or nothing, and they rely on the judgement of the professional expert group. Based on the assessment the expert group will decide on a final level of evidence for each outcome, including both meta-analysed and narratively synthesised outcomes to assign a value for the quality of evidence.

**Results:** Using the GRADE Method gives a systematic indication of the quality of the evidence on which the findings are based of each five points of impacts. This will provide health care organizations with strategies for decreasing the prevalence for hospital-acquired pressure ulcers and pressure ulcers in community care settings.

**Conclusions:** The national clinical guideline for pressure ulcer prevention for adults will be published by The Danish Health Authority January 2020 and the final conclusion will be presented on the Focus Meeting of the European Pressure Ulcer Advisory Panel the 25. May, 2020, Sønderborg, Denmark.

P46

## Clinical evaluation of radial shock waves in management of pressure ulcers – a prospective, clinical and preliminary study

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**Introduction:** Recent studies proved interesting and noteworthy clinical effects after applications of extracorporeal shock wave therapy (ESWT) in chronic wounds. It should be noted that so far, there is only one clinical study assessing the impact of the focused type of ESWT in pressure ulcers (PUs). This preliminary clinical report aimed to investigate the utility of radial ESWT on stimulation of PUs healing using planimetry and thermovision assessment.

**Methods:** A group of 10 elderly patients with the PU received three applications of radial ESWT using the following parameters: number of 300 + 100 pulses/cm<sup>2</sup> at the pressure of 2.5 bars, the energy density of 0.15 mJ/mm<sup>2</sup>, and the frequency of pulses of 5 Hz. ESWT treatments were provided once a week for three consecutive weeks, and the standard wound care procedures were continued. The innovative planimetric smartphone application\* was used for calculation of metric parameters of the PUs. Also, the infrared thermographic camera\*\* was used for objective assessment of local blood microcirculation of the PUs. All assessments were performed at baseline (M0), one week after each of three ESWT (M1–M3) as well as one (M4), two (M5) and four weeks (M6) after ESWT finalization (follow-up).

**Results:** A statistically significant clinical effect in terms of decrease of the wound surface area was shown in the planimetric assessment ( $p < 0.05$ ). Other parameters of the PUs such as length, width, depth, undermining and tunneling have also been improved ( $p < 0.05$ ). Positive changes in the surface temperature distribution through thermovision analyses were observed ( $p < 0.05$ ).

**Conclusions:** ESWT demonstrate a promising clinical utility supporting the healing process of PUs. Nevertheless, further randomized controlled studies including the more representative population of patients with PUs, considering placebo ESWT intervention with blinding the controls and with advanced laboratory tests to explain biological mechanisms of ESWT are necessary to improve a methodological quality of this study.

**References:**

- [1] Dymarek R, et al. Extracorporeal shock wave therapy as an adjunct wound treatment: a systematic review of the literature. *Ostomy Wound Manage.* 2014 Jul;60(7):26-39. [2] Omar IM, et al. Extracorporeal shockwave therapy for the treatment of chronic wound of lower extremity: current perspective and systematic review. *Int Wound J.* 2017 Dec;14(6):898-908. [3] Zhang L, et al. Extracorporeal shock wave therapy for chronic wounds: A systematic review and meta-analysis of randomized controlled trials. *Wound Repair Regen.* 2017 Aug;25(4):697-706.

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\*\* MobilR M8, Wuhan Guide Infrared, China

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## Developing individualized pressure ulcer prevention plans for spinal cord injured using pressure monitoring technologies

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**Introduction:** Specific patient groups including individuals with spinal cord injury (SCI) are at high risk of developing pressure ulcers (PUs) due to intrinsic changes in local tissues physiology and morphology, as well as impaired mobility and sensation [1]. Prevention strategies involve patient led or assisted movements to relieve pressures in vulnerable tissue sites, often prescribed in a generic format (e.g. 2-4 hourly repositioning). A recent retrospective study conducted by the authors revealed a 16% inpatient prevalence of PUs and a high caseload severe community ulcers (grade 3-4).

A major challenge for preventing PUs amongst individuals with SCI is the variability in their presentation. The present study is designed to develop an individualised pressure ulcer prevention plan (IPUPP) utilising the latest pressure monitoring technologies.

**Methods:** The intervention combines interviews, questionnaires and long-term pressure monitoring in both the bed and wheelchair to provide biofeedback to the SCI patients in order to co-create an IPUPP. The intervention and assessments take place at four time-points, starting when the individual is in their wheelchair for four hours and continuing until 3 months post-discharge. Assessments are made pre- and post-intervention using the monitoring technologies to assess the frequency and magnitude of repositioning strategies. The utilisation and usability of pressure monitoring technologies from patient and clinician perspectives will be assessed.

**Results:** This study is ongoing. In the case of the first participant, it was evident that pressure relieving manoeuvres were not being conducted during prolonged sitting postures (Figure 1). This was discussed with the participant and the follow up data (1 month), has provided some evidence of a change in behaviour. The 2nd period of monitoring showed significant drops in peak pressure in addition to displacement of centre of pressure, seen approximately every 2 hours (Figure 2).

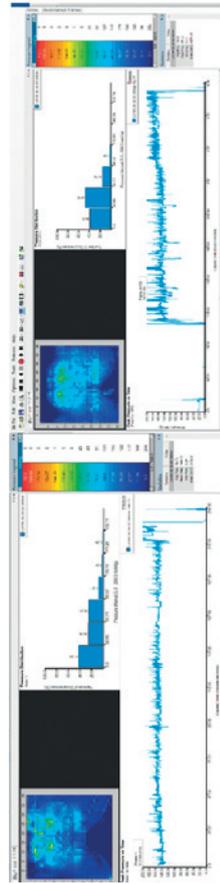


Figure 1: Peak Pressure vs Time graph for participant 1. (Left) the initial monitoring in the seat demonstrating minimal movements. (Right) One month follow up data revealing an increase in the frequency and magnitude of movements.

**Conclusions:** Initial results show pressure monitoring data and associated software enabled clinicians to provide detailed feedback regarding the pressure signatures and formed the basis to create an IPUPP. Further research is being conducted on a cohort of up to 15 SCI patients in order to understand the feasibility of using pressure monitoring technologies to aid PU prevention.

**References:**

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P48

## Potential adverse effects during the treatment of pressure ulcers with radial shock waves - clinical challenge and management opportunities

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**Introduction:** Due to the complex nature of the pressure ulcers' management, new therapeutic methods are being developed to accelerate the healing process. Treatment options include biophysical agents such as laser therapy, and electrotherapy but also an innovative extracorporeal shock wave therapy (ESWT). During implementations of new therapeutic technologies, attention should be paid to the problematic events. This study aims to present the adverse effects that may occur during ESWT application in pressure ulcers (PU) and the methods of their minimizing or eliminating based on our experience.

**Methods:** Clinical observation included patients with a coexisting pressure ulcer, qualified for specialist treatment sessions with ESWT. Local changes in the pressure ulcer, which may occur during the application or following a series of ESWT, are presented. Moreover, the possibilities for dealing with these unexpected clinical situations were discussed.

**Results:** One of the potential complications of ESWT application is uncontrolled and excessive hypertrophy of tissue granulation in the wound. Wound bleeding associated with hypertrophy of granulation tissue and bleeding occurring during direct ESWT application on the wound should also be mentioned. An event that may lead to the discontinuation of the applied ESWT is a wound infection occurring between treatments. Every therapist who is aware of the risks should have preventive options in the form of hemostatic sponges and lavaseptic, antiseptic and antibacterial specialist dressings.

**Conclusions:** It should be concluded that the use of innovative methods such as ESWT for the treatment of pressure ulcers sometimes causes some disadvantages during, between or after treatment ESWT sessions. During the treatment of ESWT, pressure ulcer should be assessed for the risk of complications and effective methods should be used to prevent wound bleeding as well as specialist antibacterial dressings when the risk of infection occurs. It is advisable to use sterile or carefully disinfected materials during ESWT procedures.

**References:**

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## POSTER PRESENTATIONS

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## A novel infrared thermography method for evaluation of dressing-induced skin microclimate conditions

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**Introduction:** Infrared thermography (IRT) is a noninvasive quantitative method for mapping skin temperatures, which makes it powerful and effective in assessing microclimate conditions associated with use of preventative or treatment dressings. Here we have used IRT to measure skin temperatures at the buttocks of weight-bearing healthy subjects to investigate, for the first time, microclimate conditions induced by dressings, focusing on a polymeric membrane dressing (PMD) [1] versus placebo foam for comparisons, with a no-dressing case used as reference.

**Methods:** We studied skin temperature changes at the buttock cheeks "with" versus "without" application of dressings. Buttock skin temperatures were acquired using a high-resolution IRT camera at baseline during prone lying. A PMD and a matching placebo foam dressing were then attached to the right and left cheeks of the buttocks of participants, respectively. We repeated the temperature measurements following nearly motionless lying for 1-hour in a Fowler's position, immediately after removing both dressings (if present), and 5, 10, 15 and 20min thereafter (without dressings) to determine the skin cooling rate [2]. Temperature values and homogeneity over skin regions covered by the dressings were analysed via digital image processing (Matlab).

**Results:** We found that the PMD composition does not reduce the heat conductivity (or increase the thermal insulation) of this dressing type, as the heat trapping under the dressing does not exceed that of placebo foam. Moreover, the contribution of the PMD to skin heating with respect to a no-dressing case did not exceed 1 °C [2], and skin temperatures immediately after lying were uniformly distributed, similarly to the no-dressing case. In this regard, PMDs performed better than the placebo foam, which induced less uniform skin heating patterns.

**Conclusions:** We demonstrated the importance and utility of IRT in evaluating the microclimate induced by dressings [2]. In particular, we developed a new method to determine the uniformity of heat trapping using IRT-image processing, which identified PMDs as better conductors and homogenizers of heat, compared to placebo foam.

**References:**

- [1] Gefen, A. *Wounds International* 9:22-28, 2018.
- [2] Gefen, A. et al. *Wounds International* 10:8-15, 2019.

P50

## Medical grade honey for the treatment of pressure ulcers - a case series

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**Introduction:** Pressure ulcers are localized areas of tissue damage and occur as a result of intense or prolonged pressure, shear, or friction. Pressure ulcers are more common in complex patient groups that have additional comorbidities, such as the elderly or those who are bedridden. Patients' quality of life is affected by the level of pain, infection, malodor, exudate, and worry about healing. Medical grade honey (MGH) has antimicrobial and pro-healing activities. We postulated that MGH would be effective in the treatment of pressure ulcers.

**Methods:** We present a multicenter prospective observational case series of six patients with pressure ulcers located on the heels and coccyx. Patients were in overall bad health. Treatment consisted of monotherapy with a medical grade honey formulation<sup>1</sup>, after previous treatments were unsuccessful (povidone iodine, systemic antibiotics).

**Results:** MGH possesses physicochemical characteristics that enhance wound healing. The low pH, high osmolarity, release of low amounts of hydrogen peroxide, and containment of several antimicrobial molecules make it a strong broad-spectrum antimicrobial agent. In the presented cases, this has led to a fast resolution of infection, sometimes even when antibiotics were ineffective. In addition, MGH formed a physical barrier and prevented new pathogens from invading. Bacteria that were already present in the wound stopped to produce malodor within a couple of days as they shifted from consuming tissue proteins to odorless sugars present in the honey. The MGH kept the wound moisture, which enhances wound healing. The osmotic effects enhanced autolytic debridement and stimulated the blood flow and angiogenesis, while MGH also enhanced granulation tissue formation and epithelialization. It is also important to note that MGH is user-friendly and was easy to apply and did not adhere to the secondary dressing, and thus did not disrupt the newly formed tissue. No pain or discomfort was experienced during dressing changes.

**Conclusions:** MGH has both antimicrobial and pro-healing activities and forms a safe and cost-effective approach for the treatment of pressure ulcers.

**References:**

- <sup>1</sup> L-Mestran Ointment

**P51**

**Use of a nutrition support protocol contributed to improving pressure ulcer healing**

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**Introduction:** Patients with pressure ulcer(PU) are prevalent in malnutrition. Nutrition support is critical in preventing and managing PU. The aim of this study was to evaluate the impact of nutrition support protocol on PU healing.

**Methods:** 27 patients who were treated on stage II or greater PU before introduction of nutrition support protocol were retrospectively compared with data for 26 patients after implementation of the protocol in an acute care setting. The protocol consisted of individualized nutritional care, including prescription of adequate calorie, high protein, vitamins, minerals and trace elements supplement. PU healing was defined as PUSH(Pressure Ulcer Scale for Healing) score decreased on day 14 from first assessment. Results were compared with t test, Mann-Whitney U test, X2 test and correlation analysis.

**Results:** Supplementation with protein and micronutrients improved PU healing, indicated by a significant decrease in PUSH scores compared with the control, over the period of 2 weeks (median 0 vs 2, P<0.001, Mann-Whitney U test). The incidence of PU Healing increased after implementation of the protocol (P<0.001, X2 test). C-reactive protein(CRP) level on day 14 after initial assessment significantly decreased in the protocol group (median 56 vs 16.25 P=0.02, Mann-Whitney U test). There was a weak positive correlation in values of PUSH scores and CRP levels(r=0.297, P=0.03, Spearman's correlation).

**Conclusions:** Implementation of the protocol led to significant improvements in PU healing. Optimal provision of nutrition support can improve outcomes.

**References:**

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**P52**

**User experiences of a powered pressure area care support surface in a university hospital in Finland**

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**Introduction:** Pressure ulcers (PU) are an established key quality indicator and a well-recognized 'avoidable-harm'. It is therefore unsurprising that PU prevention is a board-level focus for healthcare providers.

Successful PU prevention/management policies are multifaceted. Effective pressure relief and redistribution are the cornerstone of successful PU policies.

Quality pressure area care (PAC) support surfaces play a key role in PU prevention and in addition to selecting a clinically-effective PAC support surface, healthcare providers must also ensure that their chosen product is well liked and widely accepted by clinical staff

The aim of this work was to determine the user views of clinical staff using a specific type of powered PAC support surface within a University Hospital in Finland.

**Methods:** Between January and March 2019 a user acceptance project was set up to determine the level of staff satisfaction with a particular type of powered PAC support surface. The structured questionnaire used Likert scales to rank respondents views over an 8 week period.

**Results:** Over 50 staff returned completed questionnaires. Results are displayed in the table below.

Number of respondents	Very good	Good	No view	Poor	Very poor
How effective is the mattress for PU prevention/management?	23	28	4	0	0
How easy is the mattress to set-up and use for patients?	26	27	0	0	0
How would you rate mattress noise when in use? (good=quiet)	4	43	11	5	0
How would you rate patient comfort when using the mattress?	4	39	7	3	0
How would you rate patient safety/stability when using the mattress?	13	36	2	4	0
How do you rate mattress reliability/quality?	19	32	2	0	0

**Conclusions:** With EPUAP 2014 guidelines recommending 'Use [of] an active support surface (overlay or mattress) for individuals at higher risk of pressure ulcer development when frequent manual repositioning is not possible' it is imperative that powered PAC support surfaces combine clinical effectiveness with high levels of user acceptance, product quality and patient comfort.

This structured evaluation of staff using their current PAC support surface clearly demonstrates that the majority of respondents rate the mattress very highly across on a wide range of topics including performance, safety, ease-of-use, patient comfort and reliability/quality.

