INNOVATION, KNOW-HOW AND TECHNOLOGY IN WOUND CARE
BeneHold™ TASA™
The future of wound care is clear

(Thin Absorbent Skin Adhesive)™

Exceptionally transparent, thinner than any other generation of absorbent skin adhesive, and surprisingly absorbent for its size, BeneHold TASA provides an innovative window into the healing process.

Visit the Vancive booth #10A10 of the European Wound Management Association’s annual exhibition, May 14-16th.

Join us at our symposium on May 15th at 15:40-16:40 in conference room N111+N112.

Learn more at vancive.averydennison.com/benehold

An Avery Dennison business

©2014 Avery Dennison Corporation. All rights reserved.
Avery Dennison, Vancive Medical Technologies, Vancive, BeneHold, TASA, Thin Absorbent Skin Adhesive, Design “V” Logo, are trademarks of Avery Dennison Corporation.
Make a difference in clinical practice

Become a Member of EWMA

Benefits of your EWMA Membership:

- You make a difference in clinical practice within wound management in Europe
- Right to vote and stand for EWMA Council
- EWMA Journal sent directly to you two times a year
- EWMA news and statements sent directly to you
- A discount on your registration fee for EWMA Conferences
- Right to apply for EWMA travel grants
- Yearly membership fee € 25
- Yearly membership fee for members of cooperating organisations € 10

Please register as a EWMA member at WWW.EWMA.ORG

26TH CONFERENCE OF THE EUROPEAN WOUND MANAGEMENT ASSOCIATION

EWMA 2016

11-13 MAY 2016 · BREMEN, GERMANY

In collaboration with WUND-D.A.CH and ICW (Chronic Wounds Initiative)
24th Conference of the European Wound Management Association

EWMA · GNEAUPP

14-16 May 2014

adrid · Spain · España

Innovation, know-how and technology in wound care

European Wound Management Association
Asociación Europea para el manejo de las heridas
www.ewma.org

Spanish Group for the study and advice on pressure ulcers and chronic wounds
Grupo Nacional para el Estudio y Asesoramiento en Úlceras por Presión y Heridas Crónicas
fundaciónsergiojuánjordán.org

Sergio Juan Jordán Foundation for investigation and study on chronic wounds
Fundación Sergio Juan Jordán para la Investigación y el Estudio de las Heridas Crónicas

Technical Secretariat
bocemtium.com

www.ewma2014.org
www.gneaupp.org
Fourteen years ago, EWMA held a conference in Stockholm, at which the partnership structure of the EWMA Cooperating Organisations was announced.

One of the creative minds behind this innovation was Christina Lindholm, who for many years has been a driving force in the EWMA Council and the EWMA Education Committee. In 2014, we celebrate Christina and her many contributions to EWMA at the EWMA-GNEAUPP 2014 conference by inviting her into the group of esteemed EWMA Honorary Speakers.

The EWMA Cooperating Organisations partnership has grown tremendously since its inception in 2000, and today, it includes 49 wound care associations, representing 35 European countries. Representatives from many of these associations will meet during the 2014 EWMA conference to elect members for the EWMA Council, discuss aspects of wound care across Europe, and learn from each other’s experiences during the EWMA Cooperating Organisations Board Meeting and the Cooperating Organisations Workshop.

In 2008, the EWMA Council formalised the first collaborations with associations outside of Europe through the establishment of International Partner Agreements with the Association for the Advancement of Wound Care (AAWC) of the U.S.A., initially, and subsequently with the Australian Wound Management Association (AWMA).

JOINING FORCES THROUGH JOINT INTERNATIONAL ACTIVITIES

The number of International Partners has increased to 11, and the initial collaborations with AAWC and AWMA have led to publication of the “Managing Wounds as a Team” document, which is presented on page 99. We are proud to announce that, together, these three major international associations have designed and published a joint guidance document on wound care.

Furthermore, as a result of these rewarding collaborations, a recent invitation has been extended by the AAWC Board for EWMA to appoint a member for the AAWC Board for 2014-2015, a position that will be held by the EWMA Immediate Past President Jan Apelqvist.

INNOVATION, KNOW-HOW, AND TECHNOLOGY IN WOUND CARE

Innovation, Know-how, and Technology in Wound Care is theme for the EWMA-GNEAUPP 2014 Madrid conference theme. Taking place 14-16 May, the conference will explore these topics as well as other ongoing EWMA activities and projects.

The EWMA Home Care Wound Care guidance document will also be launched at the conference. This document has been developed in collaboration with HomeCare Europe (www.homecareeurope.org), a new European partner of EWMA. For more details about this document, see page 96.

The eHealth symposium, which was a newcomer at the EWMA 2013 conference, will run again this year. It is being organised in collaboration with the European Health Telematics Association (EHTEL, www.ehtel.org). EHTEL plays a pivotal role as the focal point of eHealth in Europe, and we look forward to EHTEL’s contribution in developing the EWMA eHealth symposium this year and for the EWMA 2015 London conference, at which an extension of the collaboration is already being planned.

We look forward to seeing many of you in Madrid and wish you an enjoyable Spring 2014.

Yours sincerely,

Sue Bale, Editor of the EWMA Journal
Salla Seppänen, EWMA President
Thorough and selective.

**Ultrasonic-Assisted Wound Debridement (UAW).**

The usage of UAW ensures a quick and safe cleansing of chronic and acute wounds. The innovative debridement procedure removes non-viable tissue and biofilms while preserving healthy tissue. With its precise and reliable technology Söring offers you the benefit of effective and easy to handle products.

**Sonoca 185: The practical and compact generator.**
- Simple, safe operation
- Integrated irrigation pump

**UAW handpieces: Versatility for a range of wounds.**
- Lightweight and ergonomically shaped
- Can be steriley reprocessed
- Three different sonotrodes for the debridement of a range of wounds

**Double-ball sonotrode:**
Debridement of wound pockets

**Hoof sonotrode:**
Ideal for wound surfaces

**Spatula sonotrode:**
Used for wounds in difficult-to-reach intermediate spaces, such as between the toes
The exciting new Negative Pressure Wound Therapy solution

Find out more at the Coloplast symposium, 15:40-16:40, Room N103, Thursday the 15th May

www.coloplast.com/product
Prevalence of Pressure Ulcers in Hospitalized Patients in Germany – Trends from 2005 to 2011

Summary
Objective: Based on the data of hospitalized people in Germany we aimed to determine changes in prevalence, localization of pressure ulcer (PU) and comorbidity of the affected patients in the period from 2005 to 2011.

Patients and Methods: Age-adjusted prevalence and tables for gender and age distribution of pressure ulcers separately for the principal diagnosis and for additional diagnoses were provided from the Federal Statistical Office. Hospitals are legally obliged to deliver extensive data on hospital treatment, including demographic data, diagnoses, comorbidities, complications, and procedures to the “Institute for the Hospital Remuneration System” which uses the data for yearly adaptation of the German Diagnosis Related Group System.

Results: Total number of cases hospitalized with the principal diagnosis PU increased from 9,941 in 2005 to 12,581 in 2011 (increase of 26.5%) with a disproportional increase of PU grade 4 (from 46% in 2005 to 59% in 2001). Total number of cases hospitalized having the additional diagnosis PU increased from 239,760 in 2005 to 412,029 in 2011 (increase of 71.8%) with a disproportional of PU grade 2 (from 39% to 47%). Age adjusted population based data per 100,000 inhabitants show no increase in cases with the principal diagnosis, but cases with the additional diagnosis does. Comparing the distribution of PU localization there are no relevant differences between 2005 and 2011. Urinary and faecal incontinence play a major role in those with the principal diagnosis PU whereas fracture of femur, heart failure and pneumonia are the most frequent diagnoses coded with the additional diagnosis of PU.

Conclusion: In Germany the rate of cases hospitalized with the principal diagnosis PU did not increase whereas the rate of PU documented in hospitalized patients increased from 2005 to 2011.

INTRODUCTION
Pressure ulcer is a generally preventable complication of immobility. The awareness for prevention of pressure ulcers (PU) and for early detection increased in the last decades. The impact of these changes in awareness and in prevention on the prevalence of PU is unclear. Data from the National Center for Health Statistics and the Washington State Department of Health for the 14-year period from 1987 through 2000 found no evidence that the guidelines for the prevention of PU have been effective in decreasing pressure ulcer formation in the United States. As a limitation of their findings they stated that they could not exclude a more thorough manner of reporting pressure ulcer counteracting a decrease in the absolute number of PU. It could also be accounted for by changing demographics in that, the incidence of chronic disease is increasing along with increased age profile and thus one would expect a similar increase in PU, but this did not happen. So the guidelines might be effective in decreasing PU in absolute terms. The same is reported for Canada in a more recent study based on the Annual Pressure Ulcer Prevalence Census 1994-2008. In contrast to the somewhat constant prevalence and incidence of PE in these countries, an analysis of seven cross-sectional studies reporting point PU prevalence in 225 German
hospital found a significant decrease when non-blanchable erythema were excluded. Prevalence rates decreased from 6.4% (year 2001) to 3.9% (year 2007) (p=0.015).

Thus we analyzed prevalence of PU based on the federal statistic. With the introduction of Diagnosis Related Groups (DRGs) in 2005 for reimbursement this is the most valid data base for principal and additional diagnoses for hospitalized patients in Germany. We aimed to determine changes in prevalence, localization of PU and comorbidity of the affected patients in the period from 2005 to 2011.

