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### Audit of the use of a new silver dressing in clinical practice

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**Aim:** To audit the use of a new silver dressing in clinical practice.  
**Introduction:** Wound infection remains a critical problem, and the increase in hospital acquired – infections in recent years has given the issue even greater urgency. As the use of topical microbial agents to combat infection is seen by many to be controversial, the recent availability of silver containing dressings is of particular interest. This audit was designed to determine the effect of making available a new silver dressing (ACTICOAT\* Absorbent) in a busy outpatient clinical facility.

**Methods:** This study prospectively collected data on its use over a 6 week period where no other topical anti-microbial was to be used. During this period 28 patients were treated with the dressing – where normal practice is to use a topical antimicrobial when features of local infection are present (Cutting & Harding, 1994). This amounts to 5 % of all patients seen during the same period (563). The wounds that were treated included post surgical (9), diabetic foot ulcers (4) and leg ulcers (15).

**Results and discussion:** Follow up of these patients identified that 50 % of patients reported a decrease in wound pain whereas only 10 % of patients reported an increase in pain following the use of this dressing. Of the 2 patients who were known as MRSA positive at the commencement of treatment, one of these patients completely healed while the other had no observable signs of clinical infection during the study period; neither patient required systemic antibiotics. The patients were reviewed 6 weeks after starting this new treatment. At that time 64 % had healed or improved, whereas only 7 % had deteriorated and in 25 % no improvement was noted. This audit illustrated the potential and impact of using a silver containing dressing in clinical practice and the need for further work to accurately select patients who may benefit from such treatment. \*Trademark of Smith & Nephew

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### Comparison between three methods for measuring wound surface

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**Introduction:** Wound surface is stated as a prognostic value for evolving towards wound healing. There are different methods

to determine a wound's surface. We conduct this study to determine the reliability degree inter and inter-observer if 3 methods for measuring wound surface.

**Methods:** A study is designed with repeated measures. 5 pressure ulcers of different sizes, stages and localization are randomized. 3 independent observers took 3 measurements with three different methods: surface estimation length x width (lineal measurement), estimation by digital photography with computerized program with "Mouseyes" and the third method consisted of estimation with "Visitrak digital" (laboratory Smith&Nephew). Data analysis: measures, variation degree and Pearson's correlation degree, variance analysis of repeated measures, marginal measures graphics and box diagrams for the measure and the variation coefficient. Due to the sample size, only descriptive data were studied.

**Results:** to reflect the results we present 2 overall graphics:

Figure 1: P 182 Variability.

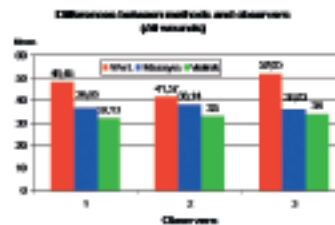
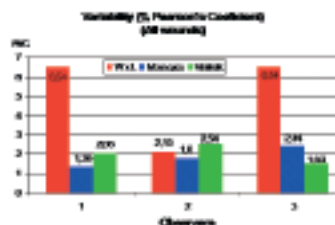


Figure 2: P182 Mean Differences.



**Conclusions:** Considering a descriptive point of view, there are differences in the averages and variation degrees (variability) intra and inter-observers and among methods. If we take into account the exactness, from most to least we establish the following order: digital image, Visitrak digital and length x width. If we consider the easiness of use in normal practice and the time used to make the measurements, Visitrak is the most advantageous. Due to the lack of a "Gold standard" for surface measurements we cannot establish which method is the most reliable.

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## Evaluating a hydrofibre dressing on a patient with complex healing

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**Aim:** To evaluate the performance of a hydrofibre dressing with ionic silver in a patient with challenging wounds and a complex medical history

**Methods:** Mr H a 50 year old man was admitted to an acute hospital with deteriorating health. He had a complex medical history which included monoclonal gammopathy of undetermined significance with subsequent chronic sensory and autonomic neuropathy; Post Traumatic Stress Disorder; amyloid disease with chronic diarrhoea. He was also extremely underweight with a Hb of 8.4. He presented with 2 wounds

**Wound 1:** a large wound on the lateral aspect of the right lower leg. Wound base was 100 % necrotic with low levels of exudate, healing had been delayed and the wound appeared to be critically colonised

**Wound 2:** an undermined pressure ulcer on the right hip. The wound base was 70 % sloughy, 10 % necrotic with copious amounts of purulent exudate.

Wound 1 was treated 3 days with silver sulphadiazine then both wounds were treated with a hydrofibre dressing with ionic silver.

**Results:** At week 8: Wound 1 had a granulating base with evidence of epithelialisation. Wound 2 also has a granulating base and produced low levels of serous exudate.