Based on the results of this evaluation the product meets the needs of both patients and staff and is widely accepted as an effective part of the PU care bundle within the hospital.

**References:**

- EPUAP PU Guidelines(2014).

**P53**

## Effectiveness of case-centered education program for pressure injury treatment

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**Introduction:** Efficient pressure injury care requires exact pressure injury stage determination and appropriate nursing intervention for each stage. The education consisting of actual pressure injury stage cases needs to be utilized in clinical practice.

**Methods:** An education program has been developed with a focus on the pressure injury's case to ensure effective application of treatment by pressure injury stages. This study was conducted to examine the effectiveness of the developed education program, which was a nonequivalent control group pretest-posttest design, in the order of pre-survey, experimental treatment, post-survey 1(one week after completion of experimental treatment), and post-survey 2(four weeks after completion of experimental treatment) for approximately three months from July 28 to November 4, 2017. The study participants were nurses working at K University Hospital located in the A City, and patients with stage 2 or 3 pressure injuries. The research variables for clinical nurses were measured using the PI (Pressure Injury) nursing knowledge test, PI nursing attitude scale, PI nursing self-efficacy scale, PI nursing implementation questionnaire, PI stage discrimination ability test and PI management clinical judgment ability scale. Nurses' PI management clinical judgment ability was measured during the initial and re-evaluation period by evaluating participants' PI nursing performance and the healing status of the patient's PI. The data were analyzed using SPSS program. Results:

The PI nursing knowledge, attitude, self-efficacy, nursing implementation, PI stage discrimination ability and PI management clinical judgment ability of the experimental group were significantly increased compared to the control group. There was significant difference comparing the PI stage 2 healing status of the experimental and the control group. However, there was no significant difference comparing the PI stage 3 healing status of the experimental and the control group.

**Conclusions:** Consequently, this education program is expected to improve the clinical nurse's PI nursing practice, which can contribute to greater PI healing statuses of patients with PI.

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**P54**

## Incontinence-related dermatitis and pressure ulcers : How to distinguish?

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Elderly fragile subjects have a risk of occurrence of pressure ulcer but also of incontinence-related dermatitis (ICD) when they are incontinent. Caregivers are often in difficulty to establish the correct diagnosis between ICDs and stage 1 or 2 pressure ulcers. A wrong diagnosis will have consequences for the care of the patient with a risk of sustaining the lesion.

ICD is inflammation of the epidermis with erythema of the skin with or without erosion. This definition is quite similar to that of a stage 1 or 2 pressure ulcer. The Stage 1 corresponds to non blanchable erythema on intact skin. Stage 2 is defined as a partial thickness skin loss affecting the epidermis and / or dermis, presenting as a serum-filled blister or abrasion. Both pathologies have common risk factors.

The occurrence of pressure ulcer is used as an indicator of quality of care. The interest of prevention is in a better comfort of the patient and a reduction of costs. The same can be said for incontinence-related dermatitis. It raises under standardized care protocols as well as those for the management of pressure ulcers. Current local treatments help to prevent incontinence-related dermatitis in an efficient and cost-effective way and must be combined with quality nursing care. The treatment of advanced ICD remains complex and relies on skin repairers.

**P55**

Preventing pressure injuries during prone positioning for acute respiratory distress syndrome

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**Introduction:** The purpose of this quality improvement project is to reduce the incidence of pressure injuries (PI) among patients managed with prone positioning for acute respiratory syndrome (ARDS) in a 24-bed medical intensive care unit (MICU). Patients managed with prone positioning for ARDS have an increased risk of developing a pressure injury. Literature shows an incidence of PIs related to prone position of up to 49%. Unrelieved pressure for extended periods leads to breakdown. Prolonged prone position, difficulty repositioning, hemodynamic instability and use of norepinephrine, increase risk. Pressure injuries increase costs and LOS. We developed a practice change utilizing a custom device to prevent pressure injuries from developing in this population. Between 12/2014 and 1/31/2017, 35 patients treated for ARDS with prone positioning were followed.

**Methods:** All patients undergoing prone positioning for ARDS management were placed on low-pressure air chamber designed to adapt to the patient by positive air displacement. Fluidized positioners were placed under the air chamber and under the patient's head to allow ease of repositioning. Demographic and treatment data, and the incidence of PI to 72 hours post termination of prone positioning were collected.

**Results:** Data were collected on 35 patients from 12/2014-1/2017. Of these, 83.3% were receiving norepinephrine infusion. The average time spent in the prone position was 15.8 hours per day for 3.8 days. None of the patients developed pressure injuries during the observation period.

**Conclusions:** Use of low-pressure air chamber and fluidized positioners is effective in preventing pressure injuries among patients managed with prone positioning for ARDS.

**References:**

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**P56**

A "time & cost saver" technology to treat pressure ulcers

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**Introduction:** Often pressure ulcers have very long healing times although we treat them with good dressings, feeding well the patients and using effective mattresses and cushions. This means prolonged time of treatment and significant costs increasing. In Italy the mean healing time is about 120 days [1] and wound care costs 1 billion €: about 300 millions due to bedsores (60 for materials) [2]. When ulcer lasts many weeks and cannot heal, we can reactivate the tissue repair with a technological help. The aim of this work is to prove that shockwaves (ESWT - Extracorporeal Shock Waves Therapy) can promote wound healing [3] and allow significant cost saving.

**Methods:** We enrolled 10 patients, divided into two groups, with sacral/trochanteric pressure ulcers; patients with dry eschars, thick slough and infection have been excluded. We treated them all with advanced dressings with a 3-times-a-week change. Twice a week, for four weeks, we administered to five of them ESWT treatment using an electrohydraulic shock wave generator. We evaluated Healing Rate (HR) and Wound Area Reduction (WAR) after 28 days (time of ESWT treatment) and after the next 10 weeks (98 days).

**Results:** All patients of the ESWT Group completely healed within the observational period, 2 (40%) within 60 days. No patients of Control Group healed. The mean HR of ESWT Group was 0.139 cm/week and WAR 100%; in Control Group HR was 0.098 cm/week and WAR 76.4%. The ESWT treatment cost was €120.00 each patient; the mean dressings cost was about €27.50/week. The mean cost for ESWT Group patients was about €378.50 each; after 98 days, the one of Control Group was about €385.00.

**Conclusions:** Though all patients improved, only patients of ESWT Group healed within the observational period; the materials cost of these patients was less than the cost of the ones of the Control Group, even if they hadn't the ESWT costs. Patients of Control Group needed more days and money to heal. Nursing time costs haven't been included in the analysis. In any case ESWT demonstrated to be a "time & cost saving" treatment.

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## POSTER PRESENTATIONS

P57

## An antimicrobial spray\*: an added value for a quicker bedsores healing

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**Introduction:** In case of deep bedsores our first target is the substance loss filling as soon as possible to allow the wound epithelialization avoiding a depressed scar. We usually use algimates or hydrofiber as cavity dressing but often the filling time is too slow. The aim of this work is to prove that is possible to accelerate the tissue growing with the addition of a technological dressing without changing the type of medication.

**Methods:** We enrolled 12 elderly patients with deep bedsores, developed within the last 30 days, all treated with alginate dressing. Every patient had good mattresses, controlled nutritional intake and life expectancy more than 6 months; patients with cachexia, neoplasms and immunosuppressive therapies have been excluded. Six of them have been treated with a different protocol: the addition of antimicrobial spray\*, an olive oil derived ozonide with vitamin E acetate, to allow a moderate imbibition of the alginate [1]. Once filled the wound, we used moist gauze as secondary dressing and TNT pads. Dressing change 3 times a week. Observational time 2 weeks. We evaluated depth variation or time to achieve the complete wound filling.

**Results:** All wounds improved and all patients had a satisfactory depth reduction but the ones of the antimicrobial formula \* had a mean improvement of more than 60% in comparison with the patients treated with alginate dressing only. In one patient (16.6%) we had the complete wound filling within the observational period. No worsening, no induced pain, no allergies, no adverse reactions, no signs of infection or critical colonization. Patients didn't report any disturbance or any unpleasant feeling.

**Conclusions:** The addition of this olive oil derived ozonide allowed us to achieve a quickest wound healing in comparison with the lesions treated with alginate only. We didn't change the dressing protocol just because we needed to evaluate how much the addition of antimicrobial formula spray\*, could be significantly effective [2], avoiding any other interference. In any case we had a good granulating tissue with both treatments, but antimicrobial formula spray\*, demonstrated to be a real added value to accelerate the filling of the loss of substance and the complete healing.

\*Ozoile

**Ref.:**

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P58

## The effect of prophylactic dressings for the prevention of sacral pressure injuries among high risk patients

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**Introduction:** Pressure injuries (PI) are a significant clinical problem across all healthcare facilities, associated with poor patient outcomes, increased length of stay and healthcare costs. Prophylactic dressings may play in both redistributing pressure and protecting the skin from the effects of shear and friction. The purpose of this systematic review of the literature considers the evidence supporting the use of prophylactic dressings for the prevention of sacral pressure injuries among high-risk patients.

**Methods:** Electronic database searches were conducted on May 2017. The searches found 604 titles and after removal of duplicate records 384 titles were scanned against the inclusion and exclusion criteria. Of these, 210 were excluded based on their title and abstract primarily because the intervention was not a prophylactic dressing. Finally, the full text of 10 papers were retrieved.

**Results:** The study designs differed with two randomised controlled trials (RCTs), seven cohort studies, and one case series. Nine studies applied silicone based foam dressings, one study applied transparent film. In all 10 studies, the incidence of pressure injuries was significantly lower in the intervention group treated with the prophylactic dressings.

**Conclusions:** The randomized controlled trial (RCT), cohort, and case series all indicates that the dressing as part of pressure injury prevention may be clinically beneficial in reducing sacral pressure injuries among high-risk patients in the acute care setting.

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**P59**

**Easing the burden of choice: a concept to map the relative performance characteristics of product combinations in clinical practice**

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**Introduction:** The use of an appropriate support surface is well known in playing a key role in the prevention and on-going management of pressure ulcers<sup>1</sup>. However, the clinician is presented with an increasing equipment selection and corresponding data from which to make a judgement on the choice of appropriate product(s) to provide the optimum solution for their patient. Manufacturers often receive questions and requests from clinicians for advice in selecting an appropriate support surface amongst the variable features and functions available, particularly on the use of emerging therapies such as microclimate management<sup>2</sup>. There is an obvious need for this selection process to be made easier for clinical staff, upon whom there is an increasing demand to perform more tasks in less time. Therefore, it is proposed that there is a concept system that can be used by individual clinicians and within facilities to assist in the selection process, easing the burden of choice. **Methods:** Input from a range of stakeholders was collated on the topic. Clinicians are already well versed in using scoring systems to aid in clinical judgement (Waterlow, Braden and Norton Scales). The proposed concept extends this scoring approach to develop the basis for a scoring/visualisation system by creating relative scoring of strengths/weaknesses of products and their features. Where available, standardised tests<sup>3</sup> were used to assess the strength/weakness of a product feature and create a scoring table (figure 1). The score results were then shown in a radar plot for ease of visualisation.

**Results:**

Example Scoring Levels	4 = 'Excellent/Best in Class / Outstanding'				3 = 'High performance'			
	2 = 'Medium Performance'				1 = 'Low Performance'			
	Individual Product Types							
Categories	Foam		Hybrid		Pressure (AP)		Microclimate	
	Alternating		Coverlet (MC)		Foam & MC		Hybrid & MC	
Clinical Flexibility	1	3	3	4	4	4	4	4
Moisture Removal	1	1	2	4	4	4	4	4
Heat Removal	1	2	3	4	4	4	4	4
Shear Characteristics	1	1	3	2	2	2	3	3
Ease of Use	3	2	2	3	3	3	3	3
Infection control	1	1	2	3	3	3	3	3
Tissue Offloading	1	2	4	1	1	2	2	4
Pressure Redistribution	3	3	2	1	3	3	3	2
<b>Total</b>	<b>12</b>	<b>15</b>	<b>21</b>	<b>22</b>	<b>24</b>	<b>24</b>	<b>25</b>	<b>27</b>

Figure 1 Example Scoring Table created using standardised tests as a reference

**Conclusions:** During the consultation process it was clear that a simple, flexible approach was needed with a configurable/open-source visualisation approach that required no training but could be applied from initial purchasing through to clinical decision making. The proposed concept developed a scoring/visualisation system for the parameters of each type of support surface. The results were incorporated into a 'radar' style visualisation graph. This provides a quick and easy way to interpret and compare product options to form an appropriate patient solution via a holistic view. The use of this visual approach may assist in comparisons and decision making, and allows for a simple record of the product solutions to be created.

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**P60**

**Heel offloading: connecting ergonomic design to clinical practice**

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**Introduction:** The heel (Posterior calcaneal tuberosity) is a particular risk area for pressure ulcers<sup>1</sup>. A new support surface was designed that includes an internal feature to provide heel offloading.

The design challenge involved identifying the size and location within the mattress, calculating positioning and validating for suitability in the intended market. If the heel offloading is performed incorrectly the pressure in the sacral area could be adversely affected<sup>2</sup>.

A further problem was how to effectively communicate the use and position of this feature.

**Methods:** Demographic/ergonomic data for the key intended markets covering the 2.5th, 50th and 97.5th percentile heights for males and females was collected.

This was checked against multiple on-line and reference sources and a working range of heights was obtained<sup>3</sup>.

**Results:** The position of the heel can vary significantly dependent due to many factors. It is therefore important to know just where on the surface the heel will be positioned in order to provide optimal offloading. This varying position results in an ergonomic limitation with some 'fixed position' heel solutions such as an sloped angle on a foam mattress.

A flexible solution that can accommodate a range of heel positions on the surface is required. The provision of this in the form of individually ventable heel cells meaning that the same level of offloading effectiveness can be provided irrespective of the patient height. This may help to improve consistency of care in respect to heel off-loading.

The results of the heel positions were visually mapped against the cell locations in the surface. This allowed a visual map to be created to help the user which valves were likely to correspond to a given patient height and forms part of the instructions for use and helps to promote the correct and effective use of the heel offloading feature.

**Conclusions:** In conclusion, the provision of individually deflatable heel cells provides for flexibility in the prevention and treatment of heel-related pressure ulcers across a wide range of patient heights.

The user is provided with a usable map of the heel offloading feature.

The internal location of the heel vent controls ensures that the outer surface can be easily wipe cleaned.

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## P61

## Assisted patient turning at eight to twelve hour interval using new device

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**Introduction:** The Filipino doctors invented a device\* for prevention and treatment of Pressure Ulcers specifically for quadriplegic patients.

**Methods:** This is a prospective cohort study using two new prototypes of mechanical bed in an ICU of a tertiary hospital. The standard hospital bed was used for comparison. Patients recruited are quadriplegic patients who have suffered spinal cord injury due to trauma or other causes with or without pre-existing decubitus ulcer. The surface of the experimental bed changes automatically at a given time interval set by an operator. There is patient turning from side to side on an eight-hour interval (per shift basis) instead of the traditional 2-hour interval done with the standard hospital bed. Daily measurements of pre-existing pressure ulcers and observation of newly formed injuries are documented as well as live feeds from a CCTV recorded to a central computer. Sensors on the device\* is designed to detect weight, moisture and temperature to account for other variables to be addressed in the study.