METHODS
The national statistic (DRG-statistic) published by the Federal Statistical Office includes data from all hospitals in Germany that use the DRG-system. These hospitals treat almost 99% of all patients in Germany and they are legally obliged to deliver extensive data on hospital treatment, including demographic data, diagnoses, comorbidities, complications, and procedures to the “Institute for the Hospital Remuneration System” which uses the data for yearly adaptation of the German DRG-system and transmits them to the Federal Statistical Office. Only some private clinics do not participate in this system.

For 2005 to 2011 all diagnosis were coded with the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10), which was adapted for Germany by the German Institute for Medical Documentation and Information (DIMDI) as ICD-10 German Modification (ICD-10-GM) version 2005 to version 2011. Pressure ulcers were coded as L89.- given all 5 digits of the code (Table 1). This code implies information regarding the grade of the pressure ulcers (depicting the depth) and the variety of localizations. As shown in Table 1 coding changed from 2009 to 2010.

STATISTICS
Age-adjusted prevalences and tables for gender and age distribution of pressure ulcers separately for the principal diagnosis and for additional diagnoses were provided from the Federal Statistical Office. These data count pressure ulcers not inpatient cases. According to its definition, each principal diagnosis represents a single case. But, each case could suffer from several pressure ulcers which have to be coded. As consequence, inpatient cases could be included severalfold in the statistic on additional diagnoses. Therefore, the distribution of patients with at least one pressure ulcer as additional diagnoses was provided by the federal Statistical Office additionally. Last, a single inpatient case could be count in the statistics on principal and additional diagnoses in parallel.

Calculations were done using Microsoft® Excel 2003 and Microsoft® Access 2003.

<table>
<thead>
<tr>
<th>2005-2009</th>
<th>2010-2011</th>
</tr>
</thead>
</table>
| L89.1     | L89.0     | PU Grade1
| L89.2     | L89.1     | PU Grade2
| L89.3     | L89.2     | PU Grade3
| L89.4     | L89.3     | PU Grade4
| L89.9     | L89.9     | unknown Grade

Fifth digit defines the localisation of the pressure ulcers (example grade 1)

| L89.10 | L89.0 | PU Grade1: Head
| L89.11 | L89.01 | PU Grade1: Upper Limb
| L89.12 | L89.02 | PU Grade1: Spinal Process
| L89.13 | L89.03 | PU Grade1: Iliac Crest
| L89.14 | L89.04 | PU Grade1: Sacrum
| L89.15 | L89.05 | PU Grade1: Ischium
| L89.16 | L89.06 | PU Grade1: Great Trochanter
| L89.17 | L89.07 | PU Grade1: Heel
| L89.18 | L89.08 | PU Grade1: Other Localisation at Lower Limb
| L89.19 | L89.09 | PU Grade1: Not Defined Localisation

Figure 1: Total number of patients hospitalized with the principal diagnosis L89 separated by grade 1 to 4.
Table 2: Prevalence of patients with PU (ICD code L89.-) as principal diagnosis and as additional diagnosis per 100,000 population in Germany.

<table>
<thead>
<tr>
<th></th>
<th>60 - 64</th>
<th>65 - 69</th>
<th>70 - 74</th>
<th>75 - 79</th>
<th>80 - 84</th>
<th>85 - 89</th>
<th>≥ 90</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Principal diagnosis pressure ulcer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>15,3</td>
<td>20,1</td>
<td>30,3</td>
<td>43,2</td>
<td>65,9</td>
<td>102,5</td>
<td>125,7</td>
</tr>
<tr>
<td>2011</td>
<td>16,9</td>
<td>25,2</td>
<td>37,2</td>
<td>53,2</td>
<td>75,9</td>
<td>111,5</td>
<td>111,3</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>8,1</td>
<td>13,2</td>
<td>24,0</td>
<td>49,1</td>
<td>85,9</td>
<td>136,8</td>
<td>195,7</td>
</tr>
<tr>
<td>2011</td>
<td>10,7</td>
<td>18,6</td>
<td>28,4</td>
<td>52,8</td>
<td>93,6</td>
<td>150,4</td>
<td>206,5</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td>11,6</td>
<td>16,5</td>
<td>26,8</td>
<td>46,8</td>
<td>79,9</td>
<td>127,9</td>
<td>181,2</td>
</tr>
<tr>
<td>2005</td>
<td>13,7</td>
<td>21,8</td>
<td>32,5</td>
<td>53,0</td>
<td>86,8</td>
<td>139,3</td>
<td>181,9</td>
</tr>
<tr>
<td>2011</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Additional diagnosis pressure ulcer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>364,1</td>
<td>560,3</td>
<td>956,2</td>
<td>1510,2</td>
<td>2396,1</td>
<td>3771,3</td>
<td>5516,0</td>
</tr>
<tr>
<td>2011</td>
<td>584,0</td>
<td>921,9</td>
<td>1435,6</td>
<td>2396,1</td>
<td>3771,3</td>
<td>5516,0</td>
<td>6133,7</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>190,5</td>
<td>342,1</td>
<td>661,3</td>
<td>1238,5</td>
<td>2259,2</td>
<td>3377,9</td>
<td>4556,9</td>
</tr>
<tr>
<td>2011</td>
<td>312,4</td>
<td>524,0</td>
<td>898,8</td>
<td>1787,4</td>
<td>3218,1</td>
<td>5162,6</td>
<td>6684,1</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td>275,8</td>
<td>446,2</td>
<td>794,8</td>
<td>1347,1</td>
<td>2311,8</td>
<td>3410,8</td>
<td>4445,7</td>
</tr>
<tr>
<td>2005</td>
<td>445,9</td>
<td>715,4</td>
<td>1147,7</td>
<td>2051,6</td>
<td>3429,2</td>
<td>5263,0</td>
<td>6540,8</td>
</tr>
</tbody>
</table>

Figure 2: Total number of patients hospitalized with the additional diagnosis L89 separated by grade 1 to 4.

RESULTS
Prevalence of cases with PU
Total number of cases hospitalized with the principal diagnosis PU increased from 9,941 in 2005 to 12,581 in 2011 (increase of 26.5%). Within this population the rate of PU grade 4 increased disproportionally from 46% in 2005 to 59% in 2001 (Figure 1).

Total number of cases hospitalized for other diseases but having the additional diagnosis PU increased from 239,760 in 2005 to 412,029 in 2011 (increase of 71.8%). Within this population the rate of PU grade 2 was the most frequent grade (Figure 2). Its rate increased disproportionally from 39% in 2005 to 47% in 2011.

In 2005 a total of 16,071,846 cases were treated as in-patients in German hospitals. Thus 0.062% (9,941) was referred with PU as principal diagnosis and 1.5% (239,760) had at least one additional diagnosis PU. In 2011 a total of 18,691,076 cases were treated as full time patients in German hospitals. The rates of cases with PU as principal diagnosis were 0.067% (12,581) and that of additional diagnosis 2.2% (412,029).

Population based data per 100,000 inhabitants are shown in Table 2. Looking at this data there is no increase in cases with the principal diagnosis PU but in cases with the additional diagnosis.

Localization of PU
The most frequent localizations of PU were ischium, sacrum and heel, but there are some specific differences between the group of patients with PU as principal diagnosis or as an additional diagnosis. In 10 to 59 years old patients with the principal diagnosis PU the ischium plays a much greater role than in patients 60 to 90 years old patients (Figure 3). In older patients the relevance of the ischium as most frequent localization diminished and the sacrum and the heel PU dominated.

These differences can not be found when a PU is coded as an additional diagnosis. There is a consistent gradual increase in the frequency of sacral PU with an increasing age.

Comparing the distribution of PU localization there are no relevant differences between 2005 and 2011 with the exception of a decrease of PUs of rare localization (head, upper extremity, vertebral spin) and not specified localizations. Within the cases of PU as principal diagnosis the rate decreased from 25.8% to 16.5% and with in the cases with PU as additional diagnosis the rate decreased from 29.1% 18.0%.

Comorbidity
The comorbidity is different between those patients with pressure ulcer as the principal diagnosis and those with pressure ulcer as an additional diagnosis. Urinary and faecal incontinence play a major role in those who were referred for treatment of the pressure ulcer (Table 2). Fracture of

Figure 1: Total number of patients hospitalized with the additional diagnosis L89 separated by grade 1 to 4.
femur, heart failure and pneumonia are the most frequent diagnoses coded with the additional diagnosis of pressure ulcer (Table 3). These patterns of comorbidity did not change in the period from 2005 to 2011.

**DISCUSSION**

Data from the DRG-statistic of the years 2005 to 2011 present a good overview about the problem of pressure ulcers handled in acute hospitals in Germany.

There is an increase in absolute numbers of PU which in part is explained by the aging population. After age-adjustment the incidence rates per 100,000 inhabitants of PU as principal diagnosis did not increase. There is a variety of possible interpretations that could be discussed. One could hypothesize, that burden of PU in out of hospital care in general remained unchanged. One can also hypothesize, that the overall strategies in prevention of PU failed as the rates did not decrease. We did not see a shift towards patients suffering from lower grades of PU, thus it can be excluded that there is trend to earlier hospitalization of affected patients. The opposite is true as the rate of patients admitted with PU grade 4 increased disproportionally. This might be in indicator for an increasing burden of PU in non-hospital settings.

