

3rd EPUAP FOCUS MEETING

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

4 – 6 April 2016 | Berlin, Germany

www.focusmeeting2016.org



FINAL PROGRAMME AND ABSTRACT BOOK

Organised by the European Pressure Ulcer Advisory Panel



in partnership with

Charité-Universitätsmedizin Berlin

Leeds University



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CONTENT

Welcome	4
About EPUAP	5
About Charite	6
About the Clinical Research Center for Hair and Skin Science	6
About Focus Meeting	7
Programme overview	8
Key sessions presentations	11
Oral presentations	24
Poster presentations	28
General Information	40
Sponsors and exhibition	43
Exhibition plan	46

WELCOME

Dear Colleagues,

On behalf of the European Pressure Ulcer Advisory Panel (EPUAP) and the local organising committee we would like to welcome you to the **3rd EPUAP Focus Meeting**, in Berlin Germany! The meeting is organised in cooperation with **The Clinical Research Center for Hair and Skin Science (CRC) at the Department of Dermatology and Allergy of the Charité – Universitätsmedizin Berlin** and **The University of Leeds, United Kingdom**.

The 3rd Focus Meeting theme is **The Role of Skin and Tissue Maturation and Aging in Pressure Ulcer Research and Practice**.

The following topics will be addressed in depth during the key sessions at the Focus Meeting 2016:

- Introduction to skin, skin function, and skin research
- Pressure ulcers in infancy
- Skin aging
- Pressure ulcers in ageing skin
- Superficial skin changes in the aged
- Industrial perspective and free papers on skin aging
- Dry skin

It is a truly international and interdisciplinary meeting of experts from all continents. In addition to the oral talks and discussion we are happy to have poster presentations as well.

The quality of the scientific programme has been acknowledged by the European Accreditation Council for

Continuing Medical Education (EACCME) by assigning 11 European CME Credits (ECMEC).

WHAT CAN YOU EXPECT FROM THE EPUAP FOCUS MEETING?

- Perspectives from the bench to bedside in areas including skin function and skin research; pressure ulcers in infancy; skin aging; pressure ulcers in ageing skin; superficial skin changes in the aged; dry skin and skin health.
- Cross-disciplinary perspectives on skin function and skin health and their clinical application to pressure ulcer prevention and management
- Unique combination of leading laboratory scientists, bioengineers, clinical researchers and clinicians working in dermatology, paediatrics, geriatrics and pressure ulcer prevention.
- An overview of current research and development trends in regard to a spectrum of knowledge and technologies in the pressure ulcer field.
- Environment for informal discussions that encourages follow-up contacts between scientists and companies such as for development of technologies, consultation projects for companies etc.

Berlin is a city of contrasts – history and modernity, bustling urbanity and sheer relaxation, skyscrapers and spreading waves of green. In Berlin, there are always natural surroundings where you can unwind, even in the downtown area!

We look forward to seeing you in Berlin!

CONFERENCE CHAIRS

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ABOUT EPUAP



The "European Pressure Ulcer Advisory Panel" was created in London in December 1996 to lead and support all European countries in the efforts to prevent and treat pressure ulcers.

At its inaugural meeting in London in December 1996, which included experts from many European countries, the group of over twenty agreed their mission statement and the initial Executive Board and Trustees.

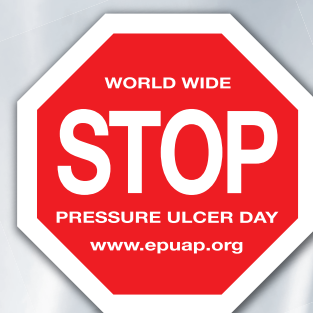
The mission statement reads: "To provide the relief of persons suffering from or at risk of pressure ulcers, in particular through research and the education of the public and by influencing pressure ulcer policy in all European countries towards an adequate patient centred and cost effective pressure ulcer care."

A very important activity for the EPUAP is our annual conference. These meetings are aimed at bringing together clinical care practitioners, researchers and people from industry, to discuss the current status of the problem in Europe and the world and to discuss new developments in pressure ulcer prevention, treatment and care.

17th November 2016

**STOP PRESSURE
ULCER DAY**

one GOAL Worldwide



ABOUT CHARITÉ



The Charité is one of the largest university hospitals in Europe. Outstanding doctors and scientists perform research, teaching, treatment and assistance in the heart of Berlin, with over half of Germany's Nobel Prize winners for Medicine and Physiology having worked there, including Emil von Behring, Robert Koch and Paul Ehrlich.

Established in 1710 by King Friedrich I as a quarantine building for people beset by the plague, the university hospital today enjoys a high reputation worldwide as a training center of excellence.

The campus is spread over four locations, comprising over 100 clinics and institutes clustered into 17 CharitéCenters. With a staff of almost 13,000, the Charité generates an annual turnover of around 1.3 billion Euros, making it one of Berlin's biggest employers.

The World Health Summit, held annually since 2009, is an expert conference initiated by the Charité. Under the patronage of the German and French Heads of State, leading international personalities from the fields of science, research and politics develop strategies to solve global health challenges.

In 2010, the Charité celebrated its 300-year anniversary.

ABOUT THE CLINICAL RESEARCH CENTER FOR HAIR AND SKIN SCIENCE



The Clinical Research Center for Hair and Skin Science (CRC) at the Department of Dermatology and Allergy of the Charité – Universitätsmedizin Berlin was founded by Prof. Dr. Ulrike Blume-Peytavi in 2002. The CRC consists of three units, the experimental and the clinical research unit and the outpatient unit.

The ISO 9001 certified clinical research unit is specialized in planning and conducting phase I to III drug and cosmetic studies as well as observational, instrument- and model development studies according to ICH-Good Clinical Practice (GCP) guidelines.

The experimental research unit conducts experimental and translational studies on hair and skin biology, hair growth and skin immunology. The multiprofessional team possesses special research competences in the field of nanoparticle-based penetration through the skin and new transcutaneous vaccination strategies.

In the outpatient unit the CRC runs special clinics for hair disorders and pediatric dermatology.

The combination of clinical research, experimental and patient centred approaches lead to synergies enabling to position translational research side by side with clinically applied research knowledge and to combine them in research practice on skin and hair science in a unique manner.

ABOUT THE FOCUS MEETING

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

WHY ATTEND THE FOCUS MEETING?

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

The 3rd Focus Meeting will focus on **The Role of Skin and Tissue Maturation and Aging in Pressure Ulcer Research and Practice.**

We are looking forward to seeing you in Berlin!

PROGRAMME

Monday April 4th

11:30 to 13:00	Registration, lunch, exhibition viewing
13:00 to 13:10	Opening <i>Lisette Schoonhoven (President EPUAP)</i>
13:10 to 13:20	Welcome <i>Jane Nixon, Jan Kottner (conference chairs)</i>
Session 1: Introduction to skin, skin function, and skin research <i>Chair: Jane Nixon</i>	
13:20 to 14:00	Function, injury and repair mechanisms of the human skin <i>Matthew Hardman (Manchester, UK)</i>
14:00 to 14:45	Measuring skin in clinical research <i>Jan Kottner (Charité, Germany)</i>
14:45 to 15:30	Coffee, tea, exhibition viewing
Session 2: Pressure ulcers in infancy <i>Chair: Nils Lahman</i>	
15:30 to 16:00	Skin maturation and growth <i>Dan Bader (University Southampton, UK)</i>
16:00 to 16:30	Evidence based skin care in babies and small children <i>Ulrike Blume-Peytavi (Charité, Germany)</i>
16:30 to 17:00	Device-related pressure ulcers from a biomechanical perspective <i>Amit Gefen (Tel Aviv University, Israel)</i>
17:00 to 17:30	Pressure ulcers in maturing skin from a clinical perspective <i>Anna Barbara Schlüer (Childrens Hospital Zurich, Switzerland)</i>
Optional: 17:45 to 18:45 Guided tour through the Clinical Research Center for Hair and Skin Science (max. 20 persons after preregistration) <i>CRC team</i>	
Optional: 17:45 - 18:45 Guided tour Berlin Museum of Medical History at the Charité including specimen collection of Rudolf Virchow (close to the venue, max. 20 persons after pre-registration)	
Evening for free disposal Dinner for invited speakers and EPUAP trustees	

PROGRAMME

Tuesday April 5th

8:30 to 9:30	Registration, coffee, tea, exhibition viewing
Session 3: Skin aging <i>Chair: Jan Kottner</i>	
09:30 - 10:00	Introduction to skin aging <i>Desmond J. Tobin (University of Bradford, UK)</i>
10:00 to 10:30	Skin aging from a biomechanical perspective <i>Cees Oomens (The Netherlands)</i>
10:30 to 11:00	The load, clinical relevance and economic impact of aging-associated skin diseases <i>Elisabeth Hahnel, Andrea Lichterfeld (Charité, Germany)</i>
11:00 to 11:30	Coffee, tea, exhibition viewing
Session 4: Pressure ulcers in ageing skin <i>Chair: Amit Gefen</i>	
11:30 to 12:00	Is advanced age an (independent) risk factor for pressure ulcer development? <i>Susan Coleman, Jane Nixon (University of Leeds, UK)</i>
12:00 to 12:30	Pressure ulcer risk and management in the aged: the geriatric perspective <i>Sylvie Meaume (Hospital Rothschild, Paris, France)</i>
12:30 to 13:00	Pressure ulcer case studies <i>Jeannie Donnelly (Queens University Hospital, UK)</i>
13:00 to 14:00	Lunch
Session 5: "Superficial skin changes" in the aged <i>Chair: Lisette Schoonhoven</i>	
14:00 to 14:30	Is "skin status" a risk factor for pressure ulcer development? <i>Jane Nixon/Susan Coleman (University of Leeds)</i>
14:30 to 15:00	Skin under pressure: microvascular adjustment capacities <i>Béregère Fromy (Laboratoire de Biologie Tissulaire et Ingénierie thérapeutique, France)</i>
15:00 to 15:30	Incontinence-associated dermatitis <i>Dimitri Beeckman (University Ghent, Belgium)</i>
15:30 to 16:00	Dermatoporosis: extremely fragile skin <i>Gürkan Kaya (Geneva, Switzerland)</i>
Optional: 16:15 to 17:15 Guided tour through the Clinical Research Center for Hair and Skin Science (max. 20 persons after preregistration) <i>CRC team</i>	
Optional: 16:15 - 17:15 Guided tour Berlin Museum of Medical History at the Charité including specimen collection of Rudolf Virchow (close to the venue, max. 20 persons after preregistration)	
19:30	Focus Meeting Dinner