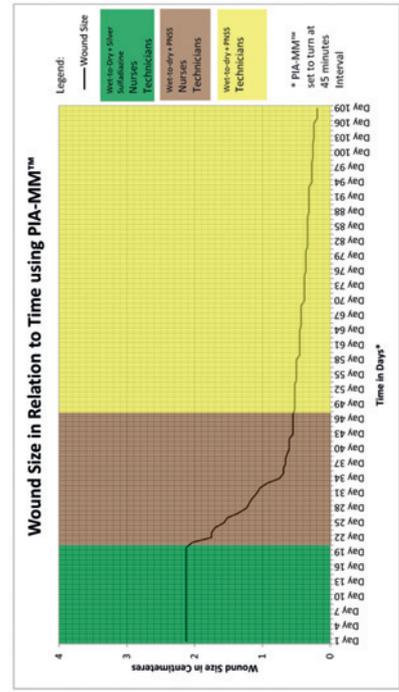
**Results:** Results of the initial phase of the study showed favorable outcome. From an initial widest size of decubitus ulcer of 2.1 cm, its size decreased to 1.7 cm in 21 days, 1 cm by 31 days, 0.55 cm by 45 days, 0.35 cm by 60 days and 0.3 cm by the end of the observation period of 90 days. This ongoing study, is highly predictive of the same results with the same principles applied from the first prototype to the new, more ergonomic, hospital grade and marketable design of the device\*.

**Conclusions:** The device\* is a promising invention that works to treat and prevent the formation of pressure ulcers. It will revolutionize management of quadriplegic patients. Free from the hassle every time a patient needs to be turned from side to side every 2 hours. Free from the guilt from the human error of neglect.

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\* Persistent Immobile Assistant – Mechanical Movement™ (PIA-MM™) with US Patent No. 10,231,890 and IPO-PHL Patent No. 1-2014000155



## P62

## Effect of a dressing (sucrose octasulfate, metalloproteinase inhibitor) in the local management of pressure ulcers: results of a clinical study

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**Introduction:** Numerous factors may contribute to the chronicity of pressure ulcers (PUs): cellular and systemic effects of aging, repeated ischemia–reperfusion injuries, local excess of Matrix Metalloproteinases (MMPs). Nano-Oligosaccharide Factor (NOSF, sucrose octasulfate) is a compound known to inhibit MMP activity and to act on vascular cells, and the healing enhancer properties of dressings\* in the management of chronic wounds, such as diabetic foot ulcers and leg ulcers, have been demonstrated through different RCTs and confirmed in current practice in large observational studies. The objective of this study was to further assess the efficacy and tolerance of the absorbent dressing\* in the local management of PUs.

**Methods:** This work presents the results of a prospective multicenter clinical trial. Inpatients or outpatients with a stage 3 PU, according to the EPUAP classification, and a wound area ranging from 3 to 50 cm<sup>2</sup>, without any dark necrosis plaque or local infection, were eligible to inclusion and treated with the evaluated dressing during a six-week period. Every week, clinical and planimetric evaluations were completed and photos of the wound were taken. The primary outcome was the Relative Wound Area Reduction (RWAR) at week six. Main secondary outcomes included wound closure rate, acceptability (ease of application and removal, conformability, pain at dressing change, odor and exudate management), and tolerance with occurrence of adverse events.

**Results:** A total of 25 patients (age range: 24 to 84 years, 80% of male) have been included with pressure ulcers mainly located on sacral area (40%) and heel (28%). At baseline, the mean wound duration was 2.5 ± 2.4 months and the mean wound area was 6.4 ± 5.7 cm<sup>2</sup>. By week six, the RWAR was 45.8% (median value). Complete healing occurred in 3 patients after a mean treatment time of 27 ± 6 days and a dressing change every 2.4 days. An improvement of perilesional skin (94% healthy versus 67% at baseline) and a very good acceptability of the evaluated dressing were reported by healthcare professionals. Two local adverse events occurred under the tested dressing.

**Conclusions:** These clinical results further illustrate the effective and safe profile of dressings\* in the management of chronic wounds. The simplicity of this effective treatment is a very promising option for the local management of PUs.

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\* TLC-NOSF

## P70

## Evaluation des Pratiques Professionnelles sur la prise en charge des plaies chroniques infectées en EHPAD: définition et place du prélèvement

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**Introduction:** Dans les Etablissements d'Hébergements pour Personnes Agées Dépendantes (EHPAD), la population âgée est particulièrement exposée au développement de plaies chroniques (escarres, lésions du pied diabétique et ulcères de jambe). L'objectif de ce travail était de réaliser une évaluation des pratiques professionnelles (EPP) sous forme de questionnaire concernant la définition et la prise en charge des plaies chroniques dans les EHPAD bénéficiant de l'expertise d'une l'Equipe Mobile d'Hygiène (EMH) EHPAD.

**Méthodes:** Un questionnaire comprenant 22 questions présentées sous forme de questions à choix multiples ou questions à réponse courte a été élaboré. Au moins un(e) infirmier(e) employé(e) dans chaque EHPAD sous convention avec l'EMH EHPAD du CHU de Nîmes a été interrogé(e). Des formations ont ensuite été organisées, assurées par une équipe pluridisciplinaire, gériatre, pharmacien, microbiologiste et hygiéniste.

**Résultats:** Au total, 20 EHPAD ont été inclus et 55 personnes ont rempli le questionnaire. Cette évaluation a mis en évidence le rôle clef des infirmier(es) et du médecin traitant dans la prise en charge des plaies chroniques. Elle a fait émerger cependant des carences du personnel paramédical en termes de connaissance générale en particulier sur la plaie infectée. Ce questionnaire a également mis en lumière que dans la plupart des établissements, il n'existait pas de procédures internes quant à la préparation de la plaie avant réfection du pansement ou prélèvement microbiologie. Les formations ont été suivies par 33 personnes dont 4 médecins et 29 infirmiers. Ces formations ont permis de renforcer les connaissances des soignants qui y ont participé, le score de connaissance obtenu après formation étant de 16,18 (+/-2,93) pour un score maximum de 21, ce qui est significativement meilleur que le score avant formation (13 (+/- 2,74)) ( $p < 0,05$ ). Les deux scores qui ont significativement progressé étaient le score concernant les signes d'urgence absolus (score allant de 0,27 à 2,53 sur 3 après formation) et les signes cliniques d'infection (score allant de 2,66 à 3,36 sur 5 après formation).

**Conclusions:** Ce travail a mis en évidence l'importance de la formation continue dans la prise en charge des plaies chroniques. Un travail avec chaque EHPAD sera mis en place afin de rédiger des procédures internes adaptées à chaque établissement et d'uniformiser les pratiques au sein de chaque structure.

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## P71

## Comment le CHU de Montpellier s'est organisé pour sa campagne stop escarre au sein de son ght

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**Introduction:** En France, les groupements hospitaliers de territoires (GHT) sont un dispositif récent qui obligent les établissements publics de santé d'un même secteur à s'engager autour d'une stratégie de prise en charge commune. Dans le cadre du projet de soin partagé, le Centre Universitaire Hospitalier de notre territoire a proposé la thématique escarre pour les 9 établissements. L'objectif de la présentation est de faire un retour d'expérience.

**Methods:** Un premier état des lieux a été réalisé à partir d'un questionnaire avec 36 items. Cet autodiagnostic a permis de déterminer les pistes d'action. La campagne STOP ESCARRE a été lancée le 16 novembre 2017. Trois axes clés constituent le projet : rédaction d'un livret informatif pour les patients et leur entourage ; organisation d'une formation annuelle; suivi indicateurs avec organisation d'une enquête tous les 2 ans. Le CHU a pu tester et proposer un outil informatisé pour effectuer le recueil de données et faciliter le traitement.

**Results:** Le livret à destination des patients a été réalisé avec la validation des comités des usagers. La formation s'est déroulée pour la première fois en 2018 avec 22 participants. En 2019, le nombre d'inscrits est passé à 37. En ce qui concerne l'enquête de novembre 2018, elle a permis de calculer un taux de prévalence sur le CHU de 8,2%, et de 8,3% pour une partie du territoire. En termes de qualité, le choix du support n'est pas optimal : des patients à risque très élevé étaient installés sur des matelas standards ; 15% des patients porteurs d'escarres n'étaient pas sur un support curatif. Autre information : les échelles de risque sont retrouvées de façon très disparate : de 98,8% pour un hôpital local à 12,8% sur le CHU.

**Conclusions:** Ce projet représente la première expérience de coopération entre diverses équipes d'un même territoire. Etant donné la différence de dimension des établissements, il n'est pas question de faire un quelconque comparatif, mais bien de créer un collectif de soignants mobilisés pour cette affection qui touche encore trop de patients.

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## P72

## Deux outils pédagogiques pour optimiser la prévention et le traitement de l'escarre

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**Introduction:** Au-delà de la prise en charge nutritionnelle, le choix du support et du pansement pour les patients à risque ou porteurs d'escarre reste déterminant. La diffusion de bonnes pratiques est fondamentale pour optimiser les pratiques. Une des missions de notre Commission Plaies et Cicatrisation (CPC) est la formation sur l'escarre. Des livrets au format de poche ont été imaginés. L'objectif de la présentation est de recueillir une évaluation externe de ces supports.

**Methods:** Un premier projet a visé l'harmonisation du choix du pansement. Une infirmière a sollicité le pharmacien et le dermatologue du groupe. La collaboration avec le service de communication a permis d'aboutir à une palette, de type nuancier. Plus récemment, la problématique du choix du support d'aide à la prévention et au traitement de l'escarre ayant été mise en exergue, les membres de la CPC ont proposé de créer un support sur le même principe. Des aides-soignants, et une ergothérapeute ont été associés à ce travail.

**Results:** La palette « De la plaie au pansement: vers une harmonisation du choix thérapeutique » présente au recto le choix de la famille de pansement possible suivant trois indicateurs: le stade de la plaie, l'évolution de la réponse thérapeutique en allant des moyens les plus conventionnels aux plus spécialisés, le statut de remboursement. Au verso, sont indiqués les produits disponibles ainsi que la conduite soignante. Distribuée depuis plus de 10 ans en formation continue et initiale, elle est remise à jour tous les 2 ans. Le « guide pratique pour le choix du support : Non aux escarres ! Oui à la mobilisation ! » rappelle quelques fondamentaux sur l'escarre. Suivant différentes situations cliniques, le support le plus adapté est indiqué en expliquant son principe et en donnant quelques noms de marque. Enfin, des conseils et astuces pour l'installation des patients clôturent le livret. L'outil est, comme le nuancier pansement, distribué lors des journées de formation escarre.

**Conclusions:** L'expérience de notre groupe, montre que ces livrets pédagogiques en format de poche présentent encore un intérêt: ils restent appréciés par les équipes parce qu'accessibles et faciles à glisser dans les poches. Mais, comme tout outil, ils ne constituent qu'une part infime du travail d'éducation des soignants.

## References:

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## P73

## Retours d'expériences de soignants sur l'acceptation d'un pansement hydrocellulaire siliconé multicouches en adjuvant des protocoles de prévention des escarres

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2 CH Chalons sur Saône, Chalons sur Saône, France  
3 CH Libourne, Libourne, France  
4 CHU Nice, Nice, France

**Introduction:** Décrire l'opinion des soignants sur l'utilisation d'un pansement hydrocellulaire siliconé multicouches\* associé aux protocoles de prévention standard des escarres.

**Methods:** Enquête réalisée auprès de centres pilotes pour recueillir leurs opinions et satisfactions sur la facilité d'utilisation du pansement en complément de leur protocole de prévention.

**Results:** L'enquête s'est déroulée dans des services de réanimation, de maladies infectieuses et de dermatologie représentant un total de 140 lits où l'âge moyen des patients est de 68 ans et la durée moyenne d'hospitalisation de 10 jours. Les soignants utilisent les pansements depuis 23 semaines en moyenne et 71,4% les utilisent fréquemment en prévention des escarres. Sur des échelles visuelles analogiques de 0 à 10, l'intérêt d'utiliser le pansement est coté à 4,9 chez les patients de 50 à 80 ans et à 7,3 chez ceux de plus de 80 ans, à 7,4 chez les patients dénutris, à 7,0 chez les patients avec incontinence urinaire et/ou fécale, à 5,4 quand le lit est équipé d'un matelas à air motorisé, à 7,6 chez les patients présentant déjà une escarre hors sacrum et à 8,6 chez les patients à risque élevé de développer une escarre selon le jugement clinique ou l'échelle d'évaluation du risque (Braden/Norton). Dans la pratique, les soignants estiment que le pansement doit être changé en moyenne tous les 2,4 jours et inspectent la zone cutanée 2,6 fois par jour. Les soignants ont également évalué les caractéristiques du pansement dans la pratique. La forme du pansement adaptée à la région sacrée est cotée à 8,7, sa facilité de manipulation à 8,4, sa facilité d'application à 8,9, sa facilité pour l'inspection cutanée à 6,4 et son caractère atraumatique au retrait est évalué à 8,3. L'intérêt du pansement comme adjuvant aux protocoles de prévention est évalué à 7,6 sur 10.

**Conclusions:** Dans la pratique hospitalière quotidienne, le pansement hydrocellulaire siliconé multicouches est perçu par le personnel soignant comme une aide à la prévention des escarres en adjuvant du protocole standard et est facile à utiliser.

## References:

\* Mepilix® Border Sacrum

**P74**

**Enseignement Escarre dans les EPHAD de Seine et Marne en France**

**Caroline Van Wijk<sup>1</sup>, Laurent Lepvrier<sup>1</sup>, Elisabeth Renault<sup>1</sup>, Marc Wiser<sup>1</sup>, Caroline Yavon<sup>1</sup>**

<sup>1</sup> GHSIF Melun, Equipe Mobile Plaies et Cicatrisation, Melun, France

**Introduction:** Dans le but de promouvoir la prévention et le traitement des escarres, notre équipe a développé une formation pour les EHPAD, « Escarres, Mobilisons-Nous ». LARS de notre région a subventionné ce projet : 3 années de fonctionnement pour former les EHPAD de Seine et Marne (2018-2020). Voici un retour sur la première année.

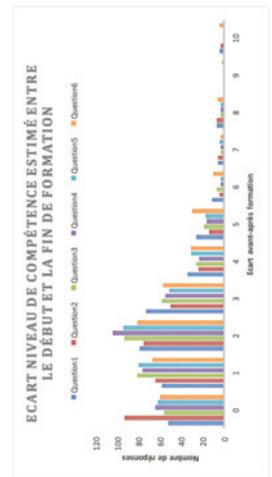
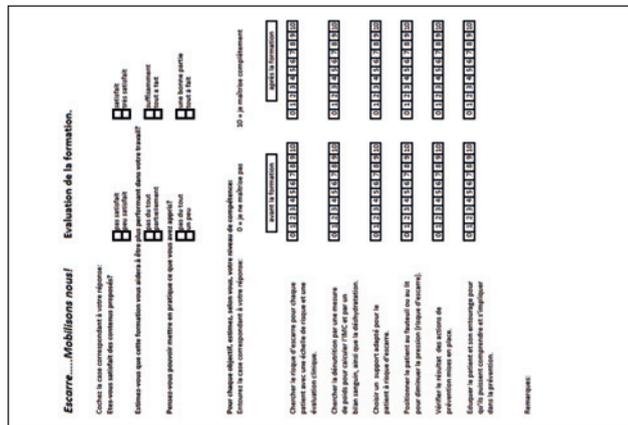
**Méthodes :**

**Résultats:** Sur les 446 personnes formées, l'écart de niveau de compétence estimé par les stagiaires oscille entre 2.39 et 2.93. Sur l'ensemble des questions posées le progrès ressenti par les soignants est donc relativement homogène.