The rates of PU as additional diagnosis per 100,000 inhabitants still increased after age-adjustment. Thus more PUs were documented in the hospitals. Again there is a variety of interpretations. As these PUs do not necessarily developed during the period of hospitalization they could have been acquired before hospitalization. As all hospitals are forced to increase their awareness after publication of the National Expert-Standard for PU Prophylaxis just more PUs could have been documented without affecting the true number of PUs. An over documentation of each discoloured skin area as PU grade 1 (or grade 0 after the change in coding 2009) should have increased the rate of this grade. Our data showed a dysproportional increase in PU grade II (or grade 1 after the change in coding 2009), which suggests that objective findings were documented.

All in all, our data do not support the results presented from Kottner et al. 2009 who analysed the results of seven point pressure ulcer prevalence studies conducted in 225 hospitals.

**Table 3:** Top five of the additional diagnosis coded in patients with the principal diagnosis PU.

<table>
<thead>
<tr>
<th>Order</th>
<th>Code</th>
<th>PU was the principal diagnosis</th>
<th>Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>R15</td>
<td>Faecal incontinence</td>
<td>40,8</td>
</tr>
<tr>
<td>2</td>
<td>B962</td>
<td>Escherichia coli</td>
<td>32,8</td>
</tr>
<tr>
<td>3</td>
<td>1100</td>
<td>Essential Hypertension</td>
<td>30,4</td>
</tr>
<tr>
<td>4</td>
<td>R32</td>
<td>Urinal incontinence</td>
<td>26,0</td>
</tr>
<tr>
<td>5</td>
<td>B956</td>
<td>Staphylococcus aureus</td>
<td>22,3</td>
</tr>
</tbody>
</table>
Practice guidelines might have improved the quality of patient care, but does not necessarily decrease the number of PU. Wilborn et al analysed the impact of the National Expert Standard Pressure Ulcer Prevention on pressure ulcer prevalence in Germany. The overall pressure ulcer prevalence grade 2-4 was 4.7%. Adjusted for hospital departments, survey year and individual characteristics, there was no significant difference in the prevalence of pressure ulcers between institutions that refer to the National Expert Standard Pressure Ulcer Prevention in Nursing or those referring to other sources in developing their local protocols (OR=1.14, 95% CI=0.90-1.44).

A Canadian study based on annual census conducted in an acute care facility in Ontario between 1994 and 2008 including 12,787 individuals who were inpatients during a 1-day reported sacrum (27%), heel (13%), ankle (12%), and ischial tuberosity (10%) as the most common PU sites. Such a distribution is similar to that described for PU as additional diagnosis in hospitalised patients but different from that of patients with the principal diagnosis. Thus distributions of PU localizations depend on the analysed patients and settings. In addition, two age dependent trends can be described. First, PE affecting the ischial tuberosity is most frequent in the 3rd and 4th decade when patients are sent to hospital for treatment of PU. It can be assumed that in this group of younger patients sitting is the most relevant problem. Second, with increasing age the heel is more frequently affected, which might be an affect of an increasing number of patients with Diabetes mellitus or peripheral arterial disease in the older population. This was shown in a study performed in North Carolina and Virginia including different healthcare settings (acute care, long-term care, and homecare). Subjects presenting with heel PU tended to be elderly and have low nutritional markers, high body mass index, multiple comorbid conditions such as diabetes mellitus, systemic infection, end-stage renal disease and peripheral arterial disease, as well as low Braden Scale scores.

### Table 4: Top five of the principal diagnoses coded in patients with the additional diagnosis PU.

<table>
<thead>
<tr>
<th>Order</th>
<th>Code</th>
<th>PU was an additional diagnosis</th>
<th>Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S72.-</td>
<td>Femur fracture</td>
<td>6.2</td>
</tr>
<tr>
<td>2</td>
<td>I50.-</td>
<td>Heart insufficiency</td>
<td>5.8</td>
</tr>
<tr>
<td>3</td>
<td>J18.-</td>
<td>Pneumonia</td>
<td>4.6</td>
</tr>
<tr>
<td>4</td>
<td>E11.-</td>
<td>Diabetes mellitus Typ II</td>
<td>4.1</td>
</tr>
<tr>
<td>5</td>
<td>A41.-</td>
<td>Sepsis</td>
<td>2.8</td>
</tr>
</tbody>
</table>

German hospitals and concluded that PU prevalence rates decreased from 13.9% (year 2001) to 7.3% (year 2007) (p<0.001) and when non-blanchable erythema were excluded from 6.4% to 3.9% (p=0.015). Comparing the distribution of PU localisation there are no relevant differences between 2005 and 2011 with the exception of a decrease of PUs of rare localisation (head, upper extremity, vertebral spin) and not specified localisations. The implementation of clinical practice guidelines might have improved the quality of patient care, but does not necessarily decrease the number of PU.
Any patient can develop a PU dependent on its individual comorbidity, the performed procedures and the intensity of nursing care. An American analysis on changes in the percentage of licensed nursing staff in Pennsylvanian hospitals between 1991 and 1997 led to the conclusion that almost all complications are seen more often in hospitals with fewer licensed nursing staff, in particular pressure ulcers and pneumonia. A Swedish group who examined the problem of pressure ulcers in intensive care wards reported that 58% of nursing staff think lack of time was a significant factor whenever pressure ulcer risk was not properly evaluated or aid devices were employed either inadequately or not at all. For Germany, our analyses indicate that a low number of full-time employees in nursing homes had an influence on the incidence of pressure ulcers both as primary and as secondary diagnosis.

There is no predominant principal diagnosis which is associated with a relevant number of PUs. Older people having PU documented as an additional diagnosis in Germany in 2005 had femur fracture in 6.9%, heart failure in 5.4% and pneumonia in 5.2% as the most frequent principal diagnosis. It remains unclear if there is a specific risk associated with these diseases if it is just a selection of old and immobile patients. In contrast in those presenting with PU as the principal diagnosis the classical risk factors faecal and urinary incontinence seem to have a relevant impact either on the development of PU or on the admission to hospital. These patterns of comorbidity did not change in the period from 2005 to 2011 as we did not expect it to change.

Limitations
Although routine data in the electronic patient record are frequently used for secondary purposes, there is currently no systematic analysis of coding quality in Germany. Whether coding matches reality as a prerequisite for further use of the data in medicine and health politics has to be investigated in controlled trials. Thus, we cannot estimate the rate of wrong coding of the grades or the localizations of pressure ulcers.

In conclusion, in Germany the rate of cases hospitalized with the principal diagnosis PU did not increase whereas the rate of PU documented in hospitalized patients increased from 2005 to 2011. Thus, PU is still a relevant problem. This analysis pointed out some specific aspects in PU localization and comorbidity that show the multi-dimensional dimension of the problem.

Acknowledgement
We thank Referat VIII A 1 from the Federal Statistical Office for extracting and providing the data from the DRG-Statistik.

References
2. Lahmann NA, Hallens RJ, Dassen T. Pressure ulcers in German nursing homes and acute care hospitals: prevalence, frequency, and ulcer characteristics. Ostomy Wound Manage. 2006;52:20-33.
sorbion silver flex

- Effective against bacteria and fungi
- No discoloration of the wound
- Wear time up to 7 days

www.sorbion.com
Enjoy the freedom of superior absorption

The new Biatain® Silicone dressing delivers superior absorption and a secure fit

- The new design of Biatain® Silicone introduces a perforated, soft silicone adhesive wound contact layer, delivering a secure fit without compromising superior absorption.
- The unique Biatain foam conforms closely to the wound bed, ensuring superior absorption and an optimal moist wound healing environment.

Visit Coloplast at EWMA 2014 and learn more about the new Biatain Silicone dressing.
Excess use of antibiotics in patients with non-healing ulcers

Although approximately 4 million cases of non-healing ulcers are diagnosed annually in Europe, non-healing ulcers have been considered a negligible problem in society\(^1\). Since there are only a few who understand the significance of the problem, there are very few in the health profession who are updated in terms of evaluation, diagnosis, and treatment of such wounds. In addition, many ulcers are never diagnosed, a fact that reflects both a lack of knowledge and also a low quality of care.

One problem among patients with non-healing ulcers is an excess usage of antibiotics. As early as 1998, Tammelin et al. reported that 60.1% of all ulcer patients were treated with at least one antibiotic within a six-month period.\(^2\) However, the indication for antibiotics was considered unfounded in most cases.

The bacterial environment in ulcers has been found to be more complicated than previously assumed. Based on new knowledge about the microbiology of non-healing ulcers, antibiotics may not be the most effective choice as a treatment strategy. Recently, there has been an increased focus on the formation of so-called “biofilms” on ulcers. Therefore, a paradigm shift in the treatment of non-healing ulcers is needed, especially among primary health services, to focus on better diagnoses and treatment of the underlying cause of the ulcer that reduces the incidence of unnecessary antibiotic therapy.

This article presents the results from an investigation on the use of antibiotics in ulcer patients who were referred to the wound healing unit at the Flekkefjord Hospital in Sørland from primary health services.

**MATERIALS AND METHODS**
The present investigation was performed as a prospective observational study from 1 January 2008 to 11 December 2008. The medical records for all patients with non-healing ulcers referred to Sørlandet Hospital Flekkefjord were obtained from doctors in the primary health services (e.g., on-duty doctors, personal physicians, and nursing home physicians). For cases that lacked the information needed for the investigation, questionnaires were mailed to the family doctor. Data from 105 of a total of 110 patients were evaluated in this investigation.

In addition to this investigation, a non-systematic literature search was conducted in PubMed.

**RESULTS**
The average age of the patients was 68.6 years (age range: 2-98). The average age of the ulcers was 7.1 months (1-36 months). Figure 1 shows a distribution of the ulcer diagnoses among these patients.

Figure 1: Overview of ulcer diagnoses

60 (75.1%) patients received treatment with antibiotics before they were referred to the Wound healing unit.