PROGRAMME

Wednesday April 6th

8:30 to 9:00	Coffee, tea, exhibition viewing
Session 6: Free papers <i>Chair: Dimitri Beeckman</i>	
9:00 to 10:30	<p>Improving the quality of evidence on pressure ulcer prevention interventions: Protocol for the development of a core outcome set for clinical trials (OUTPUT project) <i>Katrin Balzer</i></p> <p>Translational Research Technologies <i>Annika Vogt (Charité-Universitätsmedizin, Berlin)</i></p> <p>Optical Coherence Tomography is a valuable tool for pressure ulcer research <i>Daniel Woods</i></p> <p>Effect of surface liquid pH on skin barrier function <i>Sofoklis Koudounas</i></p>
10:30 to 11:00	Coffee, tea, exhibition viewing
Session 7: Dry skin <i>Chair: Jane Nixon, Kottner</i>	
11:00 to 11:30	<p>An introduction to skin care products <i>Christian Surber (University of Basel, Switzerland)</i></p>
11:30 to 12:30	<p>Assessment and interventions for maintaining healthy skin in older age: clinical and lay perspectives <i>Fiona Cowdell (University Hull, UK)</i> <i>Steven Ersser (University Leeds, UK)</i></p>
12:30 to 13:00	<p>Closing remarks <i>Jan Kottner, Jane Nixon</i></p>
12:45 to 14:15	Lunch and farewell

KEY LECTURES OVERVIEW

SESSION 1: INTRODUCTION TO SKIN, SKIN FUNCTION AND SKIN RESEARCH

- Function, injury and repair mechanisms of the human skin, *Matthew Hardman*
- Measuring skin in clinical research, *Jan Kottner*

SESSION 2: PRESSURE ULCERS IN INFANCY

- Skin maturation and growth, *Dane Bader*
- Evidence based skin care in babies and small children, *Ulrike Blume-Peytavi*
- Device-related pressure ulcers from a biomechanical perspective, *Amit Gefen*
- Pressure ulcers in maturing skin from a clinical perspective, *Anna Barbara Schlüer*

SESSION 3: SKIN AGING

- 20-Years EPUAP anniversary, *Christina Lindholm*
- Introduction to skin aging, *Desmond J. Tobin*
- Skin aging from a biomechanical perspective, *Cees Oomens*
- The load clinical relevance and economic impact of aging - associated skin diseases, *Elisabeth Hahnel, Andrea Lichterfeld*

SESSION 4: PRESSURE ULCERS IN AGEING SKIN

- Is advanced age an (independent) risk factor for pressure ulcer development?
Jane Nixon/Susanne Coleman
- Pressure ulcer risk and management in the aged: the geriatric perspective, *Sylvie Meaume*
- Pressure ulcer case studies, *Jeannie Donnelly*

SESSION 5: "SUPERFICIAL SKIN CHANGES" IN THE AGED

- Predictors of Pressure Ulcer Development: Skin Status Variables, *Susanne Coleman*
- Skin under pressure: microvascular adjustment capacities, *Bérengère Fromy*
- Incontinence-associated dermatitis, *Dimitri Beeckman*
- Dematoporosis: extremely fragile skin, *Gürkan Kaya*

SESSION 7: DRY SKIN

- An introduction to skin care products, *Christian Surber*
- Assessment and interventions for maintaining healthy skin in older age: clinical and lay perspective, *Fiona Cowdell and Steven Ersser*

SESSION I: INTRODUCTION TO SKIN, SKIN FUNCTION AND SKIN RESEARCH

MEASURING SKIN IN CLINICAL RESEARCH

Jan Kottner

Department of Dermatology and Allergy, Charité University, Germany

INTRODUCTION

The human skin is a highly complex organ fulfilling a variety of functions. Key in clinical skin research is measurement and quantification to make inferences about physiological and pathological processes, or treatment effects.

AIMS

The aim of this talk is to present selected skin parameters and measurement approaches with a special relevance to pressure ulcer research.

RESULTS

Skin topography can be quantified using microscopic to macroscopic contact or non-contact approaches. Skin surface roughness is a key parameter indicating a wide range of dermatological conditions (e.g. xerosis) and is relevant for characterizing the skin-support surface contact behavior. The skin surface pH regulates the stratum corneum integrity and cohesion, the desquamation and microbial colonization. It can be measured using colorimetric or electric methods. First temperature measurements go back to the 17th century. Since the 1960s temperature measurements based on the infrared techniques are established. Skin temperature changes correspond to local heat accumulation or blood flow changes (e.g. due to inflammation). Very high and low skin temperatures cause barrier defects, delay barrier recovery and change the mechanical skin properties. Transepidermal water loss is the flux density of condensed water diffusing from the viable epidermis to the skin surface. It is regarded as one of the most important parameters indicating the function of the stratum corneum. High values are widely regarded as skin barrier impairment but 'normal' values are unknown. Skin hydration measurements largely depend on the impedance or capacitance methods. Based on the technical specifications tissue water can be measured at different depths. Stratum corneum hydration is a very sensitive parameter for 'skin surface moisture' changes, e.g. under occlusion. Broad-band or narrow-band reflectance spectrophotometric methods are used for skin colour measurements. Using different polarization schemes, skin surface and subsurface characteristics can be enhanced. Image processing can be used to measure hyper- or hypopigmentation which is for instance relevant in post inflammatory hyperpigmentation (e.g. after IAD). Especially erythema measurements have been widely applied in pressure ulcer research. There are many more techniques in skin and especially pressure ulcer research including the measurement of stiffness and elasticity, tissue thickness, interleukins, perfusion and microcirculation, numerous clinical scores capturing clinical signs and many others.

CONCLUSION

Measurements in clinical skin research are established in dermatology and related disciplines. There is growing interest and awareness that the generation of in vivo data advances our knowledge in skin and pressure ulcer research. Despite this potential and the wide availability of measurement devices, interpretation of readings is not always easy.

SESSION 2: PRESSURE ULCERS IN INFANCY

EVIDENCE BASED SKIN CARE IN BABIES AND SMALL CHILDREN

Ulrike Blume-Peytavi

Department of Dermatology and Allergy, Charité University, Germany

Recent years have seen continuing understanding of skin morphology, physiopathology and function of skin in newborns and infants, leading to development of age and skin adapted skin care and topical dermatotherapeutic regimens. For longtime pediatric and dermatologic communities did not reach a consensus on what constitutes appropriate skin care practice of newborns and infants, however there is increasing knowledge and advancing evidence-based clinical practice in bathing and cleansing of children, thus improving clinical outcomes.

European evidence based recommendations on bathing and cleansing of infants have been developed in light of new evidence on skin maturation processes in newborn and infants and randomized controlled clinical trials investigating different aspects of routine care. Recommendations for infant cleansing, bathing, and nappy care to provide guidance on facial, body and diaper care including the use of emollients have been developed.

Today it can be assumed that bathing is generally superior to washing in newborns and infants with additional psychological benefits for the infant and parents. Newborn bathing can be performed without harming the infant, provided basic safety procedures are followed. Water alone or appropriately designed liquid cleansers can be used during bathing without impairing the skin maturation process. Recent publications have even shown that twice weekly use of baby creams and ointments are helpful for maintaining and improving skin barrier function also in healthy children.

SESSION 2: PRESSURE ULCERS IN INFANCY

DEVICE-RELATED PRESSURE ULCERS FROM A BIOMECHANICAL PERSPECTIVE

Amit Gefen

Department of Biomedical Engineering, Tel Aviv University, Israel

INTRODUCTION

Pressure ulcers (PUs) in the pediatric population are inherently different from those in adults, in their risk factors and aetiology, with more than 50% of the cases related to contact with medical equipment at the care setting.

AIMS

The aims of this study were to: (i) Determine the mechanical loads in the scalp of a newborn lying supine, near a wedged encephalogram electrode or wire, which is deforming the scalp at the occiput. (ii) Evaluate the effect of a doughnut-shaped headrest on the mechanical state of tissues at the same site.

METHODOLOGY

We used finite element computational modeling to simulate a realistic three-dimensional head of a newborn interacting with the above devices. We examined effective and shear stresses and strain energy density (SED) in the fat and skin tissues at the occipital region.

RESULTS

The interfering electrode and wire, and the use of a doughnut-shaped headrest, all resulted in concentrated stresses and elevated SEDs in the affected soft tissues, compared to a flat foam mattress. Considering that elevated and localized tissue deformations, stresses and SED indicate a risk for PUs, our simulations suggest that misplaced medical devices, and using a doughnut-shaped headrest, impose an actual risk for developing device-related PUs.

CONCLUSION

We conclude that guidelines for pediatric clinical care should recommend routine inspections of the medical setting to prevent unnecessary contact of misplaced devices with the body of the patient. Furthermore, improved design of medical equipment for pediatric settings is needed in order to protect these fragile young patients from PUs.

REFERENCES

Levy A, Kopplin K, Gefen A. Adjustability and Adaptability Are Critical Characteristics of Pediatric Support Surfaces. Adv Wound Care 2015 Oct 1;4(10):615-622

SESSION 2: PRESSURE ULCERS IN INFANCY

PRESSURE ULCERS IN MATURING SKIN FROM A CLINICAL PERSPECTIVE

Anna Barbara Schlüer

*Department of Nursing development and Science, Children's University Hospital Zurich (Switzerland)
Children's Research Center, Children's University Hospital Zurich (Switzerland)*

INTRODUCTION

Within the first days of life neonates undergo various adaptation processes needed to accommodate the transition from the wet intrauterine environment to the dry outside environment. During the first months and years of life the skin continues to develop and evolve its structure and functions. There is greater awareness that pediatric patients in certain health care settings are at high risk of developing Pressure ulcers (PU). Potential risk factors for PU are immobility and decreased skin sensitivity. Medical devices on the skin are the predominant risk factor for PU occurrence in pediatric patients.

IMPLICATIONS FOR CLINICAL PRACTICE

Effective pressure ulcer prevention includes device related under-padding and careful positioning and fixation of such devices. At least daily head-to-toe-skin assessment of neonates and infants at risk of PUs should be performed. Monitoring and regular repositioning of any monitoring sensors and cables should be conducted as well. Special attention should be paid to the fact that repositioning of the pediatric patient must be weighed against the stress that such an intervention can cause, especially in low- and very low-term neonates and critically ill infants.

It is shown that the risk factors, the anatomical localities of PUs as well as the risk of PUs due to external devices differ from those in an adult population. Therefore, specialized preventive interventions based on the specific needs of the pediatric population are mandatory, including a careful assessment of younger patients (under the age of five years) with regard to their inability to distinguish and sense pressure on the skin adequately

SESSION 3: SKIN AGING

SKIN AGING FROM A BIOMECHANICAL PERSPECTIVE

Cees Oomens

Eindhoven University of Technology, The Netherlands

Firstly, the morphology and structure of healthy skin will be explained. This includes the different skin layers, stratum corneum, epidermis, papillary dermis and reticular dermis and its building structures, collagen and elastin fibres, extra cellular matrix of glycosaminoglycans, and the cells. Based on these observations the mechanical properties of skin will be derived and used to answer the question why different mechanical ex-vivo and in-vivo tests may lead to very diverse answers. The focus of the biomechanical discussion will be on stiffness, strength, visco-elastic properties and anisotropy of the skin, leading to a conceptual model of the mechanical behaviour of skin.