**Conclusions:** In this patient with a complex medical history and challenging wounds, a hydrofibre dressing with ionic silver (AQUACEL Ag) assisted in progressing the wound to healing. To assist with the patient's needs there was an involvement with a multidisciplinary team who also aided with the overall outcome.

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## Centralized management of pressure relieving surfaces. Epidemiological impact.

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**Introduction:** The use of pressure relieving surfaces (PRS) is a basic measure both on prevention and treatment of pressure ulcers (PU). Even their acceptance is important, their use in hospital environment in our country is scarce. Taking into account that an improvement of preventive measures and the increase of PRS at hospital level, could result in a decrease of PU we planned a

prospective study with three objectives in an university general hospital: A) Describe the PRS models at hospital and determine their use according to Braden scale. B) Assess the evolution of epidemiologic data bi-monthly in 2005 and compare them with 2004. C) Check the effectiveness of centralized management in terms of incidence.

**Methods:** Prospective survey for PRS and bi-monthly Prevalence and incidence data were conducted. All PRS are counted by direct observation. New design on PRS management was created according to Braden scale, following scientific standards as well as PRS models available at the hospital.

**Results:** On observation day there are a total amount of 53 PRS, distributed on 16 at high risk, 9 medium risk and 28 at low risk. The document about the focus normative is agreed, and a PRS circuit is established with the assignment table (Table 1).

Table 1: P 184

BRADEN RISK SCORE LOW >16	BRADEN RISK SCORE 13-15	BRADEN RISK SCORE HIGH <12
overlay of alternating air or static systems	overlay with alternating air	alternating air mattress, high quality offer

The epidemiological data of 2.004 set a prevalence of 9,27 % (131/1455 patients) with an incidence of 6,73 % (74,85 % of patients with PU had developed them at the hospital facility). At risk population according to Braden scale was 33,24 %. Epidemiological costs measured bi-monthly had a significant decrease on the origin of patients with PU, maintaining prevalence and at risk population, according to Braden (Table 2).

Table 2: P184

	May 04	Jan 05	March 05	May 05	July 05
at risk population	33,24 %	32,9 %	33,53 %	not due	not due
prevalence	9,27 %	7,23 %	8,76 %	not due	not due
hospital originated (incidence)	74,85 %	57,7 %	53,7 %	not due	not due

The resolution to assign a PRS according to risk values from Braden scale, jointly with a rotating assignment distribution and the investment, has increased both demand and adjudication (table 3)

Table 3: P184

demand	total	assigned according to risk	% Pt. with adequate PRS
December	76	65	85.5
January	90	79	87.7
February	119	105	88.2
March	128	115	89.8
April	137	124	90.5

*Conclusions:* PRS have proven a high effectiveness to decrease of PU incidence. A rational use of resources increases the capacity to set preventive measures. Investment in PRS has to be a priority on implementing any PU prevention program. Distribution of PRS according to patient risk determines the prevention quality.

## P 185

### **Healing of an acute obstetric wound using a topical antimicrobial dressing**

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*Aim:* To achieve better outcomes using a multidisciplinary approach combined with an appropriate dressing to enhance healing.

*Methods:* A 32 year old primagravida of petite stature sustained an extensive perineal tear after a relatively short second stage of labour and subsequent SVD of a healthy baby. Assessment in theatre revealed a torn external anal sphincter, paraurethral tear and vaginal lacerations extending towards lateral fornices. Silk sutures were used to repair the wound at the time of surgery however difficulties arose and massive haemorrhage occurred with major blood loss > 5 litres. Immediately postop intervention radiology was performed. At 3 weeks post natal the wound dehissed and at this point the tissue viability nurse became involved. Wound assessment found a clinically infected and sloughy wound with purulent exudate present. Granulation tissue was minimal. Antibiotics were commenced. Nutritional and psychological assessment were also carried out. Following discussion with the patient and consultant regarding the risks of possible urinary contamination, the decision was made to insert an indwelling foleys catheter with a valve to minimise the risks of long term bladder tone complications. An absorbent antimicrobial dressing (Aquacel Ag) was applied to the wound bed with additional layers of secondary dressing (Aquacel) applied over.

*Results:* The wound was reviewed weekly by the consultant, midwife and tissue viability nurse. In between visits the district nurse dressed the wound daily. At week 2 following assessment there was visible healing with minimal amounts of sloughy tissue present. Clinical infection was still evident and following wound cultures the antibiotic regime was changed accordingly. Daily dressings continued and physiotherapy to strengthen pelvic floor muscles commenced. At week 4 the catheter was removed. By week 6 the wound had almost completely healed.

*Conclusions:* The choice of a topical antimicrobial dressing (Aquacel Ag) combined with an effective and sensitive holistic, multidisciplinary approach to care were undoubtedly major components in achieving success and good clinical outcomes for this patient.