56 (53.3%) patients were treated with systemic antibiotics and 9 (8.6%) patients were treated with local antibiotics. Two or more antibiotic treatments had been prescribed in 14 (13.3%) patients.
Antibiotic treatments were administered in 78.3% of patients with traumatic or postoperative ulcers, 66.6% of patients with venous ulcers of the legs, 36.4% of patients with pressure ulcers, and 30% of patients with arterial ulcers (Figure 2).

A bacteriological examination was conducted in 33 (31.4%) of patients. *Staphylococcus aureus* was found in 43% of these patients. Normal skin flora was found in 13% of these patients (Figure 3).

Antibiotics were administered in 84.5% of the cases in which bacteriological samples had been taken. Dicloxacillin, which is a beta-lactamase-resistant penicillin, was prescribed in 41% of these cases (Figure 4).

The personnel at the wound healing unit agreed with the indication for antibiotic therapy in only one case (0.9%). However, the Wound healing unit identified a need for systemic antimicrobial therapy in 6 (5.4%) patients who had not received this treatment from primary health services. Five of these 6 patients (83.3%) had an undiscovered and untreated cases of either osteitis or osteomyelitis, which is a clear indication for antibiotic treatment.

**DISCUSSION**

**Microbiology of chronic ulcers**

Conditions such as chronic venous insufficiency, arterial insufficiency, and pressure over time, can lead to the reduced reparation capacity of skin injuries, which can lead to non-healing ulcers. A non-healing ulcer, however, should not be regarded as a disease, but rather as a symptom of an underlying state. Bacteria will colonize within the ulcer if the protective barrier of the skin is broken. Therefore, the appearance of a chronic ulcer depends on several factors (Table 1). These
factors also contribute to the development of infections in the ulcer.3 As Louis Pasteur (1822-1895), the father of modern microbiology, said: “The germ is nothing. It is the terrain in which it is found that is everything.”

There are various hypotheses regarding the interactions between ulcers and bacteria. The contamination–infection continuum hypothesis is based on the fact that chronic ulcers are contaminated or colonized by planktonics, i.e., free bacteria.4 In such situations, the healing of an ulcer takes place undisturbed, despite the fact that bacteria are present. Critical colonization, however, occurs when microorganisms begin to negatively affect the healing process. In such cases, subtle signs of infection can be observed, such as friable granulation tissue, lack of epithelial growth, and increased suppuration.5 Infection is present when at least three of the following classical signs of infection have been observed clinically:

- Redness (due to vasodilation)
- Local heat (due to vasodilation)
- Pain (due to the stimulation of nociceptive nerve fibres by cytokines)
- Swelling (due to increased vascular permeability)

This contamination-infection continuum hypothesis adequately explains the inflammation observed in acute ulcers, e.g., in cases of postoperative infection.

Bacteria are always found in chronic ulcers. There are often multiple types of bacteria observed within a single ulcer. For example, the flora usually found in cases of venous ulcers of the legs include Staphylococcus aureus (90.5%), Enterococcus faecalis (71.7%), and Pseudomonas aeruginosa (52.2%).6 The bacterial flora found in a non-healing ulcer change as the ulcer ages. Staphylococci and streptococci bacteria are normally found in new ulcers, while gram-negative mixed flora are often found in older ulcers. In addition, different types of ulcers are influenced by different types of bacteria. For example, a clinical infection will develop in 60% of diabetic foot ulcers but only 20% of venous leg ulcers that are colonized by Staphylococcus aureus.12 Other systemic and local factors also influence the development of an ulcer infection.

Between 1.6 and 4.4 species of bacteria are found per ulcer by conventional culturing methods.7 However, molecular biological methods suggest that even more species of bacteria are present in the average ulcer.8 The number of ulcers with anaerobic bacterial growth is estimated to be between 25% and 82%. The most common anaerobic bacterial species are Peptostreptococcus and Prevotella.9,10 However, many ulcers heal despite the fact the presence of these microorganisms. The presence of anaerobic bacteria is therefore not necessarily a sign of an ulcer infection.

Recent research has indicated that the presence of bacterial biofilm contributes to the development of chronic ulcers. Biofilm, which is a well-known cause of periodontitis, has also been observed in cases of infection that involve medical implants and catheters. Studies performed by James et al. have shown that biofilm is present in 60% of chronic ulcers but only 6% of acute ulcers.13 This supports the view that biofilm probably plays an important role in the formation of chronic ulcerations.

In contrast to planktonic, i.e., free bacteria, the biofilm are organized into a layer that consists of proteins, nucleic acids, and polysaccharides. The biofilm is affixed to the surface of the ulcer.14 The physical properties of the biofilm protect the bacteria against most forms of chemical, biological, and physical stress. These properties also protect the bacteria against antibiotics and the immune response (e.g., neutrophil granulocytes). In addition, the biofilm assures the maintenance of a chronic inflammation in the ulcer. The bacteria in the biofilm release proteases. These proteases contribute to the breakdown of growth factors and tissue proteins that are responsible for repair processes in the tissue. The breakdown and decomposition products from the neutrophil granulocytes Kill by bacteria play a role in the inhibition of the “search and destroy” capabilities of the macrophages. This breakdown and decomposition also leads to the destruction of tissue.

| Table 1. Factors that enhance the risk of development of ulcer infections |
|-----------------------------|-----------------------------|
| **Systemic factors** | **Local factors** |
| Metabolic diseases, such as diabetes mellitus | Size of the ulcer |
| Systemic diseases, such as rheumatic diseases | Age of the ulcer |
| Other forms of chronic disease, such as HIV infection | Location of the ulcer |
| Old age | Local circulation |
| Malnutrition/poor diet | Necrosis |
| Alcohol/narcotics abuse | Suppuration and maceration |
| Medicines, such as steroids, oestrogens, and vitamin K antagonists | Edema |
| Smoking | Exposed bones or capsules |

**Note:** The table lists some factors that enhance the risk of development of ulcer infections.
as well as an increased production of pro-inflammatory cytokines. Together, these processes contribute to the chronic inflammatory state of the ulcer. Pseudomonas aeruginosa is a microorganism whose ability to form biofilm has been well studied. When Pseudomonas aeruginosa is organized into a biofilm, it releases virulence factors that are capable of eliminating polymorphonucleated neutrophil granulocytes. Instead of removing bacteria and tissue residues, the leukocytes are dissolved and proteolytic enzymes are released. Some of these enzymes are so-called metalloproteases, which break down the extracellular matrix, including collagen and growth factors. Together with an increase in free radicals, the breakdown of the extracellular matrix prevents the initiation of the normal repair processes. A high level of harmful enzymes in combination with the breakdown of tissue, however, stimulates the immune system and constantly attracts new polymorphonucleated granulocytes. The immune system is maximally stimulated, which starts a vicious cycle that can be counteracted with antibiotics. In such a situation, Pseudomonas aeruginosa is prepared to “kidnap” the immune response of the host to create a bacteria-friendly environment. The maximally stimulated immune system brings an increased supply of blood to the injured area, which provides the bacteria with sufficient nutrients. Anaerobic bacteria are attracted to this site due to the consumption of oxygen around the biofilm. An oxygen gradient has also been demonstrated inside the biofilm, which means that the anaerobic bacteria are able to penetrate into deeper tissue. These observations therefore suggest a synergistic interaction between ulcers and bacteria that have a greater importance than the isolated presence of any other pathogen.

A biofilm in an ulcer often appears as a membrane. Other characteristics include hypergranulated tissue that bleeds easily on contact, the absence of epithelial growth from the edges, suppuration, cyanotic discoloration due to oxygen deficiency, and a distinct odor from the ulcer site (Figure 5).

The results from our investigation on the use of antibiotics in patients with non-healing ulcers demonstrate that antimicrobial medications were administered in 84.5% of the cases in which microbiological samples had been examined. These results also suggest that the detection of bacteria provides an indication for antibiotic treatment. Figure 2 reports the proportion of antibiotic-treated ulcers relative to the absolute number of ulcers. For example, 66.6% of all patients with venous ulcers of the leg (i.e., ulcus cruris venosum; UCV) had received antibiotics. However, venous ulcers of the leg have an inflammatory cause such that antibiotic treatment will not be effective. There may be either a lack of knowledge among primary care doctors about the aetiology of venous ulcers or a misinterpretation of the symptoms of infection as symptoms of infection that causes the doctor to analyse a microbiological sample. The current study was not designed to tease out the reasons why a doctor may order such a bacterial test.

An investigation performed by Kerketerp-Møller et al. showed discrepancies between ordinary cultures and genetic analyses (i.e., peptide nuclear acid fluorized in situ hybridization – PAN-FISH) from ulcers. Conventional laboratory methods to detect bacteria favor Staphylococcus aureus, which may explain why Staphylococcus aureus are observed in the majority of non-healing ulcers.
The occurrence of highly virulent organisms, such as *Pseudomonas aeruginosa*, is underestimated by conventional culturing methods. Dowd et al. used genetic methods to demonstrate that obligate anaerobes are present in 62% of chronic ulcers. This study concluded that bacterial cultures from ulcers rarely reflect the true bacterial population of the ulcer.