*D'autres résultats sont en cours d'exploitation.*

**Conclusions:** Une majorité de participants apprécie la formation : le contenu est considéré comme satisfaisant, voire très satisfaisant, la formation aidera à être plus performant dans le travail et au moins une partie pourra être mise en pratique.

L'estimation du niveau de compétence est augmentée après la formation. Pour certains l'écart entre le niveau 'avant formation' et 'après formation' est très important, pour d'autres moins. Certaines questions sont restées sans réponse car l'item ne concernait pas la profession du stagiaire. Certaines personnes estiment leur niveau de compétence identique avant et après la formation (0). Malgré tout elles ont trouvé le contenu de la formation satisfaisant ou très satisfaisant, elles estiment que cette formation les aidera à être plus performant dans leur travail et pensent pouvoir mettre en pratique ce qu'elles ont appris. Probablement le fait d'être reconforté dans ses connaissances est important et motivant.



**P75**

**Evaluation clinique d'un nouveau pansement en fibres poly-absorbantes imprégnées de la technologie\* dans la prise en charge locale des ulcères de jambes, aux différentes phases du processus cicatriciel.**

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<sup>2</sup> UM France

**Introduction:** Évaluer l'efficacité et la tolérance d'un nouveau pansement composé de fibres poly-absorbantes imprégnées de la technologie\* dans la prise en charge locale d'ulcères de jambe (UDJ), aux différentes phases du processus cicatriciel.

**Methods:** Ce travail présente les résultats de deux études cliniques prospectives, multicentriques, qui différaient essentiellement, par la phase du processus cicatriciel, d'ésion ou bourgeonnement dans laquelle devaient se trouver les plaies des patients inclus. Ces deux essais, dénommés NEREIDES et CASSIOPEE, ont été menés en France auprès de 19 et 16 centres investigateurs actifs (services hospitaliers et cabinets libéraux). Les patients présentaient un UDJ veineux ou mixte à prédominance veineuse ( $0.7 \leq \text{IPS} \leq 1.3$ ), non infecté, modérément à fortement exsudatif. Ils bénéficiaient tous d'un protocole de soin standard (pansement à l'étude + système de compression approprié). Les plaies traitées étaient évaluées pendant une durée de 12 semaines ou jusqu'à la cicatrisation complète. Le critère principal de ces études était la réduction relative de surface en S12, analysée en ITT modifiée (patients avec au moins une mesure de planimétrie lors de l'inclusion). Les critères secondaires incluaient notamment le taux de cicatrisation, le délai de fermeture des plaies, les effets indésirables survenus au cours de l'étude, et l'acceptabilité du pansement.

**Results:** 37 patients ont été inclus dans l'étude NEREIDES et 51 patients dans l'étude CASSIOPEE. Les UDJs présentaient une ancienneté de 7 mois et une surface de  $7.1$  et  $7.8 \text{ cm}^2$ , respectivement (valeurs médianes). Les deux cohortes de patients différaient essentiellement par le taux de fibrine présent à J0 (valeurs médianes: 75% et 30%, respectivement) et la proportion de plaies récurrentes (51% et 39%, respectivement). A 12 semaines, l'analyse de la réduction de surface (60% et 81%), confortée par celle des critères secondaires : taux de cicatrisation (6/34 ; 18% et 10/51 ; 20%) et délai moyen de fermeture :  $58 \pm 27$  jours et  $55 \pm 23$  jours), rapporte les résultats bénéfiques du pansement dans les deux cohortes. La nature et la fréquence des effets indésirables locaux étaient très similaires dans les deux études, et cohérentes avec la bonne tolérance des fibres poly-absorbantes et de la technologie\* rapportée dans la littérature. L'acceptabilité du pansement a été jugée très bonne ou bonne à toutes les phases du processus cicatriciel.

**Conclusions:** Ces résultats cliniques confortent les bénéfices de la technologie\* sur le processus cicatriciel et confirment l'intérêt du pansement testé dans la prise en charge locale des UDJs, aux différentes phases et jusqu'à cicatrisation.

\*TLC-NOSF, URGO Medical

## POSTER PRESENTATIONS

P76

## Interroger et repenser les pratiques de soins dans la pertinence d'utilisation du matelas à air pour la prévention des escarres

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**Introduction :** En tant qu'équipe mobile des plaies et cicatrisation nous avons mené dans notre centre hospitalier universitaire un audit en lien avec le bon usage du matelas à air dans la prévention du risque d'escarre.

Ce projet de pertinence des soins a été initié en collaboration avec le département de la qualité et de la gestion des risques ainsi que la cellule de matériovigilance.

Des déclarations d'événements indésirables sont à l'origine de cet audit. En effet les équipes de soins utilisatrices du matelas à air ne respectent pas toujours la bonne indication et les précautions entourant ce dispositif médical.

### Constat de départ:

- Des escarres sont acquises sur matelas à air.
- L'algorithme décisionnel pour le choix du matelas n'est pas toujours respecté.
- Seulement 14,4% des demandes d'enlèvements du matelas à air sont dues à une réévaluation de la pertinence du matelas.

De plus, les plaies d'escarre représentent 45% des demandes de consultations de l'équipe mobile.

### Méthodes et résultats:

Un 1er audit a été mené en 2018 sur l'ensemble du CHU dont les conclusions sont celles-ci :

- Pour 49 % des patients le choix du matelas air n'était pas en adéquation avec l'algorithme décisionnel.
- 74% des patients installés sur un matelas à air étaient positionnables.
- La réévaluation hebdomadaire du risque d'escarre est faite dans moins d'un cas sur deux.
- Pour 54 % des patients la décharge talonnière n'est pas faite.
- Seulement 25% des matelas à air étaient fixés au cadre du lit et 30% n'avaient pas les barrières de lit.

Afin d'appuyer les préconisations et de réduire les mésusages des actions ont été réalisées :

- Création d'un guide de bon usage du matelas à air.
- Rediffusion des recommandations
- Suivi et coordination avec les référents matelas.
- Analyses de pratiques professionnelles et intervention dans les services de soins.

**Conclusions :** Suite à ce travail les locations de matelas à air ont diminuées en 2018 : - 300 locations et les coûts ont baissé de -10%. Par contre la durée moyenne d'installation et la réévaluation n'a pas progressée. Nous mènerons en juin 2019 un deuxième audit sur l'ensemble du CHU qui servira à analyser les écarts afin de retravailler sur les points de rupture dans la pertinence d'utilisation du matelas à air pour la prévention du risque d'escarre.

P77

## Action d'un pansement hydrocellulaire forme sacrum, posé en préventif, sur la prévalence mensuelle des escarres localisées au siège en médecine intensive-réanimation

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**Introduction :** Depuis 2010, une enquête de prévalence mensuelle est réalisée au sein du Département de Médecine Intensive - réanimation et médecine hyperbare (DMIRMH). Un groupe « escarre », en lien avec la Commission « Plaies - Escarres - Cicatrisation » du CHU ANGERS, travaille à diminuer cette prévalence. Les équipes sont formées, informées, ... afin de poursuivre l'amélioration de la qualité des soins.

Le service a été équipé en lit de réanimation avec un matelas de prévention des escarres à air de 20 cm d'épaisseur intégré. Pourtant la prévalence des escarres localisées au sacrum stagne au-dessus de 5%.

**Méthodes :** En 2017, la Société Française de l'Escarre (PERSE), le CERC et la SRLF ont réalisé une étude de prévalence dans les services de réanimation français. 18,7% des patients sont porteurs d'une escarre dont 12,5% d'une escarre acquise durant le séjour en réanimation. 57,4% sont situées au sacrum.

La prévalence des patients porteurs d'une escarre acquise dans le DMIRMH est de 13,8% en 2018. Un document de consensus de la WUWHS de 2016 montre l'intérêt d'une prévention des escarres sacrées en réanimation par l'utilisation d'un pansement hydrocellulaire border. Le groupe a décidé de modifier le protocole de prévention du service pour les patients ayant le critère « immobilité totale » lors du calcul du risque d'escarre à l'admission et de poser, systématiquement un pansement hydrocellulaire au niveau du sacrum.

**Résultats :** Cette modification a pris effet le 06/11/2018 et pour tous les patients porteurs d'un pansement de prévention, l'évolution locale est tracée.

**Aujourd'hui, :** 58 patients ont bénéficié de cette prévention. (23 sont décédés soit 40%)

7 ont présenté une escarre sacrée (3 stade 1, 3 stade 2 et 1 non classé) soit 12%

Les résultats des enquêtes mensuelles indiquent une prévalence des escarres sacrées acquises dans l'unité à 2,5% sur les 4 premiers mois de 2019.

**Conclusions :** Cette baisse de la prévalence peut être liée à : l'effet stimulant de la modification du protocole de prévention des escarres sur l'attention et l'investissement de l'équipe et/ou à l'effet préventif du pansement hydrocellulaire.

Les chiffres des prochains mois nous éclaireront.

**P79**

**Retour d'expérience d'une équipe mobile plaies et cicatrisation d'un CHU sur la prévention des escarres**

**Maria Benbrik<sup>1</sup>**, **Caroline Anras<sup>2</sup>**, **Christine Jousset<sup>3</sup>**

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**Introduction :** A l'initiative du comité plaies et cicatrisation, la direction des soins de notre CHU a permis la création d'une équipe mobile plaies et cicatrisation dont la principale mission est d'améliorer et harmoniser les pratiques professionnelles en matière de prévention et traitement des plaies.

Chaque année, 50% de l'activité clinique concerne les patients porteurs d'escarres de stade 3 et 4. De ce fait, nous nous sommes fixé l'objectif de diminuer l'incidence des escarres à l'hôpital.

L'implication des différents acteurs de soins (cadres de santé, infirmiers, aides-soignants, kinésithérapeutes, ergothérapeutes et médecins) et la collaboration avec les services économiques, pharmacie, service informatique, le groupe escarre sont indispensables.

Lors des consultations au lit du patient que nous avons constaté l'écart entre les recommandations des grandes instances et les pratiques soignantes révélant un manque de matériel d'aide à la prévention d'escarres, et un besoin de formation.

**Méthodes :** Un premier travail conjoint avec le groupe escarre et les services économiques a permis de :

- référer les différents matelas et dispositifs de positionnement
  - d'élaborer un algorithme de choix des matelas disponibles au CHU conforme aux recommandations HAS.
- Afin de garantir l'harmonisation des pratiques et le bon usage de ces dispositifs, nous avons construit un guide de bon usage des matelas à air et un guide de bon usage du matériel d'aide à la prévention des escarres.

Les analyses de pratiques professionnelles ont mis en lumière un défaut de traçabilité de l'évaluation du risque d'escarre et des actions de prévention. Avec l'aide des services informatiques, nous avons intégré dans le dossier de soin informatisé un « protocole de prévention d'escarre » qui se déclenche à partir du risque identifié par l'échelle de Braden. Il propose des actions adaptées, programmables dans le plan de soin, et leurs évaluations.

**Résultats :** Tous ces outils sont diffusés lors de nos actions de formation au lit du patient, en formation continue, en ateliers de compétences ou en formation initiale. Leur impact sur la qualité des soins est évalué par les extractions de données informatiques, les audits d'utilisation du matelas à air et la prévalence des escarres.

**Conclusions :** L'accompagnement de l'équipe mobile conduit à une réassurance et une autonomisation croissante des paramédicaux en participant au développement de leurs compétences dans la prévention d'escarre. Il contribue à l'amélioration de la qualité des soins dont le premier bénéficiaire est le patient.

**P79**

**Ulcères de jambe veineux traités par un système de compression multitype multicouche et suivis en ville**

**Vincent Crebassa<sup>1</sup>**

<sup>1</sup> *Angiology, Montpellier, France*

**Introduction:** Décrire les caractéristiques cliniques et l'évolution des ulcères de jambe veineux traités par un système de compression multitype multicouche suivis en ville.

**Methods:** Chaque médecin devait décrire les caractéristiques démographiques et cliniques des patients souffrant d'un ulcère de jambe veineux et bénéficiant d'une prescription d'un système de compression multitype. Une application a permis le suivi infirmier en ville des patients. Un dossier de soin évaluant l'évolution des plaies et de la cicatrisation a été élaboré.

**Results:** Sur 204 patients bénéficiant d'une prescription d'un système de compression multitype multicouche, un suivi infirmier était disponible pour 97 d'entre eux. Les résultats concernent uniquement les patients ayant eu un suivi documenté (n = 97).

Les patients sont âgés de 75 ans, et 66,2% sont en surpoids (8,8% ou obèses (57,4%). Les ulcères sont d'origine veineuse (83,3%) et d'origine mixte (16,7%). L'ancienneté de l'ulcère est supérieure à 64 jours (médiane) dans 50% des cas. Dans 62,3% des cas, il s'agit d'une récurrence d'ulcère. 74,6% des patients présentent un œdème (modéré 50,7%, important 23,9%). Une compression élastique sous forme de bas était déjà en place chez 45,6% des patients et sous forme de bandes chez 35,3% (portées irrégulièrement - 40,5% ou portées jour et nuit - 17,6%). Dans 68,8% des cas elles n'étaient « jamais » posées ou « rarement » avant le lever du patient ou après avoir surélevé les jambes (≥1h). Les ulcères de jambe veineux avaient une surface médiane de 4,0 cm<sup>2</sup> à l'inclusion et de 2,1 cm<sup>2</sup> (p<0,01) lors de la dernière visite soit une réduction de 47,5% en 34 jours en moyenne, le score push médian diminuait de 10 à 8 (p<0,01) et le pourcentage de ceux ayant des exsudats élevés passait de 26,5% à 4,1% (p<0,05). 93,3% des infirmiers(ères) jugeaient facile ou très facile la pose du système de compression prescrit, 80,0% jugeaient que leur acte infirmier était facilité par ces bandes et 80,0% qu'il leur donnait plus confiance dans l'efficacité de la compression.

**Conclusions:** Le profil des patients de cette étude est comparable à celui de la littérature. Ces patients bénéficiaient d'un système de compression dans 80,9% des cas. Cependant, cette compression n'était optimale ni en termes de pose ni en termes d'observance. Chez ces patients le port d'un système de compression multitype multicouche constitue un avantage certain qui se traduit par des évolutions significatives des ulcères vers la cicatrisation tout en facilitant la tâche des soignants.

## P80 Réinjection de graisse selon la technique de Coleman dans le traitement de l'escarre neurologique. Création d'un livret d'information dans le cadre d'une équipe d'éducation thérapeutique.

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**Introduction:** Nous suivons environ 350 patients par an présentant une escarre dans le cadre d'une lésion médullaire ou d'une atteinte neurologique.

L'équipe pluri disciplinaire est intégrée dans un programme d'éducation thérapeutique à la prise en charge de l'escarre neurologique : « C'PEAUCIBLE ».

Le service de Médecine Physique et de Réadaptation travaille en étroite collaboration avec le service de chirurgie de notre hôpital et propose aux patients depuis des années différents techniques chirurgicales dans la prise en charge de leurs escarres (lambeau musculocutané, greffe de peau, chirurgie de Coleman).