Then, a limited overview will be given of recent in-vivo and ex-vivo studies on changes with age of skin mechanical properties. In the last part of the presentation the consequences of these changes for the risk of developing a pressure ulcer will be discussed.

SESSION 3: SKIN AGING

THE LOAD, CLINICAL RELEVANCE AND ECONOMIC IMPACT OF AGING - ASSOCIATED SKIN DISEASES

Andrea Lichterfeld, Elisabeth Hahnel, Ulrike Blume-Peytavi, Jan Kottner

Department of Dermatology and Allergy, Charité University, Germany

INTRODUCTION

The human population is aging. Skin conditions and dermatological diseases associated with advanced age (e.g. fungal infections, dry skin and itch) receive increasingly attention in clinical practice and research. Economic evaluations are important sources to inform priority setting and resource allocation decisions in healthcare. The economics and epidemiology of skin conditions in aged populations has not been systematically reviewed so far.

AIMS

The aim of two separate projects was to summarize the economic and epidemiologic evidence of skin conditions in the aged (65+ years).

METHODOLOGY

Two systematic reviews were conducted including electronic database searches in MEDLINE, Embase via OVID, SCOPUS and Web of Science. Reference lists of potential eligible studies, reviews, guidelines or other sources were screened for additional literature. The methodological quality of included epidemiological studies was assessed with a standardized risk of bias tool and economic studies with the Consensus on Health Economic Criteria (CHEC) checklist.

RESULTS

Thirty-five publications reporting 38 economic analyses were included in the economic review. Ten cost of illness studies and 26 cost-effectiveness studies reporting about treatment and prevention of several skin conditions, e.g. pressure ulcers, skin tears, incontinence associated dermatitis. Costs alone and costs and effectiveness were reported for different intervention and treatment strategies, e.g. skin care interventions, preventive measures, dressings and ointments for healing, complex interventions, ointments for healing. Seventy-four records were included in the epidemiological analysis reporting data for more than 20 skin conditions. The majority of prevalence and incidence figures was identified for hospital and long term care settings. The most prevalent skin diseases were fungal infections (14.3% - 64%), dermatitis 19 (1% - 58.7%), xerosis (5.4% - 85.5%) and benign skin tumors (1.7% - 74.5%). Pressure ulcer prevalence ranged from 0.3% to 46% and incidence from 0.8% to 34%.

CONCLUSION

Skin conditions and diseases in aged populations are frequent and might be expensive. The methodological quality and reporting of epidemiological studies in the aged populations must be improved. There is a paucity of high quality evidence regarding the economic impact of age-associated skin conditions and diseases. Substantial heterogeneity in terms of study design, evaluation perspective, time period, and way of cost estimation was identified.

Systematic review registration: CRD42014014553, CRD42014009929 (PROSPERO)

SESSION 4: PRESSURE ULCERS IN AGEING SKIN

IS ADVANCED AGE AN (INDEPENDENT) RISK FACTOR FOR PRESSURE ULCER DEVELOPMENT?

Jane Nixon and Susanne Coleman

Leeds Institute of Clinical Trials Research, University of Leeds, UK

INTRODUCTION

Early prevalence and prospective studies identified age as an important factor characterizing pressure ulcer patient populations. However, in studies utilizing multi-variate modelling to identify independent risk factors predictive of pressure ulcer development, mixed findings are reported in relation to the importance of advanced age.

AIMS

To explore the relationship between key risk factors and age as a confounding factors in pressure ulcer development.

METHODOLOGY

The presentation will draw on the findings of the pressure ulcer risk factor systematic review (1) and a conceptual framework (2) to explore the relationship between advanced age and pressure ulcer development.

RESULTS

In our systematic review of 5462 abstracts retrieved, 365 were identified as potentially eligible (1). Of these 54 fulfilled the eligibility criteria including 34 prospective cohort, 9 retrospective record reviews and 11 RCTs. Thirty-two studies evaluated age as a variable in their multi-variable analysis. Of these increased age emerged in only 12 (37.5%) studies as an independent risk factor for subsequent pressure ulcer development. The conceptual framework (2) identifies the relationships between direct causal factors and indirect causal factors and in the presentation these will be explored and consider age as a risk factor taking into account the impact of the ageing process on other key factors identified in the epidemiological literature.

CONCLUSION

Age is a key clinical consideration in identifying high risk populations, but on an individual patient level risk assessment must consider the direct causal factors for pressure ulcer development.

REFERENCES

Systematic review, IJNS, Coleman et al 2013

Conceptual framework, JAN, Coleman et al 2014

ACKNOWLEDGEMENT

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SESSION 4: PRESSURE ULCERS IN AGEING SKIN

PRESSURE ULCER CASE STUDIES: SHARED LEARNING

Jeannie Donnelly

Lead Nurse – Tissue Viability, Belfast Health & Social Care Trust; Teaching Fellow Assistant, Queens University Belfast

INTRODUCTION

Whilst it is difficult to determine the true incidence of pressure damage amongst older people (> 65 years old), studies indicate that advanced age is positively correlated with an increased risk in pressure ulcer development (Stifter et al, 2015). Whilst this may be due to age related skin changes (such as reduced elasticity and collagen, loss of subcutaneous fat, muscle atrophy and reduced cohesion between dermis and epidermis), it is important to acknowledge that advanced age is a marker for other possible pressure ulcer correlates such as cognitive impairment, malnourishment, limited mobility, incontinence, diabetes and peripheral vascular disease. In practice, it is essential to assess the impact of these risk factors, and where possible, create a protective plan of care.

AIMS

The purpose of this presentation is to examine the care of 5 patients (aged between 65 and 89 years of age) who developed full thickness pressure damage in order to determine:

- what happened and why
- the impact on those involved (patient and carers)
- how the pressure ulcer could have been prevented
- what we can learn from the incident and what we need to do differently

METHODOLOGY

The care of each patient was examined by a multidisciplinary team using a Significant Event Audit (also called Significant Event Review or Analysis). This technique allows practitioners to reflect on and learn from individual cases in order to improve the quality of care overall. The resulting reports were examined in order to identify relevant factors. These factors were coded in order to conceptualize and categorise them (McCann and Clark, 2003).

RESULTS

Five key themes were identified:

- Inaccurate assessment of risk factors
- The client's right to self determination
- Lack of Leadership
- Poor communication
- Failure to deliver evidence based care

During the presentation, each theme will be examined in more detail and learning shared.

CONCLUSION

The case studies will demonstrate that whilst older people with complex needs are at an elevated risk of pressure damage (due to physical frailty and comorbidities), the root cause was human error, i.e. a failure to (1) recognize risk factors, (2) instigate evidence based care, and (3) communicate effectively. By being open, honest and accountable for these incidents, wards and departments across the hospital-community interface have dramatically reduced the incidence of pressure damage in their units.

REFERENCES

McCann, T. and Clark, E. (2003) Grounded theory in nursing research: Part 1- methodology. Nurse Researcher. 11 (2): 7-18.

Stifter, J., Yao, Y., Lodhi, M.K., Lopez, K.D, Khokhar, A.,; Wilkie, D.J., Keenan, G.M. (2015) Nurse Continuity and Hospital-Acquired Pressure Ulcers: A Comparative Analysis Using an Electronic Health Record "Big Data" Set. Nursing Research, 64 (5) 361–371

SESSION 5: "SUPERFICIAL SKIN CHANGES" IN THE AGED

IS "SKIN STATUS" A RISK FACTOR FOR PRESSURE ULCER DEVELOPMENT?

Susanne Coleman

Leeds Institute of Clinical Trials Research, University of Leeds, UK

INTRODUCTION

A risk factor systematic review identified skin status as an independent risk factor for subsequent pressure ulcer development, yet it is not universally included in Risk Assessment Instruments and descriptors vary.

AIMS

To explore the relationship between skin status and pressure ulcer development.

METHODOLOGY

The presentation will draw on the findings of the pressure ulcer risk factor systematic review (1) and conceptual framework (2) to explore the relationship between skin status and pressure ulcer development. It will also identify how the concept of "skin status" is defined, in Risk Assessment Instruments identified in a NICE review (3).

RESULTS

In the systematic review a skin status related variable emerged in the multi-variable analysis of 9 of 10 studies (including 2 high quality studies), yet a skin status is only included in 5 of the 14 Risk Assessment Instruments considered in the NICE review (3).

CONCLUSION

Poor skin status appears to be an important predictor of subsequent pressure ulcer development, yet the large number of descriptors make interpretation and the translation to clinical care difficult. Further research is needed to develop more objective measures of skin status.

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- 2) *Conceptual framework, JAN, Coleman et al 2014*
- 3) *NICE Clinical Guideline 179 2004*

ACKNOWLEDGEMENT

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SESSION 5: “SUPERFICIAL SKIN CHANGES” IN THE AGED

SKIN UNDER PRESSURE: MICROVASCULAR ADJUSTMENT CAPACITIES

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INTRODUCTION

Pressure ulcers are common among older people and are associated with adverse health outcomes and high treatment costs. It is largely admitted that pressure ulcer formation depends on extrinsic (external to the patient) and intrinsic (patient-related) factors that act synergistically.

AIMS

The aim of the presentation is to focus on the mechanisms involved in the skin defense, in particular the capabilities of the skin to adapt its microcirculation to pressures. These include defense properties to withstand the pressure delaying the onset ischemia and recovery capabilities after a period of ischemia allowing reperfusion and re-oxygenation. Then some age-related effects will be presented to take a closer look at why there is a decline in skin protection against pressure ulcers with age.

METHODOLOGY

Using functional experiments on skin mechanical reactivity, the ability or inability of the cutaneous circulation to adapt to locally applied pressure can be tested in vivo in humans and rodents.

RESULTS

A local application of low pressure on healthy skin induces an increase in cutaneous blood flow 1-3 that is altered with aging 4,5.

High and prolonged pressures led to a severe ischemia but this persisted after compression release only in absence of reactive hyperemia, as demonstrated in *Asic3* knockout mice. In these conditions the incidence and extent of the ischemic lesions were more pronounced 3.