There are several indications that conventional microbiological methods reveal only organisms that grow relatively rapidly and are simple to detect in the culture medium. Importantly, biofilm cannot be detected by these methods. Therefore, better microbiological methods are needed to understand the bacterial environment of the ulcer. In clinical practice, samples from ulcers should be taken only in cases in which there is an indication for infection that could benefit from antibiotic therapy. Indications for systemic antibiotic treatment are shown in Table 2. As outlined in Table 2, there is a low threshold for administering antibiotics in patients with diabetic foot ulcers and in patients who are on immunosuppressive medications. However, an ulcer will never be sterilized by antibiotics. The assessment of the results provided by the microbiologist should focus on the correct choice of antibiotic that reduces the risk for resistant strains to develop.

Systematic reviews have not shown that antibiotics are an effective treatment for chronic ulcers. Clinical experience demonstrates that ulcers treated with antibiotics may improve over brief periods, but deteriorate after the antibiotic has been withdrawn. The results of the current study suggest that 13.3% of patients received repeated “cures” with antibiotics. However, the assumption based on current evidence is that, although the bacterial flora within an ulcer may be reduced over a brief period during antibiotic treatment, the polymicrobial flora return when the medication is stopped.

The excess use of antibiotics in ulcer patients was studied as early as 1998 by Tammelin et al. in Sweden. Their investigation showed that 60.1% of patients had received an antibiotic treatment over an observation period of 6 months. Their investigation also found resistant *Staphylococcus aureus* in 12.5% of these cases. The risk of developing methicillin resistance increases with the administration of systematic antimicrobial therapy.

Local antibiotic treatment of ulcers is not recommended because of the rapid development of resistance and the risk of allergic reactions. Nevertheless, the results of the current study indicate that local antibiotic treatment is widely prescribed. Several studies have suggested that products containing silver, honey, or iodine are recommended if local antibiotic treatment is necessary. Secretions from blowfly larvae have also been shown to kill bacteria. These larvae have also been used to eradicate methicillin-resistant *Staphylococcus aureus* (MRSA) from ulcers. Ulcer rinsing agents or bandages that contain betaine and polyhexamidine have also been shown to be effective treatments to reduce bacteria in ulcers.

A total of 80-90% of antibiotic use takes place outside of the hospital. An English study of antibiotic use among ulcer patients reported that more than 2 out of 3 patients with non-healing ulcers received prescriptions for antibiotics from their family doctor over the course of 1 year. For comparison, only 1 out of 3 patients with other diagnoses (not related to non-healing wounds) were prescribed antibiotics. This study also showed that antibiotics were administered over a longer period of time in ulcer patients compared with patients without ulcers. The practice of antibiotic prescription therefore seems to reflect uncertainty among physicians about how to treat ulcers.

Updated Norwegian guidelines on the use of antibiotics can be found in both hospitals and primary health services. An article by Berild and Haug confirms that chronic ulcers of the legs are most frequently colonized by non-dangerous bacterial flora and that good local ulcer treatment without antibiotics is sufficient. The guidelines suggest that caution should be taken with respect to the use of antibiotics in ulcers, except in diabetic ulcers of the foot or cases of demonstrated streptococci, and indicate that topical antibiotics are contraindicated. Other guidelines on the use of antibiotics in primary health services describe conditions such as erysipelas, diabetic foot ulcers, and impetigo as examples of skin and soft tissue infections. These guidelines also caution against the use of antibiotics. However, these publications do not mention guidelines for common types of chronic ulcers, such as venous leg ulcers, pressure ulcers, and postopera-

### Table 2. Indications for use of antibiotic therapy in ulcer infections

- At least 3 of the following clinical signs of infection:
  - Local heat
  - Redness that spreads more than 2 cm around the ulcer
  - Pain
  - Swelling
- Contact with bone (osteomyelitis/ostitis)
- Progression of the ulcer with the formation of satellite ulcers
- Clinical signs of infection by streptococci group A (erysipelas)
- Diabetic foot ulcers
- Patients with immunosuppression
ative infections. This lack of information about chronic ulcers may contribute to the uncertainty among physicians regarding the use of antibiotic therapy in these cases. The National Guidelines for antibiotics issued by the Norwegian Health Directory for primary health services, which is assumed to be the primary reference point for doctors who are faced with a clinical uncertainty, should therefore provide further guidance about when the prescription of antibiotics is contraindicated.

CONCLUSION
The results of the current study suggest a significant excess use of antibiotics in patients with non-healing ulcers. Mounting evidence suggests that the use of antibiotics should be reduced significantly among this population because antibiotics do not treat the underlying cause of the ulcer. A reduction of antibiotic use among this patient population will significantly reduce antibiotic resistance and health care costs associated with the side effects of antibiotics.

The primary message
All non-healing ulcers will be influenced to various degrees by bacteria. There is therefore no reason to take routine bacteria samples from chronic ulcers. It is most important to find out the underlying cause of the ulcer and focus on its treatment.

Table 1 provides an overview of the indications for antibiotic treatment of non-healing ulcers. In such situations, bacteria samples should be taken from the ulcer. In most cases, empirical treatment will be necessary and narrow-spectrum antibiotics should be utilized to the greatest possible degree. The knowledge of the bacterial flora in different types of non-healing ulcers is therefore highly decisive. The treatment may have to be adjusted when resistance is determined.

References
Get pressure ulcers under control.

Caring for foot ulcerations with a clinically approved therapy programme.

See you at EWMA 14 – 16 May
At **smith&nephew** we fully support healthcare professionals to address the true costs of wound care.

Sponsored by Smith & Nephew Wound Management

**The Wound Care Iceberg**

**Satellite Symposium at EWMA 2014, Thursday 15th May, 13:15-14:15, Room N104**

It’s the hidden costs of wound care that affect healthcare resources the most. At Smith & Nephew we are passionate about reducing the human and economic cost of wounds. In the Smith & Nephew symposium, we will examine some of the real and hidden costs involved in wound care, how they affect you, and how we can help reduce them. We will demonstrate this with some exciting studies featuring ALLEVYN® Life advanced wound dressing and PICO® negative pressure wound therapy, which show how costs associated with nursing time and dressing changes may be decreased.

We look forward to seeing you in Madrid!

Visit us at the Smith & Nephew booth: 10D11

For patients. For budgets. For today.™

Wound Management Smith & Nephew, Medical Ltd, 101 Hessle Road, Hull, HU3 2BN, UK
T +44 (0)1482 225181 - F +44 (0)1482 328326 - www.smith-nephew.com/wound

*Trademark of Smith & Nephew
© Smith & Nephew March 2014 48467
Regenerative medicine in burn wound healing: Aiming for the perfect skin

Summary
The healing of full thickness wounds such as burn wounds remains complicated by hypertrophic scar formation and contraction. The standard treatment is transplantation with autologous split thickness skin grafts. For extensive burns, these grafts are widely meshed due to limited donor sites, which often results in a poor functional and cosmetic outcome. The application of cultured autologous keratinocytes may enhance wound closure and improve scars.

The first epidermal substitute, a confluent epithelial sheet, was developed in 1979. These cultured epidermal autografts (CEA) have been used in burn patients with variable success. Due to the variation in the efficacy of CEAs, however, new strategies have been employed. Currently, the application of preconfluent proliferating keratinocytes is considered a better strategy for burn wound treatment.

In addition to improvements in epidermal grafts, the healing outcome may improve with the application of dermal substitutes. Over the past several decades, several scaffolds have been developed to mimic the dermis. These substitutes can be supplemented with growth factors and cells. In particular, the application of mesenchymal stem cells (MSCs) is thought to be a promising perspective for cell-based tissue engineering.

DERMAL SUBSTITUTION
Although transplantation with a meshed split thickness autograft is the gold standard, healing of the transplanted burn wound is not optimal and results in scar formation, which is thought to be due to the lack of sufficient dermal material in the thin autograft and a delayed re-epithelialisation of the wound. The interstices of the meshed graft especially are prone to hypertrophic scarring. Several skin substitutes have been explored over the past several decades to improve the healing process. These substitutes comprise epidermal, dermal, or full skin constructs.

Epidermal substitutes consist mainly of cultured keratinocytes, which can be supported by a carrier system. The main component of the dermis is the extracellular matrix (ECM), which provides support for different cell types and skin appendages such as hair, sebaceous glands, and sweat glands. The ECM plays an important role in the regulation of the different cells in the dermis. The lack of dermal ECM in full-thickness burn wounds is thought, therefore, to be an important cause of scar formation. Several scaffolds have been developed to create an environment that mimics the dermal ECM. Many of these constructs are based on the natural components of the dermal ECM, with collagen as the most abundant component of the skin as a base.

One of the first skin substitutes used in burn patients was an acellular bilayered construct that consists of a collagen matrix with a silicon top layer to mimic the epidermis. In addition to collagen, this scaffold also contains chondroitin 6-sulfate, a glycosaminoglycan (GAG), which provides more elasticity and better tensile strength to the scaffold and protects the scaffold against fast biodegradation. The porous structure of the collagen/GAG scaffold allows the migration of various cell types and structures such as blood vessels into the substitute. This construct, which is currently available as Integra®, is used in a two-step procedure. During the first operation, the burn wound is excised and the skin substitute is applied. In a second operation...
after revascularization of the collagen matrix, the silicon top layer is removed and an autologous meshed split skin autograft is applied on top of the substitute. This two-step procedure is the main drawback of this material, which has led to the development of a skin substitute that can be applied in a one-step procedure where application of the dermal substitute and the meshed split skin autograft occurs during the same operating procedure. Matriderm® is one of these products. This scaffold is also composed of porous collagen sponge, which is supplemented with elastin hydrolysate. The elastin coating of the collagen has been shown to improve scaffold stability and reduce granulation tissue formation as well as fibrosis and contraction and stimulate collagen deposition by fibroblasts.