**Methods:** Nous avons souhaité améliorer la qualité de l'information donnée au patient, à ses aidants, et aux équipes de soins. Cette technique de Coleman consiste en une greffe de ses propres cellules graisseuses dans une zone où il en manque (insuffisance de matelassage en regard des saillies osseuses, trochanters, sacrum, ischions) en prévention primaire ou secondaire.

Lors de réunions d'équipe éducative, nous avons réuni différents intervenants : cadre de soins, programmation chirurgicale, diététicienne, ergothérapeute, assistante sociale, médecin, aide-soignant, infirmières, assistante médicale, patients.

**Results:** Nous avons élaboré un livret d'information destiné au patient qui explique la technique de réinjection de graisse selon la technique de Coleman (lipomodélage, lipofeeling).

Nous détaillons la procédure pré opératoire (consultation d'anesthésie, rencontre avec l'assistante sociale et la psychologue, consultation de suivi d'escarre) ainsi que la technique qui vise à injecter 30 à 50 CC de graisse dans les zones à risque de récurrence d'escarre (illustrations par photos de l'intervention). Les contraintes d'installation au lit post opératoires sont expliquées et illustrées par les positions autorisées et déconseillées. Les modalités de reprise d'assise et de surveillance sont exposées ainsi que la nécessité d'éviter tout amaigrissement post opératoire.

Un protocole de soins et de reprise d'assise est intégré au livret afin de faciliter la liaison avec les équipes de soins de suite et d'hospitalisation à domicile.

Ce livret a été élaboré en étroite collaboration avec une patiente ressource lésée médullaire ayant bénéficié de deux chirurgies de Coleman et a été relu par des patients porteurs d'escarres mais n'ayant jamais eu recours à ce type de chirurgie qui confirment l'intérêt du livret.

**Conclusions:** Ce guide est utilisé à la fois en information initiale lors de la discussion chirurgicale et comme support en péri opératoire.

### References:

Previnaire J.G. Lipofilling in the secondary prevention of ischial tuberosity and pelvic pressure ulcer. Spinal Cord 2016

## P81

## Démarche d'efficacité médico-économique au centre hospitalier de Salon-de-Provence

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**Introduction:** La prise en charge du risque escarre au sein des établissements de santé est devenu un véritable enjeu de santé publique au regard du vieillissement de la population et du développement des maladies chroniques. Au centre hospitalier de Salon de Provence, les enquêtes de prévalence réalisées en 2017 et 2018 nous permettent d'affirmer que les patients identifiés à risque d'escarre représentent environ 38% des patients hospitalisés. Sur ces deux dernières années, la prévalence annuelle moyenne du nombre d'escarre est de 8,35 % sur un nombre total moyen de 221 patients par an répondants aux critères d'inclusion des enquêtes de prévalence. Ces escarres sont présentes à l'admission ou sont contractées pendant la période d'hospitalisation. Dans ces deux conditions, elles nécessitent une prise en charge supplémentaire psychologique, médicale (matelas à air dynamique, accessoires de décharge, pansement, temps IDE ... etc) et nécessitent bien sûr un vent des délais d'hospitalisation plus importants qui augmentent considérablement les coûts de prise en charge des patients.

**Méthodes:** Afin de réduire les coûts liés à la présence d'escarre tout en conservant une efficacité de qualité des soins de prévention et d'aide aux traitements, deux actions simultanées ont été menées au centre hospitalier de Salon de Provence depuis le mois de septembre 2018 :

- Des actions de formation ont été réalisées dans chaque service de soin afin de resensibiliser les équipes soignantes sur les caractéristiques techniques des 2 supports à air dynamiques\* référencés à l'hôpital de Salon de Provence (marché Resah national). Les conditions de location des supports dynamiques ont été revues avec les soignants. Un objectif de location est fixé à 60% d'ASX6 et 40% d'APM440.

- Deux surmatelas\*\* à air réactif statique (non motorisé) ont été installés dans chaque unité de soins. Ces surmatelas\*\* à visées préventives et d'aide aux traitements de l'escarre doivent être installés en première intention

**Résultats:** Evolution des coûts de location mensuels et des économies :

	Année 2017 (en € HT)	Année 2018 (en € HT)	Economie réalisée (en € HT)
Septembre	8460,83	6974,85	1485,98
Octobre	8386,25	6265,29	2120,96
Novembre	8540,51	5611,97	2928,54
Décembre	7950,23	5358,22	2592,01
<b>Année 2018 (en € HT)</b>	<b>8570,97</b>	<b>6011,64</b>	<b>2559,33</b>
Janvier	8278,22	5578,12	2700,01
Février	8776,01		
<b>Total</b>			<b>14386,83 € HT</b>

**Conclusions:** Suivi mensuel des consommations réalisés auprès de chaque unité. Sensibilisation des professionnels.

### Références:

Guide HAS  
\* Novacare®  
\*\* Repose®

**P82**

Prevalence des escarres au CHU de Yopougon à Abidjan (Cote d'Ivoire)

Joseph Kouakou<sup>1</sup>, Didier Ekouevi<sup>2</sup>, Benjamin Manou<sup>1</sup>, Daniel Alloh<sup>1</sup>, Patrick Justin Coffie Ahuatchi<sup>1</sup>, Jephthe Houedakor<sup>3</sup>, Philippe Gallien<sup>3</sup>, Benoît Nicolas<sup>3</sup>

- 1 CHU Yopougon, MPR, Abidjan, Côte d'Ivoire
- 2 CHU Lomé, Epidémiologie-statistique, Lomé, Togo
- 3 Pôle Saint-Hélier, Rennes, France

**Introduction:** Les conséquences des escarres sont bien connues. Les études de prévalence sont indispensables pour estimer leur ampleur afin de pouvoir évaluer et mettre en place des mesures préventives adaptées. En Afrique de l'Ouest, particulièrement en Côte d'Ivoire, ces études n'ont jamais été réalisées jusqu'à ce jour.

**Methods:** Il s'agit d'une étude transversale réalisée en un jour dans les services du centre hospitalier et universitaire de Yopougon (Abidjan, Côte d'Ivoire) en avril 2019. Cette étude a été conduite par une équipe pluridisciplinaire composée de médecins, de statisticiens et d'épidémiologistes à l'aide de 2 questionnaires : l'une portant sur le recensement de tous les patients de l'établissement et l'autre sur les porteurs d'escarres.

**Results:** La fréquence des escarres sera calculée avec intervalle de confiance et comparaison avec le test du Chi2. Les caractéristiques des patients et des escarres seront décrites par la moyenne et les écart-types pour les variables quantitatives et par effectifs et pourcentages pour les variables qualitatives. Les comparaisons des variables quantitatives seront réalisées à l'aide de l'analyse de variance.

**Conclusions:** L'intérêt de cette étude de prévalence est extrêmement important car il doit permettre à la structure sanitaire d'acquiescer et d'adapter les moyens disponibles à la prévention des escarres. A terme, il s'agira d'effectuer des études épidémiologiques élargies à l'ensemble du territoire national afin d'alerter les décideurs sur l'ampleur et la nécessité d'entreprendre une politique de prévention des escarres mieux coordonnée.

**P83**

Outil d'aide à la prévention des escarres par les auxiliaires de vie de patients dépendants pris en charge en hospitalisation à domicile

Celia Minvielle<sup>1</sup>

- 1 Hôpital Henry Gabrielle, HCL, Saint Genis Laval, France

**Introduction:** La prévalence des escarres à domicile est très importante, avec, parmi les intervenants professionnels, un personnel peu formé à la prévention, à la reconnaissance des stades précoces et aux éléments qui peuvent prévenir leur apparition.

Suite à un questionnaire remis à 20 auxiliaires de vie prenant des patients en charge dans le cadre d'une hospitalisation à domicile, plus de 50% affirmaient qu'on ne pouvait pas mourir d'une escarre et qu'il s'agissait simplement d'une plaie en lien avec un frottement ou de la macération.

L'objectif de ce travail est de leur fournir des explications claires et faciles sur le génèse de l'escarre, les localisations préférentielles (au lit comme au fauteuil), le mode de surveillance lors de divers actes de la vie quotidienne, le positionnement, les éléments qui doivent amener à alerter.

**Methods:** 5 fiches ont été réalisées concernant : des Généralités sur les Escarres; Localisation; Facteurs de risques; Positionnement adéquat au lit et au fauteuil; Actions de prévention dans les actes du Quotidien.

Ces fiches ont été mises à disposition au domicile de patients dépendants nouvellement pris en charge dans le cadre d'une hospitalisation à domicile.

Des explications ont été fournies oralement aux auxiliaires de vie sur l'utilisation de ces fiches et elles pouvaient s'y référer à n'importe quel moment.

Un questionnaire a été établi 1 mois après la mise en place pour recueillir leurs impressions.

**Results:** Ces fiches ont été insérées dans plus de 50 dossiers de patients pris en charge en HAD en Mai-Juin 2019.

Le retour des auxiliaires de vie était très positif. Elles estimaient avoir appris des éléments importants et avoir modifié leur pratique (prise en compte de l'alimentation, installation optimale au fauteuil, limitation des temps de lever,...)

Sur le plan pratique, elles estimaient que les fiches étaient concises et faciles de compréhension.

**Conclusions:** La formation et l'information adaptée des aidants professionnels et capitale pour améliorer les conditions de vie des patients à domicile et limiter l'apparition de comorbidités et notamment d'escarres. Il est capital de poursuivre les actions de formation ciblées à l'attention de ces personnes en lien direct avec le patient.

A la demande de certains responsables d'organismes, il a été demandé une transmission plus large de ces fiches et parfois une courte présentation orale devant les agents intéressés et concernés par ce type de prise en charge.

# 30<sup>TH</sup> CONFERENCE OF THE EUROPEAN WOUND MANAGEMENT ASSOCIATION

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# WORKSHOPS OVERVIEW

## EPUAP Workshop 1: Debridement

**18 September 2019, 15:15 - 16:15, Breakout room #1 / Pasteur Lounge**

*Speakers: Sebastien Probst, Lucie Charbonneau, Switzerland*

Throughout this workshop, the participants will be introduced to various types of debridement, explore a comprehensive wound assessment methodology to evaluate whether wound debridement is required or not, carry out sharp debridement and appreciate the importance of a professional accountability and limitations in clinical practice.

## EPUAP Workshop 2: IAD and skin frailty

**18 September 2019, 17:00 - 18:00, Breakout room #3 / Rhône 3B**

*Speaker: Dimitri Beeckman, Belgium*

The key characteristics of geriatric patients are advanced age, multi co-morbidity, a decrease of physical and psychical performance and care dependency. In addition, advanced age, chronic and acute diseases and treatments (e.g. polypharmacy) lead either directly or indirectly to a wide range of skin and tissue problems. Skin and tissue ageing is associated with various structural and functional changes increasing the susceptibility to incontinence-associated dermatitis (IAD), skin tears, medical adhesive-related skin injuries (MARS) and pressure ulcer development. Wounds, once developed, need longer times to heal and are associated with increased risk for deterioration. This workshop will focus on three most prevalent skin conditions in geriatric care: incontinence associated dermatitis, skin tears and pressure ulcers and how they are connected among the aging population.

## EPUAP Workshop 3: Dressing selection

**19 September 2019, 17:00 - 18:00, Breakout room #1 / Pasteur Lounge**

**20 September 2019, 11:00 - 12:00, Breakout room #3 / Rhône 3B**

*Speakers: Helen Strapp, Niamh Mc Lain, Ireland*

There are thousands of dressing products available on the market today to treat different types of wounds by targeting various aspects of healing process. However, clinicians' ability to choose wound dressings on the basis of clinical evidence is hindered by the relative lack of robust clinical or cost-effectiveness evidence. This workshop will provide information on the properties of the main categories of wound dressings, focusing on their clinical indication, advantages and limitations. All these practical aspects will be discussed with the participants and analysed through several clinical cases. We plan to reduce your confusion in dressing selection at this workshop.

## EPUAP Workshop 4: Wound assessment

**19 September 2019, 17:00 - 18:00, Breakout room #3 / Rhône 3B**

*Speaker: Rolf Jelnes, Denmark*

During this workshop, a systematic approach to wound assessment will be presented – the T.I.M.E. CDST algorithm. This is a new development of the original TIME concept and acts as a decision supporting tool.

## Joint Workshop 1: Repositioning

**19 September 2019, 14:00 – 15:00, Breakout room #3 / Rhône 3B**

**20 September 2019, 09:00 – 10:00, Breakout room #1 / Pasteur Lounge**

*Speakers: Menno van Etten, Norway and Anthony Gélis, France*

*Workshop organised in both English and French.*

To prevent pressure ulcers, EPUAP's guidelines suggest positioning the patient in a 30 degrees side lying position, moving the body load from the sacral- or trochanter area to the gluteal area. In general, positioning patients is about giving the patient stability, comfort and the feeling of security. Adding the 30 degrees posture to the list of lying positions gives extra challenges to the caretakers. Being aware how to positioning the upper body without rotations and positioning the legs preventing discomfort for the patient and without creating new PU hotspots.

Questions may be asked if classical repositioning techniques and the materials used to position the patient really give the stability and comfort needed? And what about having the patient positioned in other positions for example using bed functions like lifting the backrest, can the extensive shear forces occurring be prevented?

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## Joint Workshop 2: Nutrition

**19 September 2019, 17:00 – 18:00, Breakout room #2 / Rhône 3A**

*Speakers: Emanuele Cereda, Italy Manuel Sanchez, France*

*Workshop organised in both English and French.*

Malnutrition is very common in hospitalized patients, especially in elderly (60% of elderly at admission). Pressure ulcers are particularly associated with nutritional status. Malnutrition is on one hand a risk factor for developing pressure ulcers, is associated with a delay of healing and is a risk factor for systemic complications such as infections. Pressure ulcers can also worsen nutritional status. It is necessary to manage the wound and the nutritional status together to improve the prognosis of patients as we have substantial evidence on the efficacy of nutritional support in improving the healing process.

This workshop discusses ways to diagnose and manage malnutrition in patients with pressure ulcers.

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## French Workshop 1: Nutrition

**20 September 2019, 13:30 – 14:30, Breakout room #1 / Pasteur Lounge**

*Speaker: Manuel Sanchez, France*

La dénutrition est très fréquente chez les patients hospitalisés et notamment les personnes âgées, où elle peut atteindre plus d'un patient sur six à l'admission. Les escarres sont particulièrement associées au statut nutritionnel. La dénutrition est d'une part un facteur de risque d'escarre mais également un facteur de mauvais pronostic sur le plan local et général. Elles peuvent d'autre part aggraver l'état nutritionnel. Dans ce contexte, une prise en charge conjointe de la plaie et de la dénutrition est nécessaire pour améliorer le pronostic des patients.

Cet atelier aborde les moyens de diagnostiquer la dénutrition chez les patients atteints d'escarres et de discuter les approches thérapeutiques nutritionnelles.