CONCLUSION

An appropriate adjustment to pressure in the cutaneous microcirculation protects healthy skin against pressure ulcers. Deprived of this physiological protection, older adults show an early decrease in cutaneous blood flow resulting from the application of very low pressures, reflecting a vascular fragility of the skin, enhanced by sensory peripheral neuropathy. Such an inability of the skin to resist pressure could explain the higher risk of developing pressure ulcers in older people. In agreement with this, sensory peripheral neuropathy appears to be a critical factor in the prevalence and severity of heel pressure ulcers in older hospitalized adults 6.

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SESSION 5: "SUPERFICIAL SKIN CHANGES" IN THE AGED

INCONTINENCE-ASSOCIATED DERMATITIS

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INTRODUCTION

Incontinence- Associated Dermatitis (IAD) is one of the clinical manifestations of Moisture- Associated Skin Damage (MASD). IAD is a common problem in aged patients with fecal and/or urinary incontinence.

AIMS

Update about IAD terminology, aetiology, epidemiology, observation, prevention, and treatment.

METHODOLOGY

Integrative review.

RESULTS

The lack of an ICD-10 codes and an internationally validated and standardized method for IAD data collection contribute to a variation in epidemiological data. Frequent episodes of incontinence (especially fecal), occlusive containment products, poor skin condition, reduced mobility, diminished cognitive awareness, inability to perform personal hygiene, pain, pyrexia, certain medications (antibiotics, immunosuppressant), poor nutritional status, and critical illness are associated with IAD. Correctly diagnosing IAD and distinguish it from pressure ulcers is difficult. Even though the clinical presentation of partial thickness pressure ulcers and IAD is similar, the underlying etiologic factors differ. However, incontinence and IAD were found to be risk factors for pressure ulcer development. IAD management should essentially focus on skin cleansing to remove dirt, debris and microorganisms; skin moisturization to repair or augment the skin's barrier; and the application of a skin barrier product to prevent skin breakdown by providing an impermeable or semi-permeable barrier on the skin. The body of evidence is still limited, but growing since the last decade.

CONCLUSION

Incontinence causes disruptions of the skin barrier function and leads to superficial skin damage. Macerated skin and superficial skin changes due to incontinence are associated with pressure ulcer development. Skin maceration, chemical irritation, and physical irritation should be targeted to effectively prevent and treat IAD.

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SESSION 7: DRY SKIN

AN INTRODUCTION TO SKIN CARE PRODUCTS

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ABSTRACT

The industry offers a vast armamentarium of skin care products to clean, soothe, restore, reinforce, protect and to treat our skin and hence to keep it in “good condition”. Skin care products are readily available and their promotions with fanciful claims are omnipresent. The promotions are based on effects, evoked by actives that are delivered through vehicles that rely on specific technologies. Due to the fact, that these products are in direct contact to the target tissue, their vehicle and ingredients are able to profoundly modulate the characteristics of the skin and some of its functions. This makes products for the skin absolute unique and versatile delivery systems. This presentation discusses the concept of skin care and skin protection, the choice of skin care products, their vehicles, their functionality and their regulatory status.

SESSION 7: DRY SKIN**ASSESSMENT AND INTERVENTIONS FOR MAINTAINING HEALTHY SKIN IN OLDER AGE: CLINICAL AND LAY PERSPECTIVES***Fiona Cowdell¹ and Steven Ersser²**1) University of Hull, UK**2) University of Leeds, UK***INTRODUCTION**

As the population ages there is an increasing need to ensure that skin health and integrity in older people are maintained. The broader based concept of skin barrier vulnerability embracing both biological and behaviorally base vulnerability is important[1]. To examine how to alleviate skin vulnerability by improving skin care we need to understand how best to enable older people care for their skin effectively and to ensure that skin health becomes part of nursing and medical consultations which are aimed at empowering healthier lifestyle choices (Making Every Contact Count)[2]. We also require an understanding of older people's experiences and self-management behaviour. There is also a lack of evidence into the application of behaviour change techniques related to skin health practices, both by older people and health professionals. Furthermore, analysis of the current state of literature on skin hygiene in older people's care settings is needed to guide improvements nursing assessment and intervention methods and inform the research agenda.

AIMS

In this presentation we will:

1. Report on a phenomenological investigation of the experience of skin aging;
2. Summarise the current evidence base for hygiene and emollient practices for older people in hospital and residential care settings and;
3. Outline the challenges of efficient clinical assessment of skin in older people in a range of settings and suggests ways in which they can be developed to assess skin vulnerability.

METHODOLOGY

Our paper is based on our own empirical research drawing on phenomenological methods, an exploration of clinically based measurement of skin barrier function and a Cochrane systematic review [3] and literature scoping review work.

RESULTS

Data will be presented from a phenomenological study and a systematic review.

Conclusion: Older people think about their skin in terms of 'it's alright until it goes wrong'. Robust studies on effective skin care of older people in care settings are limited, but suggest the potentially important role of emollient use. Skin barrier measurement has predominantly been conducted in the laboratory setting and requires further exploration of its application in clinical settings to aid more effective assessment of skin barrier vulnerability. Further research: There is a need to 1; investigate optimum hygiene practices for older people, including emollient therapy and barriers and enablers to best practice in skin care by and for older people and for healthcare staff; 2; develop the application of more effective and portable measures of skin assessment to assess skin barrier vulnerability in clinical areas and 3; development methods to raise awareness of the need for skin health promotion for older people and support behavioral change to maintain skin health.

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ORAL PRESENTATIONS OVERVIEW

25

- Improving the quality of evidence on pressure ulcer prevention interventions: Protocol for the development of a core outcome set for clinical trials (OUTPUT project), *Katrin Balzer (University of Lübeck, Germany)*
- Optical Coherence Tomography is a valuable tool for pressure ulcer research, *Daniel Woods (Michelson Diagnostics Ltd, United Kingdom)*
- Translational Research Technologies, *Annika Vogt (Charité-Universitätsmedizin Berlin)*
- Effect of surface liquid pH on skin barrier function, *Sofoklis Koudounas (University of Southampton, United Kingdom)*

IMPROVING THE QUALITY OF EVIDENCE ON PRESSURE ULCER PREVENTION INTERVENTIONS: PROTOCOL FOR THE DEVELOPMENT OF A CORE OUTCOME SET FOR CLINICAL TRIALS (OUTPUT PROJECT)

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INTRODUCTION

In the evaluation of health interventions, the choice, measurement and reporting of outcomes affect the quality of evidence in many ways. To prevent respective quality threats, the development of core outcome sets (COS) is endorsed^{1,2}. However, a COS is lacking for the evaluation of pressure ulcer (PU) prevention interventions.

AIMS

The Outcomes for Pressure Ulcer Trials (OUTPUTS) project aims to develop a COS for trials evaluating the efficacy or effectiveness of PU prevention interventions.

METHODOLOGY

The project follows established methods for COS development¹ comprising four steps:

- (1) Scope definition – Through structured discussions the project team and supporting experts will establish the scope of the COS and identify relevant stakeholders for subsequent consensus-building.
- (2) Domain Consensus – To identify and reach consensus about the most important outcome domains, three successive studies will be conducted: (i) Scoping review of existing trials and outcome studies, (ii) Guided service-user workshop, (iii) Delphi study involving 6-12 international representatives per stakeholder group (appr. 5 groups expected).
- (3) Instrument/measurement Consensus – To identify and reach consensus about the preferred instruments for the measurement of prioritised outcome domains, following studies will be conducted in successive manner: (i) Systematic review of existing measurement instruments and their measurement properties, (ii) Guided service-user workshop, (iii) Nominal group study involving 2-4 international representatives per stakeholder group.
- (4) Dissemination/Implementation – A range of activities will be undertaken to promote the dissemination and implementation of the COS and ensure regular monitoring of newly emerging relevant evidence.

RESULTS

The project protocol will be presented and major methodological challenges will be discussed, especially with regard to the service-users' involvement.

CONCLUSION

OUTPUTS includes several strategies to strengthen the desired COS' validity and acceptance. It will improve the quality of further clinical PU prevention research and may also advance existing knowledge regarding service-users' preferences in this area.

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²Gargon E, Gurung B, Medley N et al. Choosing Important Health Outcomes for Comparative Effectiveness research: a systematic review. *PLOS one* 2014,9(6):e99111.

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OPTICAL COHERENCE TOMOGRAPHY IS A VALUABLE TOOL FOR PRESSURE ULCER RESEARCH

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INTRODUCTION

VivoSight Optical Coherence Tomography is a valuable tool for pressure ulcer research. Optical Coherence Tomography (OCT) is a laser-based 3-dimensional imaging technique capable of producing in-vivo morphological images and angiograms of skin with <10 mm resolution up to a depth of 2 mm.

AIMS

To demonstrate the utility of OCT for pressure ulcer research.

METHODOLOGY

We demonstrate some interesting OCT images and angiograms showing early and repeated examination of pathologies and treatment response.

RESULTS

OCT has proven capabilities for early diagnosis of skin cancers¹, replacing biopsy, and has enabled and simplified several research fields by facilitating longitudinal observation in dermatological², cosmetic, rheumatological^{3,4} and drug delivery research⁶.

CONCLUSION

We believe this tool has value in research into the diagnosis and treatment of pressure ulcers; we show here how and why."

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EFFECT OF SURFACE LIQUID PH ON SKIN BARRIER FUNCTION

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INTRODUCTION

The acidic pH of healthy skin plays an important role in maintaining cohesion of the stratum corneum (SC) and barrier function (Ali and Yosipovitch, 2013). Prolonged exposure to excessive moisture can lead to disruption of the skin barrier due to overhydration of the SC and a change in pH to alkaline levels. This can lead to inflammation, skin breakdown and incontinence-associated dermatitis (IAD) (Beeckman et al., 2015). However the exact relationship between urinary pH and skin barrier disruption has not been extensively studied in intact healthy skin.

AIMS

To investigate the effects of prolonged exposure to synthetic urine (s-urine) of varying pH on the barrier function of healthy skin.

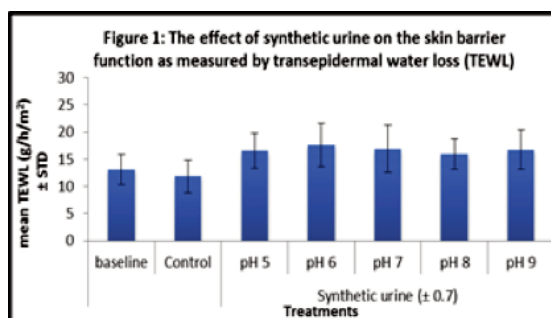
METHODOLOGY

Sixteen healthy volunteers participated in this study (aged 22-45 years). S-urine solutions based on those previously described (Mayrovitz and Sims, 2001) were applied to the volar aspect of the forearm for two hours and skin barrier function was assessed by transepidermal water loss (TEWL, MPA9, Courage & Khazaka, Germany), a measure of skin barrier function, was measured prior to (baseline) and after exposure to urine. One site served as the untreated control.