Although the take rate of the autologous meshed skin graft was somewhat diminished, a statistically significant improvement in scar elasticity was observed at the 3-month follow-up in patients undergoing scar reconstructive surgery. Furthermore, although the differences did not reach significance at the 12-month follow-up, most patients considered the scars of the substituted sides as better. In a 12-year follow-up, a significant improvement was observed in elasticity, especially in patients in which a large extension of the autograft was used. In this latter study, surface roughness also was evaluated, and this study reported that the substituted wounds were smoother than wounds in which the standard treatment with an autograft alone was applied. In a more recent multicentre clinical trial, the treatment of acute burns with a skin substitute was combined with topical negative pressure (TNP) therapy with the aim of improving the graft take rate. Although the latter goal was not accomplished, the application of TNP did improve elasticity.

**EPIDERMAL SUBSTITUTION**

The first cellular substitute was the cultured epidermal autograft (CEA), which is an in vitro cultured and differentiated epidermis. The first clinical application of this construct for burn wounds was performed during the 1980s. Although the results appeared promising at first, problems with the use of this technique became apparent over the years. Unpredictable take rates, the fragility of cell sheets, and long culture times quickly reduced the enthusiasm towards this product. Blistering often occurred due to the destruction of anchoring molecules from the tissue culture disc during the CEA harvesting procedure. In addition, the wounds remained open for a long period due to the long culture time, which increased the risk of infection and sometimes led to the inability to transplant the cultured keratinocytes back to the patient.

New methods have been developed in more recent years. These new techniques make use of proliferating keratinocytes. After transplantation to the wound bed, these cells start to differentiate and form an epidermis in vivo. This technique has the advantage that the culture times are reduced and that anchoring molecules are not destroyed during the process, which results in a better take rate.

The cultured cells can be applied either to the wound bed on a carrier or sprayed as a suspension. Several clinical studies have been performed and show promising results. However, although these new techniques restore most of the disadvantages of the CEA, the product may still be improved. For example, the culturing conditions of keratinocytes often include animal (xenobiologic) products, which potentially increase the risk of transmission of animal-derived disease components such as viruses or prions to the patient.

**CELLULAR DERMAL SUBSTITUTES**

Although the clinical requirements for the function of dermal substitutes have been defined, the translation of these requirements into physical and mechano-biological properties of scaffolds is difficult. The materials should not only provide the correct mechanical properties of the dermis, such as tensile strength and flexibility, but also provide a template for cells. The materials also should create a molecular microenvironment in which the different cell types migrate, grow, and acquire the proper phenotype to allow the regeneration of a new dermis.

References

Scaffolds such as the products Integra® and Matriderm® are typically based on biomolecules present in the dermis, such as collagen, elastin, and GAGs. However, although the clinical use of these scaffolds shows promising results, healing is still not optimal.

To further improve the healing process, cells have been included in the scaffolds. Several skin substitutes that use allogeneic or autologous fibroblasts and keratinocytes (e.g., Tiscover®, Apligraf®, and OrCel®) have been described. Their limited clinical use worldwide, however, is probably due to the high expenses for production of these constructs as well as possible immunological reactions to the allogeneic cells and the long production time for autologous cell constructs.

Recently, interest in the field has shifted to the use of mesenchymal stem cells (MSC) in skin substitutes. MSCs are thought to play an important role in tissue homeostasis and in the facilitation of the repair of damaged tissue to restore the function of injured organs. Over the past several decades, stem cells have been isolated from various tissues. Stem cells are considered to be promising for tissue engineering purposes due to their multi-lineage differentiation capacity as well as their immune-modulating effects.

MESENCHYAL STEM CELLS FOR SKIN REGENERATION

MSCs have been shown to improve healing in different wound models. The exact mechanism by which this improvement in healing is accomplished is not known. Initially, it was thought that MSCs were incorporated into damaged tissues and differentiated into tissue-specific cells. However, it is now becoming clear that these cells exert their main therapeutic effect through paracrine actions and their immune regulatory features, and to a lesser extent through their incorporation into damaged tissue.

Several studies have shown that MSCs reduce fibrosis. MSCs are able to reduce the immune response by suppressing the activation of T cells, B cells, and natural killer cells via a reduction in the maturation of dendritic cells. MSCs reduce the expression levels of MHC class I and II molecules, and they do not express co-stimulatory molecules (CD80, CD86, and CD40). Due to these features, the MSCs are immune privileged and therefore can be used in an allogeneic setting, which is a major benefit that allows MSCs to be used as an off-the-shelf product.

There remain concerns with the use of MSCs. For example, MSCs may lose their immune suppressive and immune privileged status during differentiation. MSCs also may differentiate into the incorrect phenotype. MSCs also have the potential to differentiate into tumour cells due to their high capacity for self-renewal.

Despite the criteria postulated by the International Society for Cellular Therapy (ISCT) for defining multipotent mesenchymal stromal or stem cells, real discriminating markers for MSCs are missing. The criteria formulated by the ISCT state that these cells have to express a specific CD marker pattern in which they are positive (≥ 95%) for CD73, CD90, and CD105 and negative (≤ 2%) for CD45, CD34, CD14 or CD11b, CD79a or CD19, and HLA-DR. These criteria suggest that the cell isolates represent a homogeneous cell population. The MSC populations from various tissues, however, are a very heterogeneous population of cells, of which only a small percentage possess multi-lineage differentiation potential. Until proper discriminating markers have been found to identify MSCs and other cell types, it is unknown what the different cell types in these populations contribute to the healing process. Currently, most papers that describe MSCs confine their characterization of the cell population to the different markers that have been defined by the ISCT.

Only a few studies have shown that the cell population containing stem cells also contains alpha smooth muscle actin (α-SMA) positive cells. It is unclear whether the MSCs themselves express α-SMA or whether these cells are differentiated myofibroblasts, which is the cell type responsible for scar formation and fibrosis.

Recently, we have shown that MSCs migrate into the wound during the first 10-14 days post-burn. We hypothesized that these cells contribute to scar formation. The microenvironment created by these myofibroblast-like...
cells is distinctly different from normal dermal tissue, and because cell function and tissue performance is largely dependent on the cellular microenvironment, the healing process is trapped in a vicious circle. Ideally, tissue engineering could play an important role in the development of a scaffold that is able to guide the stem cells into the proper phenotype. Although various preclinical (animal) studies have been performed and show promising results, translation into clinical trials remains limited (reviewed in22).

FUTURE PERSPECTIVES

Despite the substantial progress in skin tissue engineering over the past several decades, the regeneration of fully functional skin following a burn wound still has not been achieved. Elucidating the signals that are required to guide the cells into the desired phenotype and away from the myofibroblast phenotype will be useful for scaffold design. Such scaffolds should create the microenvironment necessary for skin regeneration instead of scar formation.

In addition to the aesthetic problems and functional impairments due to diminished joint mobility of scars, other problems may occur from scarring as a result of the absence of skin appendages. For example, the lack of sweat glands may impair the thermoregulatory function of the skin. In addition, scars often lack hair follicles and sebaceous glands. Hair transplantation and skin expansion techniques have been used to restore the lack of hair follicles in scars23, 24. In vitro and in vivo experiments have shown that a tissue engineering approach may be successful to reconstitute hair follicles25. The use of stem cells in skin substitutes have also shown promising results with respect to hair follicle induction26. Further research to elucidate the mechanisms involved in the development of sebaceous glands and sweat glands is needed to address the lack of these structures in the healing wound.

Wound healing has always had villains. Now it has a hero.

Our breakthrough new dressing attacks the key local barriers to wound healing, even biofilm.

**TWO POWERFUL TECHNOLOGIES**

Our proven **Hydrofiber™ Technology** absorbs and retains excess exudate to help create an ideal healing environment.*1-5 And now our revolutionary new **Ag+ Technology** destroys biofilm and kills infection-causing bacteria.*6-8

See how it helps you save the day at [www.convatec.com](http://www.convatec.com).

**AQUACEL™ Ag+ Dressings**

*No dressing does more.*^\n
---

*As demonstrated in vitro

^Defined as the ability to manage exudate, infection and biofilm, as demonstrated in vitro


© Indicates trademarks of ConvaTec Inc. ©2014 ConvaTec Inc. AP-014181-MM


**Introduction**

Nobody would argue against the importance of adequate nutrition to preserve skin and tissue viability and to promote tissue repair processes such as wound healing. A good nutritional status generally reflects a healthy condition and adequate body power. However, there is little scientific evidence about the relationship between nutrition or nutritional intervention and wound healing, and most studies that have been performed to date are related to the problem of pressure ulcers (PUs).1

This article first addresses the assumed role of nutrients in wound healing, and then relevant aspects of the nutritional cycle. Finally, some recent studies with an arginine-enriched oral nutritional supplement in PU healing will be described because they represent important nutritional research in this area.