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### **Open non-randomized clinical assessment of an emulsion of hyper-oxygenated fatty acids in different patients with vascular wounds – preliminary results**

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*Introduction:* Recently, commercially has appeared a new product: an emulsion of Hyper-oxygenated Fatty Acids (HFA), Aloe barbadensis and Mimosa tenuiflora. HFA have shown an action on the maintenance of the skin properties as a barrier (hydration, grease environment, increased of epidermis proliferation and support skin function as a barrier against moisture loss) as well as an improve on microcirculation at the bed of superficial capillaries. To assess the effectiveness of this new product in patients with vascular wounds to take care of the perilesional skin and prevent the recurrences has been design an open, non-comparative clinical study.

*Methods:* Between April and October 2004, 70 patients have been included in this study which has a follow-up period of one month. The patients have been attended at three different medical centers. Mean age of all the patients was 71 +/- 14.9 (SD) years. Inclusion parameters were to take care of perulcer skin of a vascular ulcer (65.7 %), of a diabetic foot ulcer (8.6 %) and skin care of other different situations (25.7 %). The product was applied at an average of 2.19 +/- 0.51 times a day and once a week on patients using multi-layer compression systems.

*Results:* None of the 70 patients in the study developed new ulcers on healthy skin protected with the product. All the symptoms associated improved in a high percentage of the cases: itching (98 %), burning (96 %), pain (98 %), skin colour (96 %), oedema (91.4 %), maceration (95.8 %), erythema (93.3 %) and peeling (100 %). The professional's opinions about the product have been very good: for its comfort, tolerability, absorption and for its easiness of application. This emulsion of HFA will be recommended for the 90.9 % of the professionals and for the 90.3 % of the patients.

*Conclusions:* These preliminary results shown us the benefits of the systematic use of this emulsion of HFA, Aloe barbadensis and Mimosa tenuiflora : alleviates the previous symptoms of a leg ulcer (avoids the skin dryness, reduces itching, burning, eczema and returns the skin's normal colour) and prevents the recurrences. Nowadays, the lack of a specific product for preventing leg ulcers and treating its perilesional skin gives an especially importance to the results of this study.

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## ***The use of mepilex border in a patient with postoperative wound complication (necrosis of the edge) after reconstruction of a femoralis with autovein***

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Often postoperative wound healing is complicated by skin necrosis at places where the operative intervention, e.g., mechanic necrectomia, is contraindicated due to mechanic damage or infection risk of the bypass graft. Main problems in such patients: the risk of infection; the risk of mechanic damage of the bypass graft; difficult place for wound dressing due to localization, care, hair; patient self-care problems; the necessity of the out-patient care and monitoring. Test period: from December, 2004 till February, 2005. Patient J, 69 years old, after reconstruction of a femoralis with autovein. Wound in the inguinal region  $7.5 \times 5.0 \times 1.5$  cm with uneven edges, covered with yellow fibrin, severe serous exudation. Edema of the lower extremity, pulsation of a dorsalis pedis has returned after surgery, but it is difficult palpable due to edema. Local therapy: wound dressing with Mepilex Border at the start of therapy once every 2 days. The only proper solution for the treatment of arterial trophic ulcer is elimination of the etiologic factor – improvement of microcirculation, reconstructive surgery of blood vessels. But local therapy of trophic ulcer is necessary both before and after reconstruction. Main problems in such patients: pain during wound dressing, little exudation from wound, the wound dries up rapidly resulting in necrosis, the wound should be protected against infection, to favor wound healing. Test period from February 2005 till May 2005. Patient V, 52 years old, smoker (20 cigarettes/day). Trophic ulcer in the region of medial ankle  $5.5 \times 4.0$  cm with uneven edges, fibrine on the bottom of the ulcer, little serous exudation, wound dressing painful. Claudicatio intermittens 100 m. No pulsation on peripheral blood vessels, over a. femoralis – systolic murmur. Brachy-ankle index 0.47. Apr-14, 2005 - femoropopliteal bypass surgery with a synthetic prosthesis. After reconstructive surgery pulsation of a dorsalis pedis is renewed, continued treatment in the out-patient department. The ulcer has healed up within 3 weeks.

**Conclusions:** The use of Mepilex Border allows to reduce pain during wound dressing significantly; allows to treat ulcer taking into account wound treatment principles; allows to take care of arterial trophic ulcer both before and after reconstructive surgery; rapid ulcer epithelialization after reconstruction; Mepilex Border was started immediately after superficial necrectomia and it has been used for all healing period up to complete healing of the wound; cost effective during treatment period; improves quality of life of the patient.