RESULTS

An increase in TEWL was seen following application of s-urine compared to both baseline and control values (Figure 1). Although TEWL was seen to increase with increasing pH this change was not significant.

CONCLUSION



Exposure to synthetic urine ranging from pH values of 5.0 to 9.0 resulted in an increase in TEWL and consequently disruption of the skin barrier function. Nevertheless, this does not seem to be pH-dependent, confirming previous studies suggesting that the presence of urine per se does not result in IAD (Voegeli, 2010). Also, this study was performed on healthy individuals with an inherent physiological buffering capacity, such that any pH effects on skin are rapidly diminished (Zheng et al., 2012). This provides a motivation for future work in which the barrier function is compromised by mechanical or chemical challenges or when testing elderly or damaged skin. This will lead to an increased understanding of the mechanisms underlying skin damage from excessive moisture.

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list can be obtained through contacting first author

POSTER PRESENTATIONS OVERVIEW

- 1) The pathology behind pressure ulcers: a systematic review, *Aglécia Budri*
- 2) Pressure ulcer prevention Sønderborg Municipality, Denmark, *Hanne Miang*
- 3) Bacterial flora of chronic wounds in patients with hyperbaric oxygen therapy - 6 weeks of observation, *Elzbieta Arlukowicz*
- 4) Diversity of microorganisms on the surface of venous ulcers - 6 weeks of observation, *Elzbieta Arlukowicz*
- 5) Challenges of conducting an audit of PU monitoring systems in NHS England, *Isabelle Smith*
- 6) The intermittent pneumatic compression (IPC) with a high pressure in reducing the skin fibrosis and lower limbs phlebolymphedema- a pilot clinical study, *Jakub Taradaj*
- 7) Evaluation of skin cell isolation for spray transplantation in an in vitro culture model, *Christa Johnen*
- 8) Preventing sores in pediatric patients submitted to ECMO, *Charlie Joseph, Charles Beetham*
- 9) Exploring simplified, canisterless negative pressure therapy in pediatrics: small patients, big deals, smart solutions, *Guido Ciprandi*
- 10) Characterization of the impact of peripheral neuropathy-associated diabetes on skin excision and pressure ulcer healing in a mice model, *Noelle Remoue*
- 11) Knowledge and practice of nurses towards prevention of pressure ulcer and associated factors in Gondar University Hospital, Northwest Ethiopia, *Nurhusien Nuru, Fisseha Zewdu*

THE PATHOLOGY BEHIND PRESSURE ULCERS: A SYSTEMATIC REVIEW

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INTRODUCTION

As a worldwide problem in many healthcare settings and community populations pressure ulcers affect patients decreasing their quality of life¹ and, especially older persons, increasing mortality². The main cause of pressure ulcers is pressure, sometimes in combination with shear, applied over a bony prominence distorting the natural anatomy of the soft tissues³. This review aims to explain the risk factors from the pathology's point of view to help healthcare professionals better understand the process and also critically identify why the risk factors increase patients susceptibility of a pressure ulcer.

AIMS

To explore the pathology and to identify the relationship between the pathological processes and the risk factors of pressure ulcer development.

METHODOLOGY

A systematic review of primary research including original studies involving human, animal, engineered tissue and finite element modeling. No time/date or language restriction will be placed. Inclusion criteria are original studies and studies with adults or older person. Exclusion criteria are studies evaluating the pathology of pressure ulcers using tests of efficacy of cushions or dressings. The search strategy involves a number of databases; Ovid MEDLINE, EBSCO EMBASE, CINAHL, Web of Science, Scopus, Cochrane Library. The review will be reported following the PRISMA Statement. The outcomes will be informed, categorised into domains and sub-domains and a narrative synthesis will be undertaken. The risk of bias will be appraised as well.

RESULTS

Until the present moment, 728 articles were retrieved on Ovid MEDLINE. 182 were selected for further scrutiny.

CONCLUSION

Most studies used experimental methods involving animal, engineered muscle tissue and finite element modeling on adults' population, but only very few studies addressed the pathology in the older population.

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PRESSURE ULCER PREVENTION SØNDERBORG MUNICIPALITY, DENMARK

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INTRODUCTION

The Implementation of pressure ulcer prevention took place in Sønderborg Municipality (76.000 citizen) in Denmark. The staff who participated in the project was nurses, nurse assistants and helpers.

AIMS

- All patients must have a pressure ulcer risk assessment at the admission to the Nursing Home or Home Care Services.
- This is repeated with a risk re-assessment if the patient's condition/needs change.
 - Acute illness
 - Discharge from hospital
 - Change in nutritional status
 - Changes in functioning
- Any patients who score 19 or less on the risk assessment are deemed to be at risk and should be put on the bundle.
- Bundle:
 - H – Skin: Inspect skin
 - U – Surface: Ensure patient is on the right mattress, cushion, with no creases or wrinkles
 - S – Mobilization, position switch, encourages self movement and repositioning.
 - K – Nutrition: Keep well hydrated, meet patient's nutritional needs

Every unit measures how they are doing in relation to this work every day.

We look at:

- Days since a pressure ulcer developed on this unit (Goal = 300 days)
- % compliance with pressure ulcer risk assessment and re-assessment (Aim=95 %)
- % compliance with (HUSK) - (Aim=95 %)

METHODOLOGY

We used the IHI's model for improvement.

RESULTS

The pressure ulcer incidences have decreased since we implemented the bundle. The work was developed and piloted on one unit before spreading to all Nursing homes and Home Care services. Days since a pressure ulcer developed on the piloted units at the Nursing Home and the Home Care Services are now over 300 days

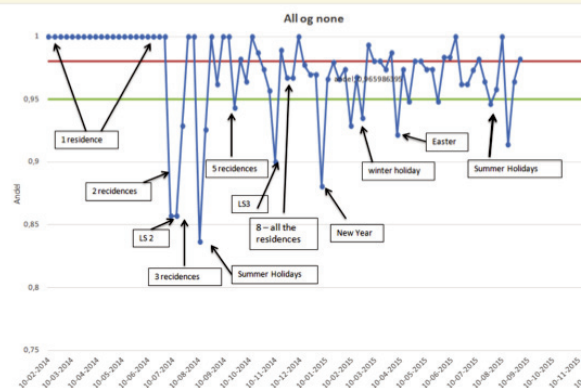
CONCLUSION

This improvement has been dramatic and sustained with almost no financial investment. It's important to keep it simple. After implementation of the bundle we do believe, that a zero tolerance for pressure ulcers is realistic.

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Compliance with (HUSK) - (Aim=95 %)



BACTERIAL FLORA OF CHRONIC WOUNDS IN PATIENTS WITH HYPERBARIC OXYGEN THERAPY - 6 WEEKS OF OBSERVATION.

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2 National Centre for Hyperbaric Medicine Institute of Maritime and Tropical Medicine in Gdynia, Medical University of Gdansk

INTRODUCTION

Chronic wounds are wounds, which have failed to heal through a period of 3 months. They are mostly seen in the lower extremities with vascular or diabetic background (98% of all lower extremity wounds). In general, local tissue hypoxia with repetitive ischemia-reperfusion injury is considered a common pathogenesis in a chronic wound development. Therefore the hyperbaric oxygen therapy (HBO) may be a solution in chronic wounds because of the influence on oxygen perfusion of tissues.

AIMS

The aim of the study is the observation of bacterial flora of chronic wounds in patients with HBO therapy.

METHODOLOGY

The observation of bacteria in chronic wounds was performed in 11 patients (pts) during six weeks of HBO. There were 3 pts with diabetic foot, 4 with venous ulcer, 2 with arterial ulcer and 2 with other causes of infection – posttraumatic wound and postoperative wound. Samples of the wound fluid (-Transwab – MWE) were taken and quantitative cultures were performed. Identification of bacteria was done by Maldi Tof (Bruker) mass spectrometry. The wound area had an average of 14,6 cm² , the time of wound duration was from 3 months to 42 years. The average patients' age was 70,1 years.

RESULTS

We cultured 28 bacterial strains. The most common was *Pseudomonas aeruginosa* (5 wounds) and *Staphylococcus aureus* (4 wounds). Three of 11 were colonised by cutaneous bacteria (*Staphylococcus epidermidis*). One wound was free from bacteria, 1 of 4 was colonised by 4 species (the average was 2,5).

The table describes bacterial quantity, diversity and the wound size in each patient group during 6 weeks.

	Venous	Arterial	Diabetes	Others
The quantity of bacteria	Unchanged	Unchanged	Unchanged	Reduction
Wound size	Reduction	Reduction	Unchanged	Reduction
The diversity of bacteria	Unchanged	Unchanged	Reduction	Reduction

CONCLUSION

The greatest effectiveness of HBO therapy was observed in patients with other kinds of wounds. Despite of the absence of the bacterial quantity changes in the wound, the size of the wound was also reduced in venous and arterial ulcers.

DIVERSITY OF MICROORGANISMS ON THE SURFACE OF VENOUS ULCERS - 6 WEEKS OF OBSERVATION

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INTRODUCTION

Wound infection is a significant problem in chronic wound healing process. It usually amplifies the pathology of skin and subcutaneous layer. Chronic venous insufficiency (CVI) is very common in Poland where it affects 38% of men and 51% of women. The venous ulcer is a characteristic sign of advanced CVI and occurs in 1,5% of population. Conditions in wound environment favour the adherence of bacteria just after few hours of venous ulcer developing. Microorganisms may remain in the wound without any signs of infection but a prolonged healing is observed in cases where bacterial concentration exceeds 10⁶CFU/ml of wound exudate.

AIMS

The aim of the study is to observe a diversity of microorganisms on the surface of venous ulcers during 6 weeks.

METHODOLOGY

The observation of bacteria in wound exudate was performed in 5 patients (pts) with venous ulcer during six weeks of hyperbaric oxygen therapy. The wound fluid samples were taken (-Transwab – MWE) and quantitative cultures were performed. Identification of bacteria was done by Biotyper (Bruker) mass spectrometry. The wound area had an average of 25,6 cm², the time of wound duration was from 4 weeks to 42 years. The average patients' age was 74,4 years.

RESULTS

During the observation only a local therapy with antiseptics and silver dressings was applied. Table 1 shows the bacterial concentration and their identification from wound exudates in studied patients.