## French Workshop 2: Escarre et talon

**20 September 2019, 13:30 – 14:30, Breakout room #2 / Rhône 3A**

*Speaker: Ali Mojallal, France*

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## French Workshop 3: Chirurgie

**20 September 2019, 13:30 – 14:30, Breakout room #3 / Rhône 3B**

*Speakers: Marc Lefort, Célia Rech, France*

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## French Workshop 4: Douleur

**20 September 2019, 14:40 – 15:40, Breakout room #1 / Pasteur Lounge**

*Speakers: Sabine Petrilli, Isabelle Defouilloy, France*

A partir d'un cas clinique, cet atelier interactif sur le thème « douleur et plaies » se propose d'aborder les fondamentaux :

- types de douleur,
  - importance d'une évaluation adaptée (et d'une réévaluation) en utilisant les outils validés,
  - traitements à la fois médicamenteux (locaux et par voie générale) mais aussi utilisation de tous les moyens non médicamenteux (notamment positionnement et communication thérapeutique),
  - connaissance des synergies thérapeutiques,
  - nécessité de bien coordonner soins et traitements.
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## French Workshop 5: Organisation et vie d'un groupe escarres

**20 September 2019, 14:40 – 15:40, Breakout room #2 / Rhône 3A**

*Speakers: Martine Barateau, Sandrine Robineau, Christiane Bollon, France*

La dynamique collective des groupes escarre se nourrit des questionnements et des expériences de terrain. Elle est essentielle pour favoriser la prévention du quotidien, au service du patient.

Ainsi depuis plusieurs années les échanges entre la Société Française de l'Escarre et les groupes escarres des établissements ont permis d'avoir une vue d'ensemble sur les points forts ou à améliorer les habitudes, les connaissances ou encore les difficultés rencontrées par les équipes mais aussi les motivations et implications des équipes dans différentes structures en France.

Il s'agit au cours de cet atelier d'impliquer encore plus le terrain et de faire remonter les bonnes idées, les outils de bonnes pratiques et de permettre à chaque groupe de s'appuyer sur le collectif pour mieux se structurer et poursuivre la dynamique, adaptée à ses besoins propres.

Les résultats de l'enquête 2019 renseignée par plus de 50 groupes escarres sur les modalités d'évaluation épidémiologique dans les établissements seront discutés. Que pouvons-nous mutualiser pour améliorer les pratiques de terrain ? Nous échangeons ensemble pour améliorer l'organisation de chacun et faciliter le travail des groupes au quotidien sur le terrain.

## French Workshop 6: Escarres et fin de vie

20 September 2019, 14:40-15:40, Breakout room #3 / Rhône 3B

Speakers: Françoise Balliet, Jean-Marc Michel, France

Les escarres correspondent aux plaies chroniques les plus fréquentes en fin de vie (NPUAP : prévalence 14 à 28 %), il est possible d'en limiter la fréquence à l'aide de mesures de prévention personnalisées (1). Pour des escarres constituées de stade III et IV, il s'agit de réaliser des soins locaux « sur-mesure » dans le cadre d'une réflexion multidisciplinaire ; les objectifs étant de limiter leur extension, prévenir l'infection ou la traiter et de gérer les symptômes suivants : douleurs, anxiété, souffrance morale, exsudats et mauvaises odeurs.

Actions de prévention... Les talons étant particulièrement vulnérables (40 % des escarres), leur décharge doit toujours être réalisée de façon appropriée. Pour les soins d'hygiène, l'utilisation d'un savon surgras évite la macération et la sécheresse cutanée. En cas d'incontinence, l'application d'un film protecteur cutané de qualité est indispensable pour limiter le risque de dermatite associée à l'incontinence (DAI), source d'importantes douleurs (2). La dénutrition est un facteur prédictif d'escarre, mais forcer un patient en fin de vie à s'alimenter correspond à une forme d'acharnement thérapeutique (3). De même, un excès d'hydratation majore les œdèmes avec un risque d'escarre aux endroits où ils se focalisent.

Soins locaux et la gestion des symptômes... En cas d'exsudats très abondants ou pour espacer les soins, nous pouvons superposer plusieurs plaques d'un pansement primaire à haut pouvoir d'absorption (hydrofibres, alginates de calcium), y associer un pansement superabsorbant, adapter une poche de recueil pour stomie ou pour fistule digestive (Poches Fistula-Coloplast). Ne jamais déterger une escarre en fin de vie est une conception erronée. L'élimination des tissus nécrosés humides, fortement colonisés, est le geste le plus efficace pour réduire les odeurs et limiter le risque infectieux, responsable de l'aggravation de la plaie et de la majoration des phénomènes douloureux. La décision d'effectuer cette détersion se fait en concertation avec l'équipe soignante après avoir évalué sa faisabilité. Une antalgie doit alors être administrée avant le soin, en respectant le délai d'action (4).

Conclusion... En situation de fin de vie, nous avons tous le souci d'améliorer le confort des patients. Concernant les soins d'escarres, les soignants doivent adapter les protocoles de prévention et de soins de plaies à la situation singulière de chaque patient. Lorsque les défenses immunitaires d'un patient sont très faibles, nous devons absolument éviter l'humidité qui favorise l'infection, l'aggravation de la plaie ainsi que la survenue de mauvaises odeurs !

### Références bibliographiques

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# FRENCH KEY SESSIONS OVERVIEW (FRIDAY AFTERNOON PROGRAMME)

## Controverse: La prévention et les outils connectés, dangers ou atouts

**20 September 2019, 13:30 – 14:30, Pasteur Auditorium**

*Benoît Nicolas, Yohan Payan, France*

Faut-il et peut-on utiliser les objets connectés pour prévenir les escarres ? Quel est leur degré de fiabilité en 2019 ? Est-ce utilisable par les patients eux-mêmes ? Est-ce une aide ? Mais ne risquent-ils pas de se fier de façon excessive aux objets ?

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## Table ronde: Financement de la prévention en EHPAD

**20 September 2019, 14:40 – 15:40, Pasteur auditorium**

La prévention des escarres en EHPAD représente un coût élevé. Les établissements, ont-ils les moyens de la prendre en charge ? Comment optimiser les stratégies ?

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## Session de clôture des Journées Nationales de l'Escarre

**20 September 2019, 16:00 – 17:30, Pasteur auditorium**

- Recommandations de bonne pratique pour la prévention des escarres : quelle est la place de l'EBM ( évidence based medecine) ?  
*Brigitte Barrois, France*
- Quelle recherche fondamentale et clinique dans l'avenir pour développer les stratégies de prevention ?;  
*Bérengère Fromy, France*
- Croyances et connaissances : comment développer la prévention des escarres; *Benoît Nicolas, France*

# EPUAP AWARDS

In partnership with

## EPUAP and 3M IAD and Pressure Ulcer Innovation Awards



EPUAP is happy to present, in partnership with 3M, the IAD and Pressure Ulcer Innovation Award again in 2019. This award acknowledges and supports innovative approaches in the treatment and prevention of pressure ulcer and IAD.

The EPUAP and 3M IAD and Pressure Ulcer Innovation Award winning projects voted for by the EPUAP Scientific Committee members 2019 during the abstract review process, are:

- Repositioning for preventing pressure ulcers: a systematic review; Pinar Avsar, Royal College of Surgeons in Ireland
- Integrated experimental-computational analysis of sacral soft tissue stresses during patient migration in bed; Maayan Lustig, Tel Aviv University, Israel

The winners will present their research during Free Paper Sessions within their category and will be acknowledged during the EPUAP 2019 Conference Dinner on Thursday 19 September, 20:00 in Château de Saint Trys.

## EPUAP 2019 Quality Improvement Projects Awards



This award aims to recognize and acknowledge innovative quality improvement projects relating to the prevention of skin breakdown.

The following projects have been selected by the EPUAP Scientific Committee members for the Quality Improvement Awards 2019:

- A new approach of risk assessment and prevention: using the UZ Leuven risk assessment in a pro-active pressure ulcer prevention policy; Annelies de Graaf, Belgium
- The development of the Purpose T pressure ulcer risk instrument into an electronic questionnaire to support mobile working; Nikki Stubbs, United Kingdom
- Striving for Perfect Care – preventing skin breakdown in the community setting in the UK; Nicky Ore, United Kingdom

The winners will be acknowledged and will present their projects during the Award Session EPUAP 2019 Quality Improvement Projects Awards on Wednesday 18 September at 17:00 in the Pasteur Lounge room.

## EPUAP 2019 Excellence in Education Awards



This award aims to recognize and acknowledge excellent education strategies and projects relating to all domains of pressure ulcer prevention and treatment.

The following projects have been selected by the EPUAP Scientific Committee members for the Excellence in Education Awards 2019:

- Shanley Pressure Ulcer Prevention Programme (SPUPP); Emer Shanley, Ireland
- Interdisciplinary systematic education about prevention of pressure injury among patient with spinal cord injury; Hanne Haugland, Norway

The winners will be acknowledged and will present their projects during the Award Session EPUAP 2019 Excellence in Education Awards on Thursday 19 September at 15:50 in the Pasteur Lounge room.

# INDUSTRY WORKSHOPS AND SYMPOSIA

## Industry Session 1: FRONTIER LUNCH SYMPOSIUM

18 September, 12:15 – 13:45, Breakout room #2 / Rhône 3A



**Theme:** A multi-centre prospective randomized controlled clinical trial to compare the effectiveness and cost of a static air mattress and alternating air pressure mattress to prevent pressure ulcers in high risk nursing home residents.

### Speaker:

Prof. Dimitri Beeckman, Ghent University, Belgium

### Brief description:

During this symposium, Professor Beeckman will provide an insight into:

- The background to the challenges of pressure ulcer prevention in a high-risk patient group
- The methodology for the RCT and the educational programme implemented
- The findings from 308 high risk patients across 26 nursing homes
- The differences between static air support surfaces and alternating air mattresses

## Industry Session 2: WINNCARE LUNCH SYMPOSIUM

18 September, 12:15 – 13:45, Breakout room #3 / Rhône 3B



**Theme:** Treating people who have lost independence

Best practice for handling and assisting people to and from beds and armchairs.

### Keynote Speakers:

Dr. Brigitte Barrois, Specialist in physical medicine and rehabilitation, Société Française de l'escarre;

Dr. Berangere Fromy, CNRS Research Director at the Laboratory of Tissue Biology and Therapeutic Engineering of Lyon

### Speakers:

Fabrice Nouvel, Occupational therapist, Chair of the Association française des ergothérapeutes en gériatrie

Sébastien Bayol, Occupational therapists, PRAP 2S instructors, Pôle autonomie santé l'ETAPE (34)

Fanny Dubois, Occupational therapist, PRAP 2S instructor, Pôle autonomie santé l'ETAPE (34)

Aurélie Galbrun, Professor of adapted physical activity - Occupational therapist, Centre de l'Arche (72)

Myriam Turenne, Professor of adapted physical activity - Occupational therapist, Centre de l'Arche (72)

### Brief description:

This satellite symposium aims to increase awareness among health care professionals on how to treat people who have lost independence, to prevent complications related to prolonged sitting or lying, compensate for disabilities and protect the health of caregivers and care assistants. Posturology and handling cannot be dissociated from quality of care, combined with appropriate use of technical aids, adapted to the needs of the individual and caregivers.

## Industry Session 3: DABIR SURFACES WORKSHOP

18 September, 15:15 – 16:15, Breakout room / Rhône 3B



**Theme:** Dabir Surfaces (Pressure ulcer prevention)

### Speakers:

Michelle Tobin, RN, BSN, National Clinical Manager, Dabir Surfaces Inc.

Amit Gefen, PhD MSc BSc, Professor in Biomedical Engineering, Tel Aviv University, Israel

Vinoth Ranganathan, MSE, MBA, Director of Clinical Research, Dabir Surfaces, Inc

### Brief description:

Discuss the aetiology of pressure ulcers and the shortcomings (or limitations) of current prevention protocols generally, and more specifically in the surgical or operating room setting. Experts will provide insights into active pressure offloading and innovative strategies in pressure ulcer prevention and clinical evidence that demonstrates their effectiveness in protecting patients and saving costs through improved patient outcomes.

## Industry Session 4: MÖLNLYCKE SYMPOSIUM

19 September, 10:45 - 12:15, Breakout room #1 / Pasteur Lounge



**Theme:** Reducing the burden of pressure ulcers - Consolidating technology, research and evidence-based practice to enhance clinical and economic outcomes in pressure ulcer management.

### Chair:

Nathalie Salles, MD PhD, Head of Geriatrics Department, Central University Hospital, Bordeaux, France

### Speakers:

Franck Hentz, RN, Senior Health Executive, Central University Hospital, Clermont-Ferrand, France

Nick Santamaria, RN, PhD, Professor of Nursing Research, Translational Research, University of Melbourne and Royal Melbourne Hospital, Australia

Amit Gefen, PhD MSc BSc, Professor in Biomedical Engineering, Tel Aviv University, Israel

Paulo Alves, PhD RN MSc, Assistant Professor of Nursing and Tissue Viability, Catholic University of Portugal, Porto, Portugal

### Brief description:

Key thought leaders will discuss the current status behind the use of innovative dressings for the prevention and treatment of pressure ulcers, the evidence that demonstrates their effectiveness in protecting patients and saving costs, and also what they may offer in the future. The experts will share new insights and evidence from both a clinical and a pre-clinical perspective.

## Industry Session 5: POLYMEM LUNCH SYMPOSIUM

19 September, 12:15 – 13:45, Breakout room #2 / Rhône 3A



**PolyMem**<sup>®</sup>

EPUAP 2019

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**Theme:** Understanding the science & effects of early modulation of the Inflammatory cascade in pressure ulcers

### Speakers:

Amit Gefen, PhD MSc BSc , Professor in Biomedical Engineering, Tel Aviv University, Israel

Dr Yap Jiann Wen, MBBS, National Wound Care Committee Malaysia, Malaysia

### Brief description:

This session reviews the scientific evidence which demonstrates the effects of early modulation of the inflammatory cascade for wounds and provides clinical practice evidence to support the use and functions of a polymeric membrane system.

## Industry Session 6: BROTHIER SYMPOSIUM

20 September, 09:00 – 10:30, Breakout room #3 / Rhône 3B



LABORATOIRES  
**BROTHIER**

**Theme:** Impact des pansements sur les cellules de la cicatrisation

### Chair:

Dr Brigitte Barrois (Médecin MPR, Déléguée générale de la Société Française de l'Escarre)

### Speakers:

Dr Marina Samardzic, Recherche & Développement, BROTHIER

Dr Valériane Levelut, Toxicologue, EUROFINS

Mme Julie Charmetant, Directrice d'études, EUROFINS

Dr Anne-Charlotte Ponsen, Chercheur, INSERM UI 197

Mme Danièle Chaumier, Infirmière stomathérapeute, AP-HP Hôpital Tenon

Dr Fabien Boucher, Chirurgien plasticien, HCL – Hôpital de la Croix Rousse

### Brief description:

L'objet de ce symposium est de faire le lien entre résultats d'études fondamentales (in vitro) et d'études cliniques sur l'impact des pansements sur la cicatrisation. Les études in vitro ont comparé les effets des plusieurs pansements sur l'activation du fibroblaste, une des cellules clés de la cicatrisation. Les études cliniques montrent une corrélation entre les résultats de l'efficacité d'Algostéril® dans le traitement de plaies et ses résultats in vitro.

# GENERAL INFORMATION

## Conference venue

Cité Centre de Congrès Lyon  
50 Quai Charles de Gaulle  
69463 Lyon cedex 06  
France

## Official conference languages:

English and French

## Conference hours

### Tuesday, 17 September

16:00 – 19:00 Pre-registration (Congress Centre, Entrance G)

During the pre-registration hours, oral presentations can be uploaded at the Registration desk and posters can be set up in the Poster area.