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## ***Clinical study using hydrocolloid dressings with hydroactive ionic silver in the treatment of chronic wounds***

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**Introduction:** A multicentric, prospective, open and comparative study was designed to evaluate the performance of an antibacterial hydrocolloid dressing with hydroactivated silver, when used to activate the healing process in wounds with high bacterial load, clinical signs of infection or malodour. Additionally, once the wound bed was appropriately prepared, a comparison in terms of efficacy was made to a standard moist wound healing treatment using dressings without silver.

**Methods:** 43 patients with chronic ulcers were included, and divided into two parallel treatment groups: In group A (19), an antibacterial hydrocolloid dressing was used until complete wound healing or for a maximum of 10–12 weeks, and in group B (24) the antibacterial hydrocolloid dressing was used until the wound showed signs of positive evolution, at which moment the treatment was continued until complete healing or for a maximum of 12 weeks with dressings without silver and designed specially for the proliferative phase of healing.

**Results:** The following parameters were studied: relative ulcer area reduction, wound bed preparation in terms of exudate and odour decrease, and quality of life based on pain evaluations. The results obtained indicated that the use of the antibacterial hydrocolloid dressing prepared the wound bed and increased healing, effectively reducing pain and malodour. The relative reduction of the ulcer area was 51,3 % in the group A and 69,7 % in the group B. The Q&L index, determined both at the beginning and the end of the study, showed significant improvement mainly due to the pain reduction. Additionally, according to the evaluation by the professionals, in 87,4 % of the records the use of the antimicrobial dressing was rated as easy or very easy.

**Conclusions:** The results indicate a good performance of antibacterial hydrocolloid dressings in highly colonised wounds with low to moderate exudation. The study also shows that when a clean wound bed is obtained, the use of a dressing without silver will facilitate healing. The effective wound bed preparation and the improvement in the Q&L index indicate that both of the evaluated treatments options are adequate although the combined treatment in group B indicates a better cost/efficacy.

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## ***The differential diagnostic spectrum of lower limb ulceration: the exact diagnosis is essential for causative therapies***

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More than 80 % of chronic lower limb ulcerations are caused by vascular diseases. Nevertheless the differential diagnostic spectrum spans many diseases, from venous hypertension to arterial diseases, skin cancer, peripheral neuropathy, infections, trauma, drugs, genetic alterations and to other skin conditions such as pyoderma gangraenosum and necrobiosis lipoidica. To enable a causative and therefore most effective therapy it is important that all differential diagnoses are considered, a vascular status has to be obtained, and often punch biopsies have to be taken. Here we present four examples of rare differential diagnosis from the dermatological outpatient clinic. Case 1: an ulcer induced by arterial hypertension, as it was first described by Martorell, is presented. After exclusion of significant arteriosclerosis, diabetes, venous hypertension and neuropathy the existing hypertension was considered as predominant reason for the ulceration. After 4 weeks of sufficient antihypertensive treatment the Martorell ulcer healed, underlining the importance of a causative therapy. In case 2, multiple localized small ulcers occurred on the lower limb. The punch biopsy revealed cholesterol embolism leading to occlusion of the cutaneous arteries. Arteriosclerosis was known, but no surgical or vascular intervention was performed prior to the development of the ulcers. A symptomatic therapy was applied and led to healing of the ulcers within several weeks. In case 3, ulcers induced by hydroxyurea were suspected, since the vascular status was normal and no other reason for the ulcers could be found. Since hydroxyurea was able to control an underlying myeloproliferative disease for several years, oncologists were initially reluctant to change the therapy regime. More and more ulcers appeared over a period of several months. Only after discontinuation of the hydroxyurea treatment no further ulcers appeared, and the skin lesions started to heal. In case 4, a slowly progressive ulcer of the lower leg was clinically suspected to be induced by a squamous cell carcinoma. Punch biopsies revealed extramammary Paget's disease of the lower limb. Complete excision was necessary to enable wound healing.

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## ***Use of soft silicone foam dressings in chronic wounds of patients suffering from acquired or hereditary fragile skin conditions***

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Fragile skin conditions such as acquired or hereditary bullous diseases are often associated with chronic wounds. Even minimal trauma during dressing changes can cause new blisters and wounds. Also in ulcers of the lower limb caused by e.g. venous hypertension, the wound edges show in many cases fragile skin, even blistering occurs. Chronic and acute wounds in patients suffering from fragile skin conditions present high demands for the wound dressing. The dressing should cause minimal friction when removed, take up excessive exudate to prevent maceration at wound edges and it should induce no or minimal pain during dressing changes. Here we present our experience with the soft silicon foam dressings Mepilex® and Mepilex transfer® applied in more than 40 patients with fragile skin conditions, mainly acquired and hereditary blistering skin diseases. Wound healing, epithelialization, secretion, and friction at the wound edges were monitored during dressing changes. The patients were asked to evaluate pain during dressing changes and to compare the soft silicon dressing to the standard dressings used so far.