**BASIC ASPECTS OF WOUND HEALING AND THE ASSUMED ROLE OF NUTRIENTS**

The wound healing process involves several stages, including phases of blood coagulation, inflammation, migration and proliferation of defence and repair cells, remodelling of tissue structure, and scar formation and maturation. Several endogenous factors play an important role in promoting this process, for example the power of the body to generate adequate inflammation as well as the defence response to deal adequately with the bacterial burden of the wound. Nutrients also play a relevant and important role in this process. Carbohydrate, protein, and fat provide the energy source (kilocalories) for the body. The provision and consumption of adequate kilocalories supports collagen and nitrogen synthesis and promotes anabolism by sparing body protein from being used as an energy source.1

**Fat**

Fat is the most concentrated source of kilocalories, transports the fat-soluble vitamins (A, D, E, K), and provides insulation under the skin and padding to bony prominences. Moreover, fat is an essential component of cellular membranes, which are also important for preserving tissue viability and for wound repair processes. Meats, eggs, dairy products, and vegetable oils represent dietary sources of fat.1

**Protein and Amino Acids**

Protein is composed of amino acids and is the only nutrient containing nitrogen. Protein is important for tissue perfusion, preservation of immune function, repair and synthesis of enzymes involved in wound healing, cell multiplication, and collagen and connective tissue synthesis.2

Foods that provide all essential amino acids, such as meat, poultry, fish, eggs, milk products, and soybeans, are considered complete proteins. The body requires an adequate supply of the essential amino acids plus enough nitrogen and energy to synthesise the other amino acids. Legumes, grains, and vegetables provide nonessential proteins.
During period of stress or trauma such as injury and wound healing, certain amino acids, such as arginine and glutamine, become conditionally essential.

L-Arginine is composed of 32% nitrogen and has been shown to increase the concentration of hydroxyproline, an indicator of collagen deposition and protein, at the wound site.\(^3,4\) Faster wound healing has been described in non-malnourished patients with stage III-IV PUs who received an oral nutritional supplement (ONS) containing arginine, protein, zinc, ascorbic acid, and vitamin E.\(^5\)

**Water**

Water is distributed throughout the body in intracellular, interstitial, and intravascular compartments and serves as the transport medium for moving nutrients to the cells and removing waste products. Fluids are solvents for minerals, vitamins, amino acids, glucose, and other small molecules, thus enabling them to diffuse into and out of cells. Individuals with draining wounds, diarrhoea, elevated temperature, or increased perspiration require additional fluids to replace the fluid lost.\(^6\) Water constitutes 60% of an adult's body. The elderly individual generally has an increase in body fat and a decrease in lean body mass, resulting in a decrease in the percentage of water stored. This decrease in body water, coupled with a diminished sense of thirst, places the elderly at particular risk for dehydration.\(^7\) Hydration needs are met from liquids plus the water content of food, which accounts for 19% to 27% of the total fluid intake of healthy adults.\(^8\)

**Vitamins and Minerals**

The role of micronutrients in promoting wound healing is debatable.\(^1\)

Ascorbic acid (vitamin C), a water-soluble vitamin, is a cofactor with iron during the hydroxylation of proline and lysine in the production of collagen. Therefore, a deficiency of vitamin C may prolong the healing time and contribute to decreased resistance to infection.\(^9\) The required daily intake of vitamin C is achieved through the consumption of fruits and vegetables. Mega doses of ascorbic acid have not resulted in accelerated pressure ulcer healing.\(^10\)

Vitamin A and Vitamin E are fat-soluble vitamins and dietary intake of these vitamins comes from a variety of foods. Vitamin A acts as a stimulant during the wound healing process to increase collagen formation and promote epithelisation. High doses of Vitamin A are not recommended without consultation with a physician. Vitamin E acts as an anti-oxidant and the required intake can easily be met with food and/or a multivitamin unless a deficiency is confirmed.

Zinc, a cofactor for collagen formation, also enhances metabolism of protein, liberates vitamin A from storage in the liver, and assists in immune function. Unless a deficiency is confirmed, elemental zinc supplementation is not recommended for individuals with wounds such as pressure ulcers.\(^11,12\) Copper is a mineral that is essential for collagen cross-linking. Zinc and copper compete for the same binding site on the albumin molecule, thus high serum zinc levels interfere with copper metabolism and can induce copper deficiency.\(^13,14\) If deficiencies are suspected, a multivitamin with minerals may be appropriate.

**THE NUTRITIONAL CYCLE**

Screening and assessment of nutritional status followed by adequate nutritional intervention should be part of the prevention and treatment plan for patients at risk for (chronic) wounds.\(^1\)

Pressure ulcers are a representative example of such wounds.

The ‘why’ of this statement is clearly revealed by the literature related to PUs, which are used as an example here. The essentials, however, also apply to other types of wound such as chronic venous leg ulcers, arterial leg ulcers, and diabetic foot ulcers, in which nutritional care is additional to other disease-specific interventions.

**Nutritional status and PUs**

Whether a patient develops a PU depends on both extrinsic and intrinsic factors. Important extrinsic factors (coming from outside the patient) are pressure, friction, and shear forces.\(^15\)

Intrinsic (patient-related) factors affect tissue viability and therefore the tissue response to mechanical loading.

A number of intrinsic factors have been described in the literature. An adequate nutritional status is one of the most important intrinsic factors, and also one that can be readily influenced.\(^16,17\)

Poor nutritional intake and poor nutritional status have both been identified as key risk factors for pressure ulcer development and protracted wound healing. Notwithstanding methodological shortcomings, cross-sectional and prospective studies suggest a fairly strong correlation between undernutrition and pressure ulcer development.\(^18-21\) Moreover, it appears that many acutely or chronically ill patients and elderly patients who are at risk of pressure ulcer development or have established pressure ulcers suffer from undesired weight loss.\(^22-26\)
Nutrition Screening

Unless the patient has a terminal illness, undernutrition is a reversible risk factor for pressure ulcer development and early identification and management is therefore critical. Individuals at risk for wounds like pressure ulcers are often also in danger of undernutrition, so nutritional screening should be completed in such cases.\(^\text{2,27}\) Healthcare organizations should have a policy on nutrition screening and its frequency. Since individuals frequently move from one health care setting to another, the screening results must be documented and communicated from one care setting to another.\(^\text{2,28}\) Screening tools should be quick, easy to use, validated, and reliable for the patient population served.\(^\text{29}\) Validated screening tools are widely used in Europe. In a cross-sectional study by Langkamp-Henken et al., the Mini-Nutritional Assessment (MNA) and the MNA short form (SF) were noted to have an advantage over the use of visceral protein when screening and assessing nutritional status.\(^\text{30,31}\) The MNA-SF, which was revised to six questions and re-validated for adults 65 and older, has 80% sensitivity and specificity and 97% positive predictive value according to clinical status.\(^\text{32}\) The Malnutrition Screening Tool (MUST) has been validated in acute care, long-term care, and the community setting, and identifies individuals who are underweight or at risk for undernutrition.\(^\text{33}\)

When the screening tool indicates nutritional deficits, timely referral to the appropriate professionals is critical. The nutrition assessment should be completed by a registered dietician who collaborates and communicate with other members of the healthcare team, including the speech therapist who is responsible for screening, evaluating, and treating swallowing problems; the occupational therapist who works to strengthen the patient’s ability to feed themselves; and the nursing staff, whose responsibilities include monitoring the patient’s acceptance of nutrition. The physician is responsible for the overall care of the patient and ordering any treatments recommended by the team.

Nutrition Assessment

The in-depth nutrition assessment that is performed in individuals with a screening result that points towards undernutrition is a methodical process of obtaining and interpreting data in order to make decisions about the basis of nutrition-related problems. The assessment includes interpretation and analysis of medical, nutritional, and biochemical data and food-medication interactions; obtaining anthropometric measurements; and evaluation of visual signs of poor nutrition, such as oral status, chewing/swallowing ability, and/or diminished ability to eat independently.\(^\text{1}\)

Diет History: The diet history includes consultation with the patient and/or caregivers to determine the type, quantity, and frequency of food normally consumed by the patient. One should consider any factors that may influence the patients’ decision about nutrition.

Nutrition-Focused Clinical Examination: The interdisciplinary team, including the dietician, should examine the individual for physical signs of undernutrition and protein depletion, as evidenced by changes in the hair, skin, or nails such as thin, dry hair, cracked lips, or brittle nails. Individuals with missing or decayed teeth or ill-fitting dentures often reduce their intake of protein foods that are difficult to chew, thus restricting their caloric intake and increasing the chance for weight loss. Moreover, individuals with swallowing problems or dysphagia may become dehydrated, lose weight, and develop pressure ulcers. Loss of dexterity and/or the ability to self-feed is a risk factor that often results in poor oral intake. All of these conditions negatively affect wound healing.

Anthropometrics: Anthropometric measurements include height, weight, and body mass index (BMI). Obtaining an accurate height and weight is important, because these values are the basis for calculating body mass index (BMI) and caloric requirements.

Individuals should be weighed on a calibrated scale, at the same time of the day, and wearing the same amount of clothing. Specialty beds often are equipped with a device to weigh an immobile individual. Significant weight loss places an individual at increased nutritional risk and has a negative effect on wound healing. Several studies support the theory that unintentional weight loss of 5% in 30 days or 10% in 180 days is a predictor of mortality in the elderly.\(^\text{34-37}\) Moreover, an obese patient is also at risk for PU development and healing may also be delayed in such patients when the diet consumed is inadequate in nutrients including protein.

Biochemical Data: Analysis of current laboratory values is one component of the nutrition assessment, but not a very important one. Biochemical assessment data must be used with caution because values can be affected by hydration, medication, and changes in metabolism. There is no single specific laboratory test that can expressly determine an individual’s nutritional status. Serum levels of hepatic proteins including albumin, prealbumin (transthyretin), and transferrin may not correlate with the clinical observation of nutritional status.\(^\text{38}\) In fact, studies indicate that hepatic proteins correlate with the severity of illness rather than with nutritional status.\(^\text{39-41}\)
Nutrition Intervention

Ultimately, the nutrition assessment will lead to a nutrition diagnosis, followed by the necessary nutritional support. Early nutrition intervention and subsequent monitoring of the nutrition plan can reverse poor outcomes associated with undernutrition and promote healing. Caloric, protein, and fluid requirements should be individualised and either increased or decreased, depending on the assessed requirements of each patient. Furthermore it should be determined when fortified foods and/or ONS should be incorporated into the treatment plan. Fortified foods include commercial products, such as cereal, soup, cookies, or dairy products enriched with additional calories and protein, or enriched menu items.