### Wednesday, 18 September

07:30 – 18:00 Registration  
09:00 – 10:40 Opening Plenary Session  
10:45 – 18:00 Scientific Programme  
09:30 – 17:30 Exhibition  
19:30 – 21:00 Welcome Reception at the Lyon City Hall  
(1, Place de la Comédie, 69001 Lyon)

### Thursday, 19 September

08:00 – 17:15 Registration  
09:00 – 18:00 Scientific Programme  
09:30 – 17:30 Exhibition  
20:00 – 23:30 Conference Dinner at Château de Saint Trys (dinner transfers organised from the Congress Centre to Château de Saint Trys and back)  
(Château de Saint Trys, 69480 Anse)

### Friday, 20 September

08:00 – 13:00 Registration  
09:00 – 12:30 Scientific Programme  
09:00 – 13:30 Exhibition  
13:30 – 17:30 Scientific Programme in French

## Certificates of attendance

All participants will receive their certificate of attendance by email after the conference.

## CME – Continued Medical Education

The 21<sup>st</sup> EPUAP Annual Meeting has been accredited by the European Council for Continuing Medical Education (EACCME) and has been designed for a maximum of, or up to 13 European CME credits (ECMEC).

In order to obtain the CME credits, your attendance must be verified for each of the days you wish to obtain the credits for.

In order to verify your attendance, please stop by the Registration desk to sign in the attendance sheet after 15:00 on Wednesday and Thursday and after 10:00 on Friday.

A certificate with your CME credits will be issued after the conference and sent to you by email once you have filled in the feedback questionnaire provided by EPUAP.

## Badges

Please refer to the Registration desk to collect your name badge together with the conference documentation during the registration hours.

All participants and exhibitors are asked to wear their name badge at all times throughout the conference programme.

## Entitlements

Full conference registration:

- Final programme and abstract book
- Admission to all sessions of the conference programme, coffee breaks & lunch boxes.

1-day registration:

- Admission to all sessions and symposia of the day, coffee breaks & lunch box.

## Lunches and coffee breaks

All lunches and coffee breaks will be served in the Exhibition area.

## Information for speakers

All invited speakers and abstract presenters (both oral and poster) are asked to fill in the COI disclosure form towards the topic of their contribution and send it to the EPUAP Business Office ([office@epuap.org](mailto:office@epuap.org)) or bring it to the Registration desk on the day of the poster setup – if they have not already done so before the conference.

## Presentations upload on site

**Pre-registration: 17 September 2019, 16:00 – 19:00**

You can upload your presentations at the Registration desk during the Pre-registration hours.

### Conference days: 18, 19 and 20 September

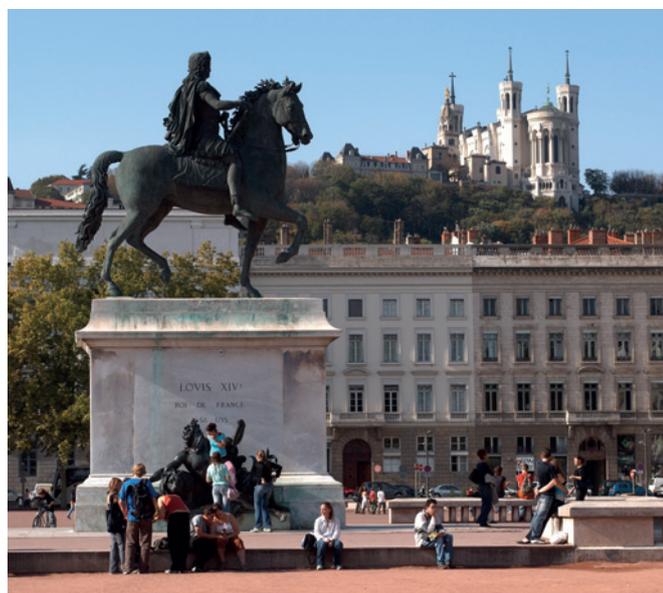
Make sure you upload your presentation in the **morning hours (08:00 – 09:00)**, or during **coffee breaks** or **lunch breaks** at least 2 hours prior to your session directly in the meeting room where your session will take place. There will be a technical support present in the meeting rooms helping you with the presentation upload.

### Please note that

- if your presentation is taking place on **the first day of the conference** (Wednesday, 18 September), your presentation should be uploaded during the Pre-registration hours (on Tuesday, 17 September) - if it has not already been sent to the Conference secretariat.
- the meeting rooms **Rhône 3A and Rhône 3B** will not be available during lunch hours on Wednesday and Thursday. Please make sure your presentation is uploaded during the morning hours (08:00 – 09:00) or coffee breaks at least 2 hours prior to your session - if it has not already been sent to the Conference secretariat.

## Exhibition

The most important companies in the field of pressure ulcer and wound management will present the latest products and developments in the field. The exhibition is open during the conference programme. You can visit the exhibition area during coffee and lunch breaks which will be served there. The exhibition is located in the Forum I&2 Halls.



## Internet and wifi

Free WiFi is available at the Congress Centre. WiFi login details are available at the registration desk.

## Poster area

The Poster area is located in the Exhibition area (Forum I&2 Halls). The posters should be set up either on Tuesday 17 September, 16:00 - 19:00 (during the pre-registration) or on Wednesday 18 September, 07:00 - 09:00 (before the conference opening).

All posters must be removed on Friday 20 September at 16:00 at the latest. The conference secretariat takes no responsibility for left or damaged posters.

## Transportation in Lyon

### Public transportation

The direct Rhone Express train connects the airport and the Part Dieu central train station in less than 30 minutes, every day from 4am to midnight.

The Congress Centre is located 3 km from the Lyon Part Dieu station and can be easily reached by bus (number C1 and C2 from the Part Dieu train station).

C1 : Stop at Musée d'art contemporain (Congress Centre)

C2 : Stop at Cité Internationale Transbordeur (Congress Centre)

The Congress Centre can be also reached by bus number C5 from the Cordeliers metro station (Lyon City Centre).

C5: Stop at Musée d'art contemporain (Congress Centre)

### Taxis

Taxis are easy to find in Lyon.

A taxi station is located right in front of the Congress Centre entrance.

Useful taxi numbers: +33 472108686 (Taxi Lyon), +33 478282333 (Allo Taxi).

## EPUAP 2019 Conference secretariat

Tel: +420 601 026 251

office@epuap.org

# ABOUT LYON

Lyon, the second-largest urban area of France and the capital city of France's Auvergne-Rhône-Alpes region, is charmingly located at the junction of the Rhône and Saône rivers. Its impressive centre, classified as a UNESCO world heritage site, reflects more than 2,000 years of rich history from the abundant ruins of the Gallo-Roman times, through the Middle ages and Renaissance architecture of the Old Lyon and the classical buildings of the city centre, to the very modern Confluence district on the Presqu'île peninsula – an inspiring example of a contemporary public architecture.

Today, Lyon is recognised as an important international hub of innovation and continues to develop centres for research and science that remain at the edge of technology.



The city proudly counts more than 600 public and private laboratories, 13300 researchers including 1800 from abroad, and 4 renowned scientific and technological sites facilitating collaboration between higher education establishments and business.

While visiting Lyon, you should not forget the city has been voted World Capital of Gastronomy. Its streets offer an inexhaustible selection of places ranging from local bouchons, home made food bistros, bakeries and sweet shops to many historical restaurants.

Enjoy your stay in Lyon!



## CODAN CONSULTING

Codan Consulting provides know-how and support in the following fields

-  Conference organisation & Conference bidding support
-  Association development & Project management
-  Destination management services & Company events



# SOCIAL EVENTS

## Welcome Reception

**When:** 18 September 2019, 19:30

**Where:** Lyon City Hall

*1 Place de la Comédie, 69001 Lyon*

*Free of charge, however registration is required due to limited capacity.*

**Organised thanks to the kind support of the City and the Metropole of Lyon (Ville et Métropole de Lyon).**

The delegates will enjoy the first networking event on Wednesday evening, receiving a Welcome by the Deputy Mayor of the City of Lyon in charge of intergenerational relations.

The Welcome Reception represents a great occasion to make acquaintance with new colleagues and catch up with old friends whilst enjoying the beauty of Lyon.



**GRAND LYON**  
la métropole



*Public transportation: Direct bus C5 from the Congress Centre (stop Musée d'art contemporain) to the City Hall (stop Hôtel de Ville). / Lyon Walk organised from the Congress Centre to the City Hall*

## EPUAP Lyon Walk

**When:** 18 September 2019, at 18:15

**Where:** Route from the Lyon Congress Centre to the Lyon City Hall

*It's time to move for pressure ulcer prevention.*

After the EPUAP walk in Rome, EPUAP will lead an Awareness Walk again for pressure ulcer prevention during its 21<sup>st</sup> Annual Meeting in Lyon. Let's walk across the green part of Lyon along the famous river Rhône from the Congress Centre to the Lyon City Hall where the Welcome Reception will be held. Meeting point for the walk is at the Registration desk at 18:00. If you have ordered a STOP PU T-shirt for the Walk while registering at the conference, you can pick it up at the Registration desk from 18:00.

## Conference Dinner

**When:** 19 September 2019, 20:00

**Where:** Château de Saint Trys, Anse

*Château de Saint Trys, 69480 Anse*

*Price of the dinner ticket is not included in the registration fee. Last tickets are available at the Registration desk.*

The Conference Dinner will take place at the Château de Saint Trys, a family property from the 17<sup>th</sup> century located at the gateway of the French Beaujolais wine region (25 minutes from Lyon).

The Welcome will take place at the Terrace offering splendid views of the Saône valley and the Alps. The dinner will be served in the historical Cuvage Hall, large space in stone dating from the 18<sup>th</sup> century. The delegates will have the opportunity to network whilst enjoying the pure authenticity of this historical venue.



### Dinner transfers

Information on dinner transfers is available at the Registration desk.

Transfers will be organised to the dinner venue (Château de Saint Trys, Anse).

3 coaches will leave from the Lyon Congress Centre at 19:00 / 19:10 at the latest.

The coaches will be leaving from Château de Saint Trys back to the Congress Centre in regular intervals starting from 22:15.

If needed, one extra coach will be organised from/ and to the Lyon City Centre. Please stop by the Registration desk for the most up-to-date information.

## PLATINUM SPONSOR



Mölnlycke  
[www.molnlycke.com](http://www.molnlycke.com)  
 Stand 36

## GOLD SPONSORS

 <p>3M  <a href="http://www.3m.com">www.3m.com</a>                  Stand 33</p>	 <p>Arjo  <a href="http://www.arjo.com">www.arjo.com</a>                  Stand 23</p>	 <p>Care of Sweden  <a href="http://www.careofsweden.com">www.careofsweden.com</a>                  Stand 6</p>	 <p>Carital  <a href="http://www.carital.com">www.carital.com</a>                  Stand 21</p>
 <p>Dabir Surfaces  <a href="http://www.dabir-surfaces.com">www.dabir-surfaces.com</a>                  Stand 17</p>	 <p>PolyMem  <a href="http://www.polymem.com">www.polymem.com</a>                  Stand 20</p>	 <p>Stryker  <a href="http://patientcare.eu.stryker.com">patientcare.eu.stryker.com</a>                  Stand 25</p>	 <p>WinnCare  <a href="http://www.winnCare.com">www.winnCare.com</a>                  Stand 24</p>

## SILVER SPONSOR



Smith & Nephew  
[www.smith-nephew.com](http://www.smith-nephew.com)  
 Stand 19

# EXHIBITORS

	<b>3M</b> <a href="http://www.3m.com">www.3m.com</a>	At 3M, we apply science in collaborative ways to improve lives daily. With \$32 billion in sales, our 91,000 employees connect with customers all around the world. Learn more about 3M's creative solutions to the world's problems at <a href="http://www.3M.com">www.3M.com</a> or on Twitter @3M or @3MNews.	<b>Stand 33</b>
	<b>Abigo</b> <a href="http://www.abigo.com">www.abigo.com</a>	ABIGO Medical AB, a Swedish pharmaceutical company, owner and manufacturer of Sorbact® Advanced Wound Management products. Sorbact® Right from the start - prevents and treats wound infections by lowering the bioburden. Meet us at booth #29. Welcome!	<b>Stand 29</b>
 <i>with people in mind</i>	<b>Arjo</b> <a href="http://www.arjo.com">www.arjo.com</a>	We create value by improving clinical outcomes and we thereby contribute to a sustainable healthcare system. Our pressure ulcer prevention solutions are designed to help you optimize clinical outcomes. Our solutions are targeted to your individual patients and residents. Please visit us and be impressed by the future of pressure injury technology, Auralis.	<b>Stand 23</b>
 SHARING EXPERTISE	<b>B. Braun</b> <a href="http://www.bbraun.com">www.bbraun.com</a>	REMOVE BARRIERS TO HEALING B. Braun is the right partner for those who challenge barriers of wound healing in any sense. We offer more than a single product, we offer a unique combination of technologies to focus on and encompass wound infection, exudate management and skin care. Fierce as you are!	<b>Stand 27</b>
 LABORATOIRES BROTHIER	<b>Brothier</b> <a href="http://www.brothier.com">www.brothier.com</a>	French independent pharmaceutical company founded in 1949. As the only designer, manufacturer and distributor of calcium alginate for therapeutic purposes, Brothier applies its know-how to hemostasis and tissue repair. Algostéril (dressings/ropes) are indicated and approved in healing of deep cavity wounds (infected or not), surgical and traumatic loss of substance.	<b>Stand 22</b>
	<b>Bruin Biometrics</b> <a href="http://www.bruinbiometrics.com">www.bruinbiometrics.com</a>	BBI (Europe) Ltd is a pioneer in sensor based medical devices committed to the development of assessment devices for early identification of chronic, preventable conditions. BBIs lead product is the SEM Scanner, a hand-held device that identifies increased risk of pressure ulcers 5 days earlier (median) than standard of care. I. Okonkwo H. et al NPUAP 2018	<b>Stand 32</b>
 SUPPORTING LIFE	<b>Care of Sweden</b> <a href="http://www.careofsweden.com">www.careofsweden.com</a>	Our mission is to support caregivers to enable the best possible clinical and health-economical results in pressure ulcer prevention and treatment. We proudly base our development of mattress systems and cushions on research and clinical evidence - always together with health care professionals and users.	<b>Stand 6</b>
 A1 carital ANTIDEFORMATION TECHNOLOGY	<b>Carital</b> <a href="http://www.carital.com">www.carital.com</a>	Carital Ltd is a Finnish healthcare technology company. Our story began in 1987. Today we are privileged to help healthcare professionals to provide better and more efficient patient care. This we do by manufacturing clinically proven, powered and non-powered minimum pressure mattress systems based on Carital® Antideformation Technology.	<b>Stand 21</b>
 CODAN CONSULTING	<b>Codan Consulting</b> <a href="http://www.codan-consulting.com">www.codan-consulting.com</a>	Codan Consulting is a Professional Congress Organiser (PCO), Destination Management Company (DMC), and Association Development Company. Our international team can develop creative and cost-effective solutions for all your congress needs. The company has a proven record of arranging successful meetings in various countries across Europe and in the US, boosting the client association's economics and facilitating a wide range of international company events.	<b>Stand 13</b>