Week	Patient1	Patient2	Patient3	Patient4	Patient5
1	1,3x10 ⁶	6,0x10 ⁷	6,5x10 ⁷	3,1x10 ⁹	0
2	1,1x10 ⁶	2,0x10 ⁷	3,0x10 ⁸	6,0x10 ⁸	0
3	1,6x10 ⁸	7,3x10 ⁶	1,2x10 ⁸	5,2x10 ⁸	0
4	7,7x10 ⁸	1,0x10 ⁷	3,8x10 ⁸	9,0x10 ⁷	<10 ³
5	6,1x10 ⁶	2,5x10 ⁷	1,0x10 ⁸	1,0x10 ⁸	0
6	0,5x10 ⁷	1,5x10 ⁹	1,1x10 ⁸	6,5x10 ⁷	0
Microorganisms	Serratia marcescens Helcococcus kunzii Streptococcus anginosus	Pseudomonas aeruginosa (PA)	PA Citrobacter Streptococcus agalactiae Enterococcus faecalis	PA Staphylococcus aureus (SA)	SA
Wound size	Unchanged	Enlargement	Reduction	Reduction	Healing

CONCLUSION

The only wound which fully healed in 6 weeks was the one without bacterial flora. A large quantity of bacteria in wounds had negative impact on the healing. The progress was observed in the 4 weeks old wound.

CHALLENGES OF CONDUCTING AN AUDIT OF PU MONITORING SYSTEMS IN NHS ENGLAND

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INTRODUCTION

The English NHS have monitoring systems to reduce pressure ulcer (PU) harm, including Safety Thermometer (STh) (prevalence), Incident Reporting Systems (IRS) and Serious Incident reporting (STEIS). We have previously presented our findings on the accuracy of current monitoring systems and the issues surrounding local implementation. This presentation focusses on the challenges around the methodology for assessing the accuracy of the current monitoring systems.

AIMS

The project aimed to compare current PU monitoring systems against a 'gold standard' PU and Wound Audit (PUWA).

METHODOLOGY

We worked with clinical staff to design the data collection forms to ensure that we could assess the accuracy of each monitoring system. This included recording the origin, current (and worst) category of all current PUs and the worst category of any healed PUs during that admission. The PUWA data was sealed prior to collecting data on current monitoring systems to ensure that data extraction from the monitoring systems was conducted blind to PUWA skin and record assessments. All data were collected in a single booklet to ensure that data could be compared for each patient and so that data returned were completely anonymised which meant ethical approval was not required.

To assess the accuracy and explore under- and over-reporting of the monitoring systems data were combined and restructured accordingly and this will be discussed in the presentation.

RESULTS

The accuracy of the Safety Thermometer were only evaluated on a patient level whereas other monitoring systems had the potential to explore accuracy at specific skin sites, but this was dependent on the practice at centres. The overall sensitivity and specificity of the tools are in table 1 and further detail from exploring the data will be presented.

Table 1 Overall accuracy of current monitoring systems

Reporting System	Sensitivity (95% CI)	Specificity (95% CI)
STh (weighted estimates)	48.2% (35.4%-56.7%)	99.0% (99.0%-99.0%)
IRS (unweighted estimates)	53.4% (46.3% to 60.4%)	98.3% (97.7% to 98.8%)

CONCLUSION

To evaluate the accuracy of tools used for clinical management of PUs, robust data collection and analysis methods are required.

THE INTERMITTENT PNEUMATIC COMPRESSION (IPC) WITH A HIGH PRESSURE IN REDUCING THE SKIN FIBROSIS AND LOWER LIMBS PHLEBOLYMPHEDEMA- A PILOT CLINICAL STUDY

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INTRODUCTION

The primary lymphedema and chronic venous insufficiency with present an important medical problem [1], and effective physical therapeutic methods to treat this problem are still at the search phase

AIMS

The aim of this study was to compare the efficacy of intermittent pneumatic compression (IPC) of a high- or placebo level in the treatment of skin fibrosis and phlebolymphecoma of the lower limbs

METHODOLOGY

A random selection for particular groups was carried out continuously throughout the duration of the study, that is, each new patient was subjected to randomization by computer random number generator using a Monte Carlo method, and based on the result of the draw, the patient was assigned to a given control group according to the CONSORT guidelines. The study included 41 patients with chronic venous insufficiency and primary lymphedema of the lower limbs. Group A consisted of 20 patients who underwent a monthly antiedematous therapy including a manual lymphatic drainage, multilayer bandaging, and IPC with the output pressure of 120 mmHg. Group B consisted of 21 patients who underwent the same basic treatment as group A and IPC with the output pressure of 0 mmHg (single blind placebo). To assess the volume of a limb, an optoelectronic Perometer 400 T was used. To measure the skin plasticity and fibrosis reduction a tonometer was applied

RESULTS

After completion of the study, it was found that the greatest reduction of edema occurred in patients who underwent treatment with a pressure of 120 mmHg. The comparison of percentage reduction of edema showed a statistically significant advantage of the group A over groups B, both for the changes in the right ($P=0.001$) and the left limb ($P=0.02$). Similar results were in skin tonometry

CONCLUSION

The IPC with the pressure of 120 mmHg inside the chambers effectively helps to reduce a phlebolymphecoma and significantly treat the skin fibrosis

REFERENCES

1. Farrow W.: Phlebolymphecoma-a common underdiagnosed and undertreated problem in the wound care clinic. *J Am Col Certif Wound Spec.* 2010 Apr 22;2(1):14-23

EVALUATION OF SKIN CELL ISOLATION FOR SPRAY TRANSPLANTATION IN AN INVITRO CULTURE MODEL

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INTRODUCTION

Intraoperative spray application of freshly harvested autologous skin cells is a promising treatment for a variety of acute and chronic wounds. Therefore, a method for efficient and fast isolation of skin cells and characterization of their regenerative capacity after spraying is needed.

AIMS

Aim of this study was to evaluate and optimize a previously established protocol for skin cell isolation with respect to the cell yield and viability, metabolic activity and cell growth. The isolation outcome and time required for cell separation was analyzed for different thicknesses of skin tissue. Further, the culture behavior of keratinocytes and fibroblasts sprayed into culture vessels using a novel spray device (SkinGun™) was analyzed in comparison to conventional cell seeding.

METHODOLOGY

Keratinocytes and fibroblasts were isolated from skin tissue remaining after surgical dissection. Epidermis and dermis were separated by dispase digestion performed at 37°C over various time periods. Subsequently, keratinocytes were isolated from the epidermis using trypsin/EDTA, and fibroblasts were harvested from the dermis by collagenase incubation. Isolated cells were seeded into culture vessels either by spraying using the SkinGun™ or by a pipette (control). The metabolic activity and proliferation capacity of cultured cells were assessed by glucose and lactate measurement, the cell morphology was evaluated by microscopic observation, and the cell integrity was determined by LDH release.

RESULTS

Both keratinocytes and fibroblasts were successfully isolated from skin tissue of variable thicknesses. The time needed for separation of epidermis and dermis via dispase digestion at 37°C varied between 0.5 and 3 h depending on tissue thickness (split skin or full skin). Keratinocyte and fibroblast cultures obtained by spraying showed a similar morphology and viability as the control cultures. The metabolic activity, as determined by glucose consumption and lactate release, indicates cell growth after seeding in both groups.

CONCLUSION

The results show that the described method allows isolating keratinocytes and fibroblasts with characteristics suitable for therapeutic applications. Use of the SkinGun™ for spray application of freshly isolated cells allows for even distribution of cells and does not impair the cell viability or growth in vitro as compared to conventionally seeded cells.

PREVENTING SORES IN PEDIATRIC PATIENTS SUBMITTED TO ECMO

Charlie Joseph Charles Beetham¹, S Filippelli², M. Zama³, Guido Ciprandi⁴

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3 Division of Plastic and Maxillofacial Surgery, Italy

4 Bambino Gesù Children's Hospital, Italy

INTRODUCTION

Hospitalization cost for children supported with ECMO is strongly increased because of severe associated wounds. These are main reasons for a longer stay, an increased patient's pain and distress as well as for parental anxiety.

AIMS

Seen that the pressure ulcer prevention is fundamental in order to limit both local infections and systemic episodes. Here is discussed a specific list of skin breakdown preventive measures and their role played in preventing ECMO-associated sore.

METHODOLOGY

12 children submitted to ECMO (or ECLS) during the last 18 month were submitted to an accurate preventing protocol in order to avoid pressure ulcers. No distinction is done between Veno- arterial and Veno-Venous types. Both general and specific risk factors were investigated with the aim to prevent pressure ulcers, pressure device related- sores, exit-site complications and hospital- acquired infections.

RESULTS

The five most important factors that contributed ($p < 0.001$) to lower from 65% to 18,7% the occurrence of pressure sores and associated local infections are: 1. sharing the child full assessment; 2. preventing severe hypotension in the operating theatre setting (OTs); 3. manual turnig/twisting procedures reduction; 4. increasing off- loading; 5. limiting the usage of vasopressor drugs.

CONCLUSION

An integrated Skin Care Team is necessary to face the multifaceted ECMO-related skin damages. Seen that the interaction among the members is the main cause of the statistically significant reduction observed. Particular attention must be paid to the Off-loading, maintenance of a correct TEWL, absence of friction and shearing devices. Low cost and high tecnology support surface based on a multistretching system should be preferred.

REFERENCES

Clements L, Reducing skin breakdown in patients receiving extracorporeal membranous oxygenation. *Nurs Clin North Am* Mar 2014; 49(1):61-8

EXPLORING SIMPLIFIED, CANISTERLESS NEGATIVE PRESSURE THERAPY IN PEDIATRICS: SMALL PATIENTS, BIG DEALS, SMART SOLUTIONS

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INTRODUCTION

Many causes can undermine children's skin integrity, but irrespective of whether the etiology is, any kind of healing treatment must be safe, efficacious, reducing stress and pain at dress changes, be easy for parents to handle with, permitting a faster restoration of social activities. Negative Pressure Wound Therapy applied with a simplified, canisterless portable devices is used to treat a kaleidoscope of wounded children.

AIMS

Reaching a confident use of this technique, increasing its diffusion among pediatric population, enlarging its application fields.

METHODOLOGY

75 children aged less than 10 yrs, selected according to inclusion and exclusion criteria were enrolled in this perspective study. (inclusion/exclusion criteria shown on table 1)

RESULTS

No device was broken neither sabotaged by children, whose showed a great concordance and tolerance to sNPWT, no migration to other treatment occurred. All but one patient, 95%, showed a complete reepithelialization. The follow up showed no relapse and stable healed tissues. No complications were faced, neither bleedings and pain at removal.

sNPWT, thanks to its efficacy and safety, can be used to treat fragile small babies as prematures and neonates are, in these cases it might be necessary reduce the dressing size, preserving its functionality.

CONCLUSIONS

Portable, sNPWT, both with mechanical or electrical pumps, must be considered a proper treatment for selected, moderately exudating, 1st grade infected pediatric wounds. sNPWT showed to reach positive effects in managing costs, reducing inpatients number by helping an early discharge, without short/long-term complications and it revealed itself as perfectly matching pediatric needs: simplicity, portability, painless, helping a prompt healing (PROS AND CONS, shown on table 2). Finally we applied this treatment to all selected children, from newborns to adolescents, whatever the etiology of the wound was.