*Results:* Good wound healing in acute and chronic wounds and fast epithelialization were observed in most patients. Except in one case of an acute eruptive pemphigus vulgaris, the soft silicon layer did not tear the fragile, blistering skin, indicating minimal trauma during dressing changes. The patients reported no or very little pain during dressing changes. No allergic reactions were observed. In some patients strong wound secretion led to maceration at the wound edges, and the frequency of dressing changes had to be increased. In this challenging patient group the satisfaction with soft silicon foam dressings is high and patients tend to use these dressing as a protection from trauma after the wounds have healed.

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## ***Antibacterial activity of silver-containing dressings***

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*Introduction:* In later years silver-containing antibacterial dressings have been marketed as the answer of Modern Wound Care to difficult to heal wounds and as antibacterial barriers. Silver has been used as an antibacterial for centuries, and has reoccurred due to its good antibacterial activity and safe profile as well as the small risk of bacterial resistance towards silver.

**Aim:** The aim of this study was to test the in vitro antibacterial activity of some silver-containing dressings currently on the European market in order to present and evaluate the antibacterial activity.

**Methods:** The tested dressings are some of the currently available silver dressings on the European markets. All dressings were tested in an in vitro Zone of Inhibition (ZOI) test on a bacterium detrimental to wound healing, *Ps. aeruginosa*. Suspensions with app.  $10^5$  CFU/ml were plated on Iso Sensitest agar plates.  $\varnothing 10$  mm of test products were placed on the challenged agar plates (in triplets) and the plates were incubated at 37 °C for 24 hours. The ZOI were measured and recorded. ZOI describe the clear zones that form if the product inhibits bacterial growth. The test products were then transferred to a new agar plate with fresh challenge bacteria and incubated another 24 hours and the zones of inhibition were read again. This procedure was followed for 7 days.

**Results:** The test results show a great difference between antibacterial activities for the tested dressings. Some dressings show only ZOI under or slightly beyond the product area, whereas others show ZOI larger than the product area. The duration of the antibacterial activity differs from dressing to dressing from 1 day (a) over 2 days (b-c-d), 3 days (e-f) to 7 days (g-h-i).

**Conclusions:** The results show that the currently available silver dressings on the European markets differ widely in their in vitro antibacterial activity. Also the duration of antibacterial activity differs amongst the tested dressings in this in vitro test.

- a) Atrauman® Ag
- b) Urgutül® S.Ag
- c) Actisorb® Plus 25
- d) AQAUCEL® Ag
- e) Polymem® Silver
- f) SilverCel™
- g) Contreet® Foam
- h) Acticoat® 7
- i) Acticoat® Absorbent

**Methods:** MR safety and compatibility tests of the dressings were conducted under realistic worst-case conditions at a 3T scanner. The internal temperatures of the dressings were measured before and after two hours of high Specific Absorption Rate (SAR) imaging. Realistic levels of power deposition for a clinical setting were thus exceeded. To test MR-compatibility issues, a phantom was used to evaluate induced radio frequency (RF) and magnetic field inhomogeneity and to evaluate effects of induced eddy currents.

**Results:** After two hours of SAR intensive turbo spin-echo imaging, the temperature had increased from 23.4°C to maximum 24.7°C for the three dressings. These changes are well below the level of significance. High-quality images with no signs of inhomogeneity or distortion induced by the dressings were obtained. Considerable in-plane geometric distortions were found for echo-planar imaging measurements. However, the severity of inhomogeneity problems was similar at phantom corners with dressings and the corner without dressing.

**Conclusions:** For the tested dressings, heating gave no indication of safety problems under conditions similar to realistic worst-case conditions. Consequently, the dressings are MR-safe under the considered conditions. There was no indication of MR image deterioration for conventional gradient-echo or multi spin-echo sequences, which are the most commonly used diagnostic sequences. Consequently, we conclude that (a-b-c) are MR compatible for gradient-echo and spin-echo measurements under the considered conditions and it are therefore possible to leave the dressings in place whilst performing MRI scanning. Some manufacturers state that their silver dressings are MRI incompatible. Therefore, the conclusions from the present study cannot be extended to other silver dressings.

- A) Contreet Foam
- B) Contreet Hydrocolloid
- C) Physiotulle Ag

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### ***Magnetic resonance imaging safety and compatibility for three silver-containing wound dressings***

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**Introduction:** The use of silver-containing wound dressings is increasing dramatically these years, hence there is increasing focus on whether silver dressings are safe and compatible with different diagnostics tools. Also the use of Magnetic Resonance Imaging (MRI) as a tool for clinical diagnostics is a growing field as MRI scanners are becoming increasingly widespread. Here we present results regarding the MR safety and compatibility of three silver-containing wound dressings, a foam (A), a hydrocolloid (B) and a contact layer (C).