 <b>Coloplast</b>	<b>Coloplast</b> <a href="http://pro.coloplast.fr/plaies/">pro.coloplast.fr/plaies/</a> <a href="http://soins-des-plaies/">soins-des-plaies/</a>	<p>What makes Coloplast special is our willingness to listen to the people who use our products and act on what we learn. Together, we are united by a shared purpose and passion to achieve fewer days with wounds. Therefore, our business unit Wound Care develop products of intelligent design such as our hydrocolloid dressings Comfeel® and foam dressing Biatain® with the 3DFit® technology. We dedicate ourselves to sharing deeper knowledge and guidance through Triangle of wound assessment® and through closer collaboration with health care professionals.</p>	<b>Stand 5</b>
	<b>Dabir Surfaces</b> <a href="http://www.dabir-surfaces.com">www.dabir-surfaces.com</a>	<p>Pressure injuries (PIs) are highly preventable clinical adverse events resulting in unnecessary suffering and diminished quality-of-life for patients while increasing costs for hospitals. Secondary infections often accompanying PIs and can be life threatening. Dabir systems provide tissue offloading to promote healthy tissue perfusion to prevent pressure injuries.</p>	<b>Stand 17</b>
	<b>EPUAP</b> <a href="http://www.epuap.org">www.epuap.org</a>	<p>The European Pressure Ulcer Advisory Panel was established to support research, education and awareness among policy-makers in PU prevention and treatment in all European countries with a focus on adequate patient-centred and cost-effective pressure ulcer care.</p>	<b>Stand 28</b>
	<b>Etac</b> <a href="http://www.etac.com">www.etac.com</a>	<p>Etac is world-leading developer of ergonomic mobility aids for people in all stages of life. For numerous care situations, we offer state-of-the-art products that aim to enhance activity, regardless of physical circumstances. Our heart lies in the solutions that optimize quality of life for the individual, their family and caregivers.  <b>Etac - Creating Possibilities</b></p>	<b>Stand 38</b>
	<b>EWMA</b> <a href="http://www.ewma.org">www.ewma.org</a>	<p>The European Wound Management Association (EWMA) is a European umbrella organisation, linking national wound management organisations within wound care. Attend the EWMA 2020 conference in London from 13 – 15 May 2020 and experience high level scientific presentations, hands-on workshops and networking with more than 3,500 fellow wound-care specialist from all over the world.</p>	<b>Stand 39</b>
	<b>Frontier &amp; Hospidex</b> <a href="http://www.frontier-group.co.uk">www.frontier-group.co.uk</a> <a href="http://www.hospidex.eu">www.hospidex.eu</a>	<p>For Healthcare Professionals who are involved in the treatment and prevention of pressure ulcers, where time constraints, limited resources and increasing budget pressures, can impact on patient outcomes. We understand the daily challenges you face and we want to support you to be reassured, be safe, be secure and be comforted. Join Professor Dimitri Beeckman at our lunch time symposium on the 18th September and visit stand #30/31 to learn how to reduce pressure ulcer incidence rates and enable patients to be pressure ulcer free for longer. Frontier Medical Group in association with Hospidex, our partner in Healthcare solutions are looking forward to welcoming you at this years conference.</p>	<b>Stand 30 &amp; 31</b>
	<b>Journal of Wound Care (JWC)</b> <a href="http://www.magonlinelibrary.com/toc/jowc/current">www.magonlinelibrary.com/toc/jowc/current</a>	<p>The Journal of Wound Care (JWC) is widely acknowledged as the global leader in wound care publications, internationally recognised and respected for the quality of our articles. Guided by key opinion-leaders, JWC defines cutting edge wound care practice, identifying future trends in the field and communicating best current practice.</p>	<b>Stand 42</b>
	<b>Levabo</b> <a href="http://www.levabo.com">www.levabo.com</a>	<p>Levabo is a Danish company, which develops, produces and sells inflatable single patient positioning cushions / mattresses for prevention and treatment of pressure ulcers. We have several individual product groups for specific positioning including hygienic solutions for toilet and bath.</p>	<b>Stand 45</b>
	<b>Lohmann &amp; Rauscher</b> <a href="http://www.lohmann-rauscher.com">www.lohmann-rauscher.com</a>	<p>Facilitate medical cares for health personnel by making the healing process the most comfortable and the shortest possible for the patient: That is the vocation of Lohmann &amp; Rauscher's laboratories.</p>	<b>Stand 7</b>

 MétanoiaSanté	<b>Metanoia Sante</b> <a href="http://www.metanoiasante.com">www.metanoiasante.com</a>	EscarProtect™ consists in a foam for cutaneous use to prevent risks of bedsores which can originate from skin rashes, incontinence dermatitis and generally, maceration and friction-related irritations. EscarProtect™ weaves an intra-epidermal network through liquid crystals formed by polymerization process. This network installs a sort of double membrane around the cells, delaying or preventing friction on skin and the effects of maceration for several hours, even after personal care.	<b>Stand 47</b>
 MolecuLight <small>LOOK TO HEAL™</small>	<b>MolecuLight</b> <a href="http://www.moleculight.com">www.moleculight.com</a>	MolecuLight offers point of care solutions for wound care diagnostics. The MolecuLight i: X allows clinicians to visualize bacterial and tissue fluorescence in real-time & measure wounds assessment and helping clinicians make evidence-based treatment decisions.	<b>Stand 35</b>
 Mölnlycke®	<b>Mölnlycke</b> <a href="http://www.molnlycke.com">www.molnlycke.com</a>	At Mölnlycke®, we deliver innovative solutions for managing wounds, improving surgical safety and efficiency, and preventing pressure ulcers. Solutions that help achieve better outcomes and are backed by clinical and health-economics evidence. In everything we do, we are guided by a single purpose: to help healthcare professionals perform at their best. And we're committed to proving it every day.	<b>Stand 36</b>
 novacare <small>gmbh</small>	<b>novacare</b> <a href="http://www.novacare.org">www.novacare.org</a>	novacare GmbH is an international company with more than 25 years of experience that develops and distributes medical devices such as pressure care and pressure sore prevention products e.g. alternating pressure systems for residential care and clinical use.	<b>Stand 34</b>
 SOCIÉTÉ FRANÇAISE DE L'ESCARRE	<b>Société Française          de l'Escarre</b> <a href="http://www.escarre-perse.com/escarres/">www.escarre-perse.com/escarres/</a>	The Société Française de l'Escarre is a French association of professionals founded in 1991 with the mission of field action in the area of pressure ulcer prevention, education and research. The main objective is to improve patient's quality of life by using all available means to fight against pressure ulcers.	<b>Stand 4</b>
 PolyMem®	<b>PolyMem</b> <a href="http://www.polymem.com">www.polymem.com</a>	Ferris Mfg. Corp. is a privately held company dedicated to developing innovative products that bring desired and effective results to the healing process. PolyMem® Therapeutic Dressings have been used to successfully heal wounds and optimize pain control for patients throughout the world for over 30 years.	<b>Stand 20</b>
 PUSENSOR	<b>PUsensor</b> <a href="http://www.pusensor.com">www.pusensor.com</a>	PUsensor offers a new medical device using a research based and objective method for pressure ulcer risk assessment. The purpose is to complement today's subjective scales and accurately prevent pressure ulcers in order to reduce patient suffering and healthcare costs.	<b>Stand 46</b>
 SmithNephew	<b>Smith &amp; Nephew</b> <a href="http://www.smith-nephew.com">www.smith-nephew.com</a>	Smith & Nephew is a leading portfolio medical technology company, operating in around 100 countries globally. We are a constituent of the UK's FTSE 100 and our shares are traded on the London Stock Exchange and through American Depository Receipts on the New York Stock Exchange (LSE: SN, NYSE: SNN) Our purpose: Life Unlimited. Smith & Nephew exists to restore people's bodies, and their self-belief	<b>Stand 19</b>
 stryker®	<b>Stryker</b> <a href="http://www.stryker.com">www.stryker.com</a>	Stryker is one of the world's leading medical technology companies and, together with our customers, is driven to make healthcare better. We offer innovative products and services in Orthopaedics, Medical and Surgical, and Neurotechnology and Spine that help improve patient and hospital outcomes.	<b>Stand 25</b>
 Talley	<b>Talley</b> <a href="http://www.talleygroup.com">www.talleygroup.com</a>	Talley Group Ltd is a privately owned UK manufacturer with over 65 years' experience. Product lines include a comprehensive range of high quality (Class II) pressure relieving mattress systems, intermittent pneumatic compression pumps and garments for DVT prevention and a range of negative pressure wound therapy (NPWT) products.	<b>Stand 18</b>



**Taxisense**  
[www.taxisense.com](http://www.taxisense.com)

Taxisense is dedicated to pressure ulcer prevention of wheelchair or bed ridden patients. Our devices are used by healthcare professionals, and rely on a patented connected pressure-sensing fabric which continuously monitors pressures at the skin-support interface. With our TEXICARE cushion cover, we are now bringing this technology to the people who need it the most: mobility impaired people in wheelchairs. The seating pressures measured by Texicare are processed by a smart algorithm which detects reduced mobility and sends these persons repositioning alerts, thus favouring mobility on their wheelchair and contributing to the reduction of pressure ulcer risk.

**Stand 44**



**Tissue Viability Society (TVS)**  
[www.tvs.org.uk](http://www.tvs.org.uk)

The Tissue Viability Society (TVS) is dedicated to all issues of tissue viability, a growing healthcare speciality that primarily considers all aspects of skin and soft tissue wounds, including acute surgical wounds, pressure ulcers and all forms of leg ulceration. To find out more about the Society please visit Stand 40.

**Stand 40**



**Ueni Medica**

Ueni Medica launches GRANAXYL, a new medical device for skin ulcers. This dressing in powder form develops a gel at the exact size and contact of the wound. Its hyperosmotic and acid composition allows effective detersion and rapid granulation of exudative ulcers. GRANAXYL is easy to use and well tolerated.

**Stand 43**



**Urgo Medical**  
[www.urgomedical.com](http://www.urgomedical.com)

As the Healing Company, Urgo Medical's mission is to help clinicians relieving the burden of wounds in patients by providing them innovative and best-in-class solutions. Urgo Medical's teams are committed every day to working with health professionals to contribute to reduce healing time. Because every wound-free day makes a difference for patients.

**Stand 26**



**Winnocare**  
[www.winnocare.fr](http://www.winnocare.fr)

Winnocare leads the way in France in promoting solutions for improving the care of people with loss of autonomy and susceptible to pressure ulcer risk. The group has two production facilities in France, Winnocare operates with manufacturing and commercial business units in Poland, Germany, Spain, Tunisia, United Kingdom & Scandinavia.

**Stand 24**

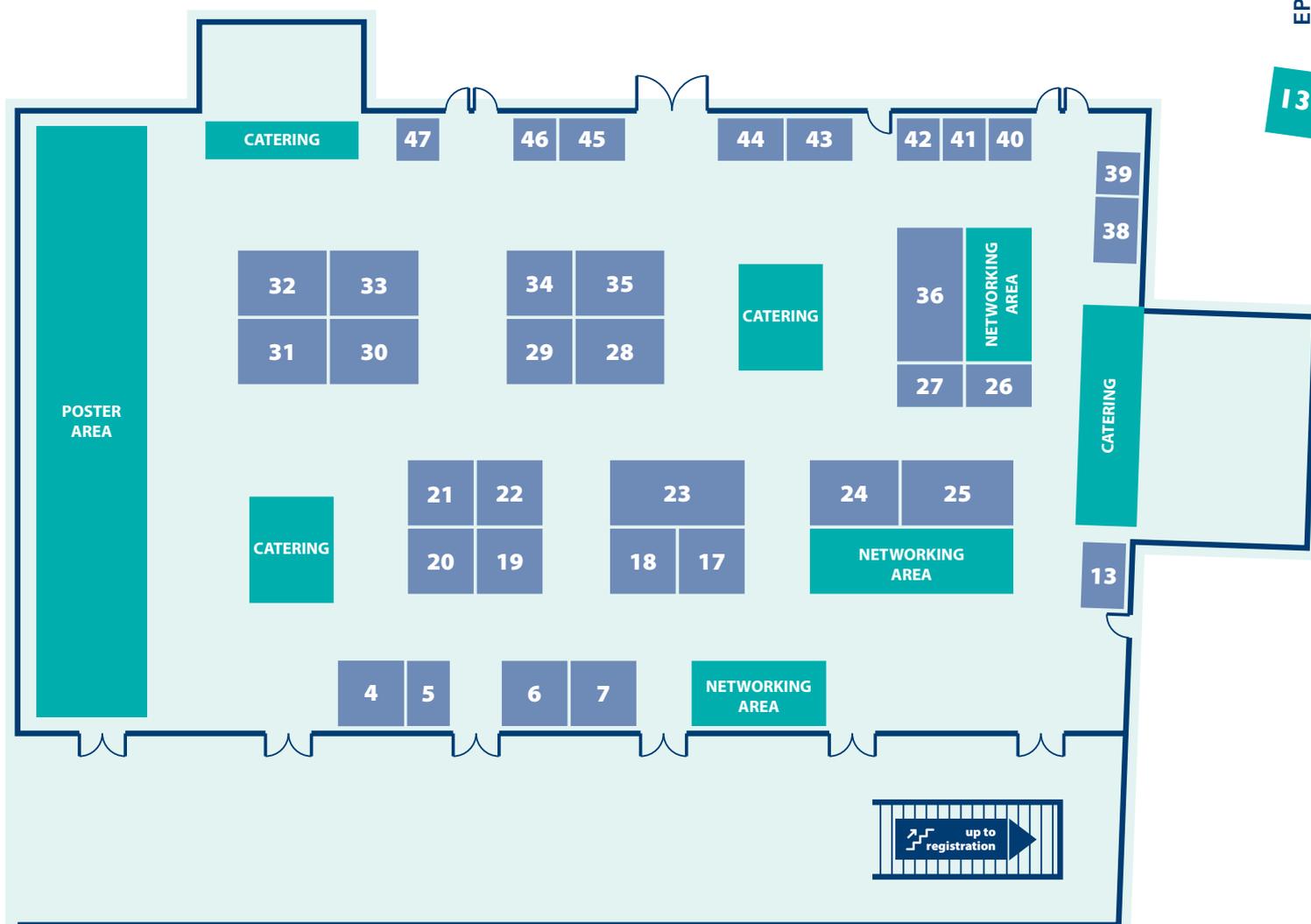


**Wounds International**  
[www.woundsinternational.com](http://www.woundsinternational.com)

Wounds International is a free online resource providing education to practitioners around the world, accessed by over 60,000 practitioners monthly from over 160 countries. Please visit our stand to collect a range of free informative resources.

**Stand 41**

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# 5<sup>th</sup> EPUAP Focus Meeting

Patient safety: Prevention and communication  
[www.focusmeeting2020.org](http://www.focusmeeting2020.org)

**25 – 27 May 2020**  
Sønderborg, Denmark

## MAIN TOPICS

- Patient safety: prevention and communication
- Quality management and patient safety
- "In safe hands": The Sønderborg Concept
- From guideline to practice
- Health technologies at the bedside

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## IMPORTANT DEADLINES

Abstract  
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**30 November  
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Early  
registration  
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**20 March  
2020**











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