REFERENCES

Payne C, Edwards D. Applications of The Single use negative Pressure Wound Therapy Device PICO on a Heterogeneous Group of Surgical and Traumatic Wounds. *EPlasty* 2014;14:e20.

Stryja J, Staffa R, et al. Cost effectiveness of negative pressure wound therapy in outpatients setting. *Ceskoslovenske Chiruricke Spolecnosti*. 2015;94(8):322:8.

EXCLUSION CRITERIA

- LACK OF COOPERATION
- NEGATIVE PSYCHOLOGICAL EFFECTS
- REFUSE TREATMENT
- HIGH RISK OF BLEEDING
- SUPERFICIAL WOUNDS
- IF DEBRIDEMENT IS PREVIOUSLY REQUIRED
- EXPOSED VESSELS, NERVES, ORGANS
- NECROSIS, ESCHAR NOT TREATED YET
- UNTREATED OSTHEOMYELITIS
- UNEXPLORED ENTERIC FISTULA

INCLUSION CRITERIA

- WOUND SIZE:
<3CM OF DEPTH, <5CM DIAMETER
- NO REPORTED ALLERGIES TO SILICON
- INTEGRITY OF PERILESIONAL SKIN
- DEEP BURN INV.
- HIGH STAGE PRESSURE ULCERS
- TRAUMATIC WOUNDS
- 1ST GRADE INFECTED WOUNDS
(INCLUDING MRSA, PSEUDOMONAS)
- NECROTIZING FASCITIS

sNPWT PORTABLE, CANISTERLESS DEVICE

PROS:

- < DEVICE RELATED COSTS
- >PATIENT'S TOLERANCE
- >>OUT-PATIENTS NUMBER
- NO PATIENT'S FUNCTIONAL LIMITATION
- << DRESSING CHANGE TIME REQUIRED
- < PAIN REFERRED AT DRESSING CHANGE
- ALMOST NO ADVERSE REACTION

CONS:

- LIMITED DURATION (ASPIRATION PUMP EXPIRE)
- NO MODULATION OF PRESSURE REGIMEN
- MULTIPLE LESIONS
- TOO WIDE OR TOO EXUDATING WOUNDS

CHARACTERIZATION OF THE IMPACT OF PERIPHERAL NEUROPATHY-ASSOCIATED DIABETES ON SKIN EXCISION AND PRESSURE ULCER HEALING IN A MICE MODEL

Noelle Remoue¹, Bouschbacher Marielle², Dominique Sigaud-Roussel¹

¹ Ibcp - Cnrs 5305, France

² Laboratoires Urigo, France

INTRODUCTION

Diabetes is one of the most worsening factors for skin ulcer healing; however only few studies using animal model looked at the wound closure time and quality/functionality of the newly formed tissue.

AIMS

The present study aims to analyze, in a streptozotocine (STZ)-induced diabetic mice, the influence of both diabetes and peripheral nerve fibers degradation 1) on skin compression, 2) on the healing time process, 3) on the quality of the healed skin.

METHODOLOGY

C57Bl6 male mice were randomly assigned to vehicle (control mice) or STZ intra-peritoneal injection. Diabetic status of STZ injected-mice was confirmed by 48h post-injection hyperglycaemia. Tail Flick latency (TFL) and motor nerve conduction velocity (MNCV) were measured to assess peripheral neuropathy. At 8 week-post-injection, we performed several cycles of skin compression using magnets (Stadler et al., 2004) to induce skin pressure ulcer (Fig. 1A, 1B) in the two groups of mice. The wound healing process was followed by skin imaging and histological analysis until wound closure.

RESULTS

Both TFL and MNCV were affected in 8wk-diabetic mice, highlighting severe neuropathy. Skin ulcer severity increased proportionally to time exposure of magnet in both groups. Histological analysis following pressure application revealed cutaneous muscle degradation by inflammatory cells, dermis disorganization and epidermis damages. The experimentations are still on going, and since the closure time post-excision raised by 1.5 fold in diabetic compared to control mice, we expect an increased closure time post-compression in diabetic mice associated with a decrease in skin quality compared to control mice.

CONCLUSION

This study suggests that peripheral neuropathy-associated diabetes impairs both skin resistance to pressure and wound healing, contributing to decrease the functionality of the newly formed tissue. The physiological and biochemical mechanisms involved in those diabetic processes have still to be investigated.

REFERENCES

Stadler, I., Zhang, R.-Y., Oskoui, P., Whittaker, M.B.S.S., and Lanzafame, R.J. (2004). Development of a Simple, Noninvasive, Clinically Relevant Model of Pressure Ulcers in the Mouse. *Journal of Investigative Surgery* 17, 221-227.

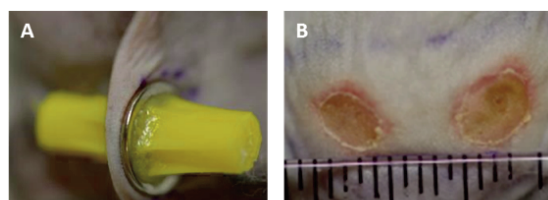


Figure 1: Method to induce skin pressure ulcer. A/ Skin fold between 2 magnets, B/ Skin pressure ulcer 4 days after.

KNOWLEDGE AND PRACTICE OF NURSES TOWARDS PREVENTION OF PRESSURE ULCER AND ASSOCIATED FACTORS IN GONDAR UNIVERSITY HOSPITAL, NORTHWEST ETHIOPIA.

*Nurhusien Nuru, Fisseha Zewdu**

Senafkish Amsalu, Yohannes Mehretie

**Department of nursing, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.*

INTRODUCTION

Pressure ulcers are the common conditions among patients hospitalized in acute and chronic care facilities and impose significant burden on patients, their relatives and caregivers. Pressure ulcers have been described as one of the most costly and physically debilitating complications since the 20th century. The pain and discomfort due to pressure ulcer prolongs illness, rehabilitation, time of discharge and even contribute to disability and death.

AIMS

This study was aimed to assess knowledge, practice and factors associated with pressure ulcer prevention among nurses in Gondar University Hospital, North-west Ethiopia.

METHODOLOGY

An institution-based cross-sectional survey was conducted from March 15 - April 10, 2014 among 248 nurses in Gondar University hospital. A structured self-administered questionnaire was used for data collection. Descriptive statistics was used to describe the study population. Bivariate and multivariate logistic regression was also carried out to see the effect of each independent variable on the dependent variable.

RESULTS

In this study nearly half (54.4 %) of the nurses had good knowledge; similarly 48.4 % of them had good practice on prevention of pressure ulcer. Educational status, work experience and having formal training were significantly associated with knowledge on prevention of pressure ulcer. While, satisfaction with nursing leadership, staff shortage and inadequate facilities and equipment were found to be significantly associated with the practice on prevention of pressure ulcer.

Conclusion and recommendation: Knowledge and practice of the nurses regarding prevention of pressure ulcer was found to be inadequate. Having higher educational status, attending formal training and being experienced were positively associated with knowledge; while shortage of facilities and equipments, dissatisfaction with nursing leadership and inadequate staff number showed negative association with practice of nurse's pressure ulcer prevention. In-service training and upgrading courses are some of the important steps to improve nurses' knowledge and practice on prevention of ulcer pressure.

REFERENCES

1. Bours G, Halfens R, Abu-Saad H, Grol R. Prevalence, prevention, and treatment of pressure ulcers: descriptive study in 89 institutions in the Netherlands. *Res Nurs Health*. 2002;25(2):99–110.
2. Shiny V: Prevention of pressure ulcer for immobilized patients among care givers in Bapuji Hospital. *Medical Surgical Nursing* 2008:48

GENERAL INFORMATION



VENUE

Kaiserin Friedrich-Haus
Robert-Koch-Platz 7
10115 Berlin
Germany

EPUAP BUSINESS OFFICE

Tel: +420 731 555 750
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CONFERENCE HOURS

Monday 4 April

11:30 – 17:30 Registration
13:00 – 13:20 Opening ceremony and welcome
13:20 – 17:30 Scientific sessions
13:00 – 17:30 Commercial exhibition
17:45 – 19:00 Guided tour at the Clinical Research Center for Hair and Skin Science
Guided tour of the Berlin Museum of Medical History at Charité University

Tuesday 5 April

08:30 – 16:00 Registration
09:00 – 16:00 Scientific sessions
09:00 – 16:00 Commercial exhibition
16:15 – 17:15 Guided tour at the Clinical Research Center for Hair and Skin Science
Guided tour of the Berlin Museum of Medical History at Charité University
19:30 Focus Meeting Dinner

Wednesday 6 April

08:30 – 10:00 Registration
09:00 – 13:00 Scientific Sessions
09:00 – 13:00 Commercial exhibition
12:45 Lunch and farewell

TAXI

There is a taxi station right in front of the venue. More information about taxi services in Berlin will be available at the registration desk.

CERTIFICATES OF ATTENDANCE

All participants will receive their certificate of attendance on site on 6th of April.



CME – CONTINUED MEDICAL EDUCATION

The EPUAP Focus Meeting has been accredited by the European Accreditation Council for Continuing Medical Education (EACCME). The 3rd Focus Meeting of the European Pressure Ulcer Advisory Panel is designated for a maximum of, or up to 11 European CME credits (ECMEC).

In order to obtain the CME credits, your attendance must be verified for each of the days that you wish to obtain the credits. In order to verify the attendance please go to the registration desk every day after 15 pm Wednesday and Thursday and after 10 pm on Friday. A certificate with your CME credits will be issued after the conference and it will be sent to you by email.

ENTITLEMENTS

- Final programme and abstract book
- Admission to the full conference programme, coffee breaks & buffet lunch
- Guided tour at the Clinical Research Center for Hair and Skin Science (registration required)
- Guided tour of the Berlin Museum of Medical History at Charité University (registration required)

LANGUAGE

English

CONFERENCE WEBSITE

www.focusmeeting2016.org

CLOAKROOM

The cloakroom is located on the ground floor, near the registration area. Please follow the signs or ask the staff at the registration desk for information. The cloakroom is unattended.

LUNCH AND COFFEE BREAKS

Lunch and coffee breaks will be served in the exhibition areas located on four levels.

INFORMATION FOR SPEAKERS

All presentations will be uploaded to the conference laptop on the day of the conference. There will be a technician present in the meeting room who will help you to upload your presentation. Please make sure you upload your presentations during the coffee or lunch break, latest 2 hours prior to the session. Presentations taking place in the morning sessions can be uploaded on the day before.

We do not allow the use of personal laptops for presentations. Please bring your presentation on a memory stick. At the end of the conference, all presentations will be deleted so no copyright issues will arise.