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## **The CONTOP study: A large-scale, comparative, randomised study in patients treated with a sustained silver-releasing foam dressing**

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**Introduction:** Large-scale comparative studies using real-life study settings add to the evidence base from rigorous clinical studies and may be helpful in treatment decision-making. The aim of this study was to assess clinical performance, cost-effectiveness and quality of life of a sustained silver-releasing foam dressing (treatment A) versus "local best practise" (treatment B) in the treatment of ulcers with delayed healing in real-life settings.

**Methods:** This was a comparative, open, prospective, and block-randomised study including patients from numerous European wound care clinics. The main ulcer types included were leg ulcers, pressure ulcers, and diabetic foot ulcers. Inclusion and exclusion criteria were limited in order to obtain real-life data. All treatments were in accordance with the products' instructions for use. During a 4-week observation period ulcer area, exudate level, odour, pain, dressing change frequency and ease of use etc. were monitored with 1-week intervals.

**Results:** 619 patients were included in the study. Baseline data were comparable in the two groups and the ulcer types were mainly leg ulcers (>70 %). Treatment B was predominantly comprised of moist wound healing treatment and to a high extent of silver containing dressings. The wound area decreased significantly faster in patients treated with dressing A (50.0 % vs. 36.6 % reduction,  $P = 0.002$ ) and progress towards complete healing was achieved to a larger extent ( $P = 0.0001$ ) in group A. Quality of life related aspects (odour and pain) were significantly improved with dressing A ( $P < 0.0001$ ). Dressing A was significantly easier to use ( $P < 0.0001$ ). The dressing wear-time was longer for Dressing A (3.1 days vs. 2.1 days,  $P < 0.0001$ ), the exudate level improved faster ( $P = 0.006$ ) and exudate handling capabilities were better for dressing A ( $P < 0.0001$ ).

**Conclusions:** Substantial comparative patient data showed that Contreet Foam is more clinically effective than "local best practise" and promotes good quality of life as well as being a practical feasible wound management solution because of a longer wear-time.

Treatment A: Contreet Foam, Coloplast A/S

Treatment B: "local best practise" = based on current clinical practice: e.g. saline gauze, moist wound healing dressings, dressings containing active components etc.

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## **The efficiency of aggressive surgical versus conservative treatment of deep dermal hand burns**

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**Aim:** Hand burns are frequent in modern world. Treatment of hand burn is still problematic because it affects patients functional ability. Major part of hand burn injuries are minor and confined, but often it is part of major burn. Recommendations of the treatment are controversial. The aim of this study was analysis of late outcomes and hand function after the treatment of deep dermal hand burn injuries in cases of aggressive surgical and conservative methods.

**Methods:** A prospective, randomised study in KMHU Department of Plastic surgery and Burns was carried out from 2002 till 2004. We analysed hand function of 60 patients with deep dermal hand burns 3, 6, and 12 months after the injury. We analysed active and passive movements of wrist, MP, PIP, DIP joints, and dynamometry. We compared two groups of patients. First group was treated performing early tangential excision and skin grafting, second group with delayed excision and skin grafting.

**Results:** Patients sustained early necrectomy and grafting had better functional results in all analysing periods. Analysing functional results after 12 month we get statistically significant differences comparing passive joint movements ( $p < 0.05$ ), and statistically significant differences comparing active joint movements ( $p < 0.05$ ) except wrist movements and extension of fingers ( $p > 0.05$ ). Hospital stay in early excision and grafting group  $23 \pm 2$ , in delayed group  $35 \pm 3$  days.

**Discussion:** Short and long term functional results are statistically significantly better in early excision and grafting group. Performing early excision and grafting is allows to shorten in-hospital stay.

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## **Evaluation on the antibacterial properties of lidocaine 1.0 % in wound biopsy for culture**

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**Aim:** To test the effects of lidocaine 1.0 % on wound pathogenic bacteria in vitro. Quantitative culture from wound tissue biopsy is often regarded as gold standard, especially when dealing with pressure ulcers. In outpatient clinics, biopsy can only be obtained by local anaesthesia. Antibacterial properties of local anaesthetics may produce false negative results (1-3).

**Methods:** 5 clinical isolates and one ATCC reference strain of each of *Pseudomonas aeruginosa* (PA), *Eschericia coli* (EC), *Strep-*

*Staphylococcus aureus* (SA) and a strain of methicillin resistant *Staphylococcus aureus* (MRSA) was tested. All isolates were incubated on blood agar (PA in serum broth) over night. Cultures were diluted in saline to obtain inoculums of 10<sup>6</sup> bacteria/ml. Five tenfold dilutions were performed and samples of 100 microliters (100 µl) were plated onto agar to estimate the concentration before lidocaine 1.0 % was applied. The test solutions were kept at 35 °C (the streptococci in CO<sub>2</sub>-rich atmosphere), and quantitative cultures were performed at 0, 1, 2, 3, 4, 6 and 24 hours. Three tenfold dilutions were prepared and samples of 100 µl of the 10<sup>-3</sup>, 10<sup>-2</sup> and 10<sup>-1</sup> dilutions were plated onto agar. After incubating for 24 hours, colony-forming units were counted and time-kill-curves constructed. Tests were made with saline as controls.

**Results:** SP was observed to be the most susceptible species with a significant reduction within 3 hours ( $p < 0.05$ ) and a total kill after 6 hours. SA was reduced after 3 hours ( $p < 0.05$ ), but not completely killed within 24 hours. EC and PA were less susceptible with no significant inhibition of EC and PA after 4–6 hours.

**Conclusions:** Wound tissue biopsy by infiltration of local anesthesia with preservative-free lidocaine 1.0 % in a ring block can safely be performed if culturing is commenced within 2 hours.

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## P 196

### **Ambulant wound treatment in Germany – new perspectives, chances and risks**

### **Ambulante Wundbehandlung in Deutschland – neue Perspektiven, Möglichkeiten und Risiken**

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**Introduction:** A new system of payment for physicians working in an ambulant setting has transformed wound treatment from a neglected area to a promising, but also demanding, field. New forms of cooperation are needed but are also possible. Special qualification is mandatory, documentation is a necessary method of validation. Good diagnosis forms the basis for successful work.

**Methods:** description of the new system and its consequences. Explanation of the existing models and possible future developments.

**Conclusions:** In the years to come the vast majority of chronic wounds will be treated by physicians and nurses "in the community". Health care professionals face new challenges but also new rewarding possibilities of work in the exciting field of wound care.

**Einleitung:** Eine neue Gebührenordnung für ambulant tätige Ärzte hat die Wundbehandlung von einem vernachlässigten zu einem vielversprechenden, aber auch fordernden, Arbeitsgebiet gemacht. Neue Formen der Kooperation sind notwendig aber auch möglich. Eine spezielle Qualifikation wird unausweichlich, Dokumentation wird zur Grundlage der Bewertung der Arbeit. Eine gründliche Diagnose legt die Basis zum Erfolg.

**Methode:** das neue System und seine Konsequenzen werden beschrieben. Bereits bestehende Modelle werden erklärt und mögliche neue Entwicklungen werden aufgezeigt.

**Zusammenfassung:** In den kommenden Jahren werden die meisten chronischen Wunden von Ärzten und Pflegefachkräften ambulant behandelt werden. Die Fachleute stehen vor neuen Herausforderungen aber auch vor neuen lohnenden Arbeitsmöglichkeiten im spannenden Gebiet der Wundbehandlung.

## P 197

### **Evaluation of a foam dressing with a new soft adherent layer**

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**Introduction:** A well-known foam dressing with a new soft adherent layer (dressing A) has been developed. This new dressing assists the practitioner or patient to change the dressing, because the foam stays in place while the secondary dressing or compression therapy is applied or removed. The adherent layer covers less than 50 % of the foam surface, which does not impair the foam's excellent exudate management. This also means minimal trauma or pain at dressing changes.

**Aim:** To evaluate dressing A in terms of exudate management, bandaging situation, pain sensation, and skin-surroundings in comparison with a non-adhesive foam dressing (dressing B). The foams of dressing A and dressing B are identical, but dressing B has no adhesive applied to the foam.

**Methods:** A comparative, crossover clinical study was carried out over 2½ weeks. The study nurses assessed the patients' wounds at every dressing change. Wound measurement was performed to evaluate progress.

**Results:** 17 patients with moderate to highly exuding chronic venous leg ulcers were enrolled. Both test dressings showed to have a median of 5 (maximum score in a 5 point scale) in exudate management plus a median of "none" in leakage occurrences (assessed by the study nurses). Maceration was found in only 3 % of the dressing changes. Dressing A was found to be easier to apply compared to dressing B. 10 patients had no pain at all when removing the dressings. The mean value of pain was lower at removal, when compared to the mean value of pain in general since the last dressing change (assessed by the patient,

numerical rating scale). No damaging of the surrounding skin at removal was observed. The study showed a wound area reduction of 43 % and a positive progress in the wound bed tissue composition in all patients.

**Conclusions:** The clinical study indicates that dressing A provides the same excellent exudate management as dressing B, which ensures a low degree of maceration and a good wound healing progress. Furthermore dressing A offers a helping hand during application, and the patient experiences minimal trauma and pain at removal.