MEETING ROOMS

1st floor (ground floor)

Registration and exhibition area

2nd floor GF Zimmer 116

Exhibition area, poster area

3rd floor Plenarsaal

Plenary hall, exhibition area

4th floor Club room

Poster area, exhibition area

Coffee and lunch break will be served in the exhibition areas. Catering stations will be located on all 4 levels of the venue.

EXHIBITION

Poster area

The posters will be located on two levels: GF Zimmer 116 on the 2nd level and Club room on the 4th level.

The posters should be set up on Monday 4th of April from 11:30 – 13:00. Equipment for setting up the posters will be provided at the registration desk upon request. Assistance will be available in the poster area during the time period mentioned above.

The authors should be available in the poster area during the coffee and lunch break to provide more information or to answer to questions from delegates attending the meeting.

The conference secretariat takes no responsibility for damaged or left posters.

INTERNET AND WIFI

Free WiFi is available through the venue. Access to WiFi / log in details will be available at the registration desk.

CONFERENCE DINNER

The conference dinner will be held at Gendarmerie Restaurant, located in the city centre. More information about transportation will be available at the registration desk.

Date: 5 April 2016
Time: 19:30
Venue: Gendarmerie Restaurant
Address: Behrenstraße 42, 10117 Berlin, Germany



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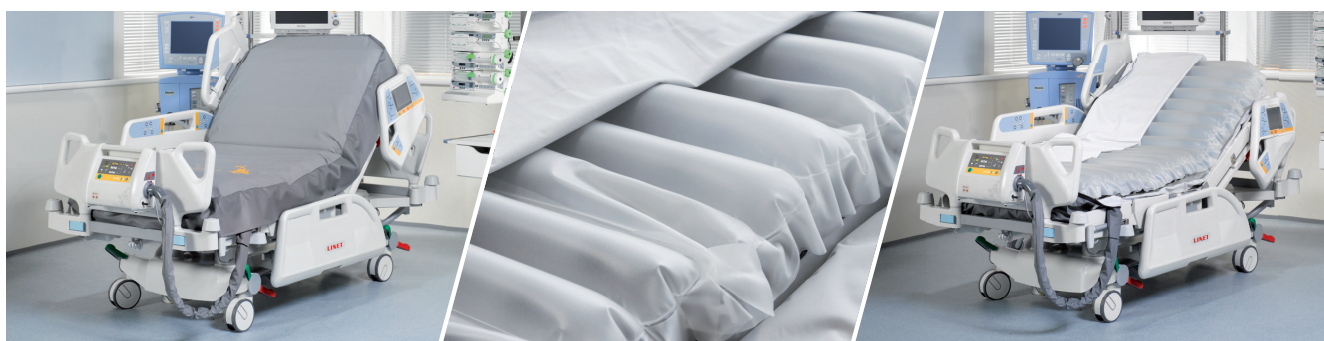
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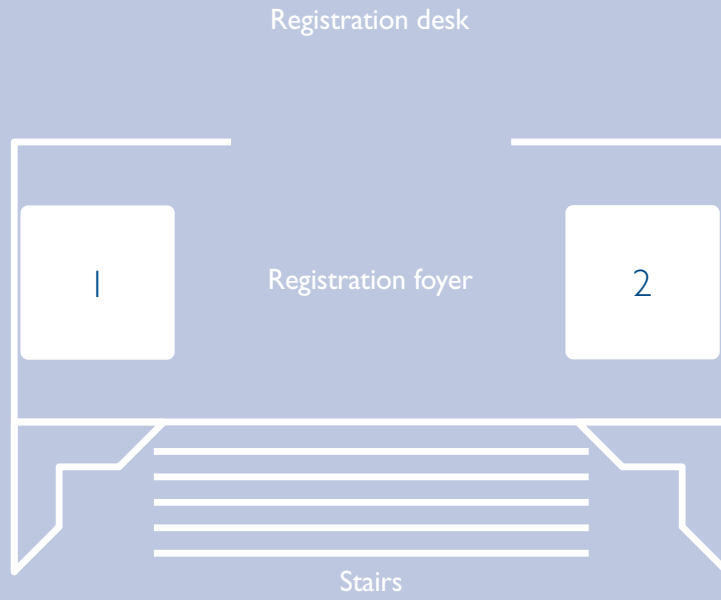
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EXHIBITION PLAN
1ST FLOOR

MEETING ROOM:
REGISTRATION FOYER

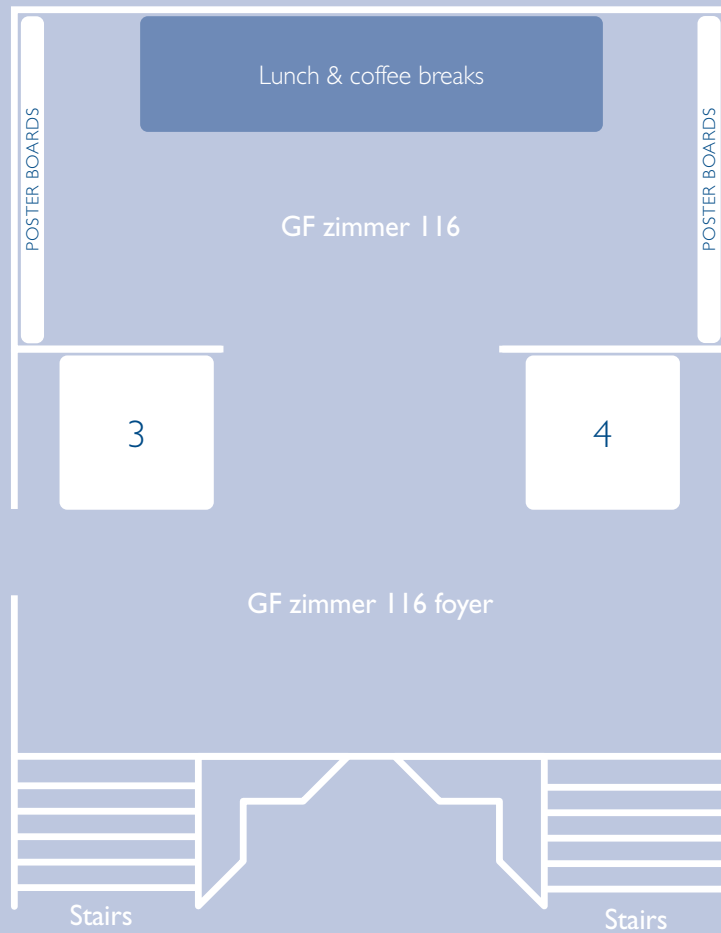
EPUAP	1
EWMA	2

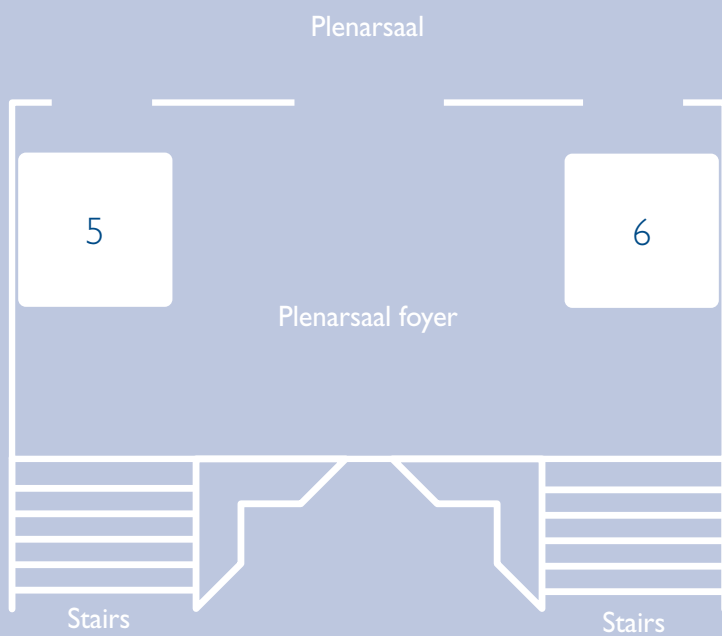


EXHIBITION PLAN
2ND FLOOR

MEETING ROOM:
GF ZIMMER 116
ROOM AND FOYER

Mölnlycke	3
Smith & Nephew	4

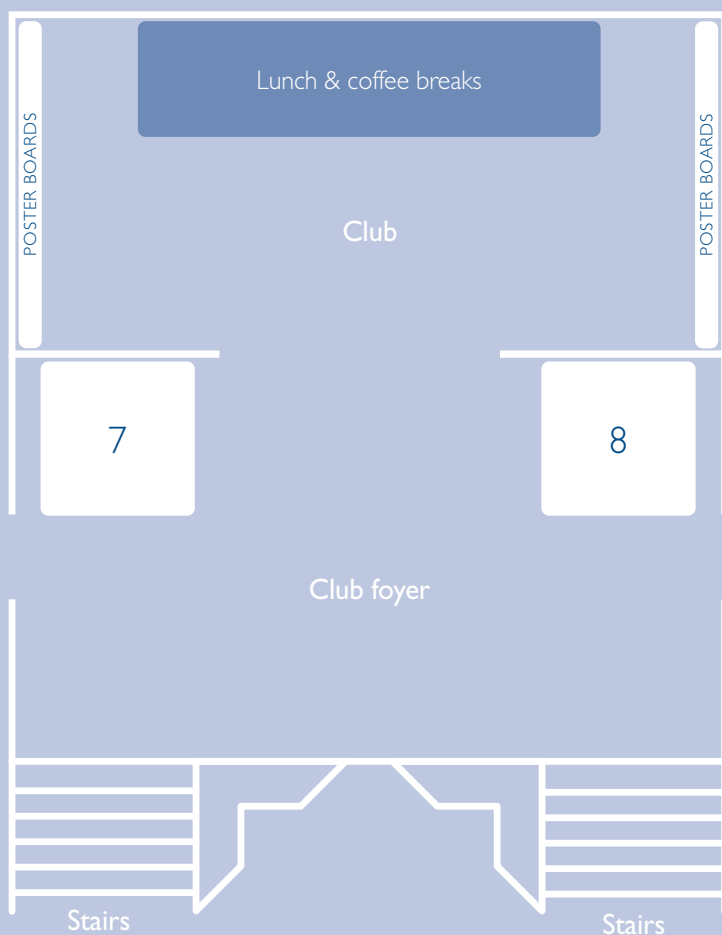




EXHIBITION PLAN
3RD FLOOR

MEETING ROOM:
PLENARSAAL FOYER

3M	5
Levabo	6



EXHIBITION PLAN
4TH FLOOR

MEETING ROOM:
CLUB ROOM
AND FOYER

Stryker	7
Care of Sweden	8