**Dressing A: Biatain Soft-Hold Dressing B: Biatain NA**

## P 198

### *In vitro* properties of a new absorbent nanocrystalline silver dressing

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**Aim:** A new absorbent antimicrobial barrier dressing has recently been developed for the management of exuding wounds, particularly those which may be critically colonized or infected. The product consists of nanocrystalline silver coated onto a polyurethane wound contact layer, laminated to a highly absorbent foam with a water-proof backing layer. The objective of the *in vitro* testing was to evaluate and assess the product performance by testing the physical and antimicrobial characteristics.

**Methods:** Test methods were developed to assess fluid handling ability, with and without compression. Simulated wound model apparatus was used to investigate the absorption and retention of wound exudate over 3 days. The antimicrobial performance was assessed against the major wound pathogens *Staphylococcus aureus* and *Pseudomonas aeruginosa* in 2 tests: log reduction in viable organisms using sample times of 30 minutes, 2 and 4 hours and repeat zone of inhibition over 7 days. The physical bacterial barrier action was assessed using a bacterial penetration test against *Serratia marcescens*.

**Results:** A 10 × 10 cm dressing was able to absorb 88g of water, retaining over 85 % of this under a 40g/cm<sup>2</sup> compression load. Under simulated, moderately exuding wound conditions, the dressing had not reached its maximum absorption capacity at the end of the 3 day test period. The dressing was able to achieve up to 5 log reduction within 4 hours and produce zones of inhibition against both *S. aureus* and *P. aeruginosa* over 7 days. The dressing was found to be a physical bacterial barrier as no colonies were found on the agar surface in the bacterial penetration test.

**Conclusions:** *In vitro* this product has excellent antimicrobial properties and was found to be an effective barrier against major wound pathogens for up to 7 days. It also has excellent fluid handling capabilities and was found to be capable of handling fluid from a moderately exuding wound for a minimum of 3 days.

## P 199

### *Hair extraction versus germ colonization in experimental surgical wounds*

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**Aim:** To relate the preoperational preparation of the skin with germ colonization in experimental surgical wounds. To find out how aggressive the methods of extractions are.

**Introduction:** The aim of the preoperational preparation of the skin is to diminish the germ sources without injuring them. Some surgeons prefer to remove the hair with electric razor, but other use manual ones or certain creams used to shave.

**Methods:** Experimental study of the effect that the extractive methods of the hair has in the germs colonization of surgical wounds that are made on the back of the adult white rat (Sprague Dawley). A group of animals was shaved manually, other group with an electric razor and the third group of animals was shaved with a shaving cream, before making the surgical wound. Doses of cutaneous specimens with liposom and post-sowing and germ cultivation, in order to find out the number of colonies that had been developed.

**Results:** The less contaminating extractive method was the one that used the electric razor (152 germs). Then the manual one (13.647 germs). The most contaminating method was the one that used the shaving cream (130.871 germs).

**Discussion:** The extractive methods with chemical characteristics not only have worse effects on the skin than the ones with mechanical characteristics, but also, they facilitate more the second germ colonization of surgical wounds in the animal.

## P 200

### *Application of the Braden Scale*

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**Aim:** To describe the technological, patient-related, organizational, and economical consequences by using the Braden Scale as well as describing the consequences of using the scale in our department.

**Methods:** A literature study – a so-called HMTV-project containing 4 perspectives. All sides of the following questions were looked at: Technology: What is the evidence concerning sensitivity and specificity? The patient: What are the consequences

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for the patient? Organization: Do we have to change work routines and education offers? Economy: What are the costs for using the Braden Scale? The results in relation to technology, patient, organization, and economy.

*Technology:* Previous studies show that the sensitivity of the Braden Scale is 60-70% and the specificity 60-80%, i.e. a certain variation in the experienced accuracy of the scale. Furthermore, 3 studies comparing the Braden Scale with the use of nursing evaluations for the detection of patients at risk have been found. These studies show that the sensitivity and specificity are similar by either method.

*Patient:* The studies presented here show that sores cause resting pain and pain in relation to change of dressing, increases time of admission as well as increases the frequency of nosocomial infections.

*Organization:* We found not concrete information concerning the organizational impact of using the Braden Scale.

*Economy:* The economical consequences of using the Braden Scale or the nursing evaluation for detection of patients at risk are difficult to estimate as a line of conditions concerning activity and prices are not fully known but in connection to this study calculations in relation to our ward have been carried out.

*Discussion:* In the light of the HMTV -project we chose to apply the use of the Braden Scale in our department. All patients in our wound department are being risk evaluated whereas patients in our plastic surgical ward are evaluated by nursing evaluation.