Of course, the nutritional intervention strategy always tries to focus first on improving normal oral nutritional intake. However, despite many daily efforts towards this goal, for example by taking into account individual preferences for foods and drinks and improving mealtime ambiance, it is known that many patients with chronic wounds like PUs cannot meet their nutritional demands via normal intake only.

When normal oral intake is inadequate to promote healing, enteral or parenteral nutrition is considered if it is consistent with the individual’s goal. When the gut is functioning, enteral feeding via oral nutritional supplements in addition to the diet or total tube feeding is the preferred route.

Research supports the theory of providing ONS to reverse undernutrition, prevent PU occurrence, and promote PU healing. ONS given in addition to the regular diet should be preferably consumed between meals so that it does not negatively affect normal intake.

ARGININE-ENRICHED ORAL NUTRITIONAL SUPPLEMENTS AND PRESSURE ULCER HEALING – WHAT’S KNOWN?

Considering nutritional intervention and the prevention of PUs, adequate nutrition, meaning the intake of adequate amounts of protein and energy, seems to reverse the common underfed status of PU-prone patients and protect against ulcer formation. With regard to nutrition and healing of PUs, there is a gradual accumulation of evidence indicating that meeting the patient’s calorie and protein requirements improves the rate of wound healing. Intake of supplements or tube feeding with a high content of protein has been described to improve the rate of wound healing.

Particularly interesting are studies performed with arginine-enriched nutritional supplements. Benati et al. tested a PU-specific nutritional supplement that was high in energy and protein and enriched with arginine, vitamin C, and zinc, and found a positive effect on wound healing. Subsequently, these findings were confirmed in an open multicentre study conducted in Belgium and Luxembourg (n=245 patients) and in a small randomised controlled trial (n=28 patients) including several tube-fed patients.

In the CUBE study, a randomised controlled trial (n=43 patients), van Anholt et al. observed significantly faster wound healing in non-malnourished patients (aged between 18 and 90, with a normal BMI and no undesired weight loss) with stage III or stage IV pressure ulcers who received the same oral nutrition as controls, but supplemented with arginine, protein, zinc, ascorbic acid, and vitamin E.

Robust evidence for the independent role of these specific micronutrients within a high-calorie, high-protein oral nutritional support came recently from the large (n=157), randomised, and controlled OligoElement Sore Trial (OEST). In this multicentre study, Cereda and collaborators found that, in malnourished patients with stage III or stage IV pressure ulcers, an 8-week supplementation with an oral formula enriched with arginine, zinc, and antioxidants resulted in faster healing (increased by 20%) than an isocaloric-isonitrogenous control nutritional support. Both the CUBE study and the OEST trial additionally found a positive cost effect, because in both studies significantly fewer wound dressings were used in the intervention group with less overall nursing time required for dressing changes. This finding is very relevant at a time when awareness of the costs of health care has become increasingly important.

ARGININE ENRICHED ORAL NUTRITIONAL SUPPLEMENTS AND HEALING OF OTHER TYPES OF CHRONIC WOUNDS – WHAT’S KNOWN?

Arginine-enriched nutritional supplements may also have a positive effect on the healing of other types of chronic wounds, such as venous leg ulcers, arterial leg ulcers, and diabetic foot ulcers. However, at the present time there are only case reports on these applications. Therefore, more research in this field should be performed.

CONCLUSION

Nutrition is a key element in the prevention and treatment of patients with (chronic) wounds such as pressure ulcers. Nutritional care has to be incorporated into integrated and multidisciplinary wound care performed by a dedicated professional team.
References:


Additional references on nutrition and wounds in general:


ADAPTIC TOUCH® can be used under negative pressure wound therapy (NPWT) to benefit patients with a range of wound types¹.

**COMFORT**  
**PERFORMANCE**  
**AFFORDABILITY**

Scan the QR code for your free sample!

www.systagenix.com/AB-ADAPTIC-TOUCH-sample

References:

© Systagenix Wound Management 2013. Brands marked with ® or ™ are trademarks of Systagenix. All other products referenced herein are acknowledged to be trademarks of their respective owners.
Efficacy of platelet-rich plasma for the treatment of chronic wounds

Abstract
Aim: To assess the efficacy of platelet-rich plasma for the treatment of patients with chronic wounds of various aetiologies.

Methods. We analysed the treatment outcomes in 81 patients with chronic wounds of various aetiologies. For the treatment of 44 patients (experimental group), we used platelet-rich plasma flat clot therapy starting from phase II of the wound healing process. The frequency of dressing changes was once in 7 days, an interval that allowed patient transfer to outpatient care. For the treatment of 37 patients (control group), traditional topical agents were used.

Results. In three patients, owing to a large area of chronic wounds, 3-4 autodermoplastic closures of the wound were performed; 85.4% of patients achieved complete wound re-epithelialisation within 46.4 ± 4.3 days. In the control group, the autodermoplastics operation was performed in three patients, and only 11.8% of patients achieved wound re-epithelialisation within 3 months. The mean inpatient hospital duration was 11.0 ± 2.5 days in the experimental group and 23.1 ± 1.5 days in the control group. The mean cost of treatment was 785.25 Euros and 1649.02 Euros per patient in the experimental and control groups, respectively.

Conclusions. The treatment of patients with chronic wounds using platelet-rich plasma is safe, clinically beneficial and cost effective.

INTRODUCTION
The treatment of chronic wounds of different aetiologies is a topical issue of modern medicine. The acceleration of reparation processes and tissue regeneration entails not only clinical but also economical and social effects.

In the late 1990s, Robert E. Marx described the method of obtaining platelet-rich plasma (PRP) and its use as a gel in dentistry.[1] In 1994, Eduardo Antitua demonstrated that the PRP gel helps to accelerate bone regeneration and confirmed the presence of specific platelet-derived growth factor receptors (PDGFs) in the bone tissue.[2] In 2001, Russian scientists R.R. Akhmerov and R.F. Zarudiy developed the Plasmolifting™ technique that included the production and use of PRP injections in dentistry and dermatocosmetology.[3,4]

PRP is a platelet suspension in plasma derived from human blood. The platelet concentration in PRP is 2- to 6-fold higher than that in total blood and may reach 1000 × 10⁹/L.[5] Platelets contain growth factors that are attracted locally to damaged progenitor cells to stimulate their proliferative activity and improve wound healing via autocrine and paracrine mechanisms. Platelet growth factors include PDGF, platelet-derived angiogenesis factor (PDAF), transforming growth factor-b (TGFβ), insulin-like growth factor (IGF), platelet-derived endothelial cell growth factor (PD-ECGF), epidermal growth factor (EGF), fibroblast growth factor (FGF), thrombospondin and osteonectin.[6]

PDGF plays a particular role in tissue reparation and regeneration. PDGF was shown to stimulate the proliferative, secretory and migratory activity of mesenchymal cells[7] and is a co-factor for other growth factors — e.g., the angiogenic vascular endothelial growth factor (VEGF).[8] Growth factors are released after human platelet activation. Once activated, the platelets release approximately 70% of their stored growth factors within the first 10 minutes. Complete release of platelet growth factors is accomplished within 1 hour. Therefore, it is recommended to activate platelets immediately before using PRP[9-11].
Apart from the growth factors, activated platelets release large amounts of substances that contribute to primary homeostasis, including serotonin, catecholamines, fibrinogen, fibronectin, factor V, factor 8 (von Willebrand factor), thromboxane A2 and calcium\(^{9-13}\). As a result, platelet aggregates (clots) are formed, causing platelet stabilisation by cross-linked fibrin and sticky glycoproteins. The fibrin matrix formed promotes normal cell infiltration with monocytes, fibroblasts and other cells that play an important role in wound healing.

The current use of PRP for the acceleration of bone repair and soft tissue growth has become a true breakthrough in dentistry, traumatology, sports medicine, cosmetology and surgery. PRP has already proven to be useful in tissue engineering and cellular therapy\(^{9,10,14,15}\). PRP is most widely used for the filling of large bone defects in maxillofacial surgery\(^{11,16}\). PRP can be used along with bone material (the patient’s own or bone substitute), applied to the implant site before the use of bone material, placed atop of the bone material or used as a biological membrane\(^{6,11,16}\). PRP has proven to be effective in accelerating soft-tissue healing and epithelialisation\(^{6}\). PRP is indicated for use in free connective tissue graft procedures, manipulations with mucoperiosteal flaps and soft tissue augmentation for cosmetic purposes in dentistry\(^{17,18}\).

Following the implementation of PRP therapy in dentistry, the treatment began to be used in orthopaedics and traumatology. PRP technology is most widely used in the management of acute injury for the stimulation of osteogenesis in combination with osteosynthesis and in the treatment of arthrosis\(^{19}\). A method for the stimulation of neoangiogenesis in the ischaemic tissues of the lower extremities using PRP has been developed\(^{20}\).

Currently, several papers have been published on PRP use for the management of chronic venous stasis leg ulcers developed against the backdrop of chronic arterial or chronic venous insufficiency. The results of these studies allowed the conclusion that the use of PRP in the combination treatment of stasis ulcers provides a wide range of local therapeutic effects, improves treatment results, enables considerable reduction of the length of treatment and increases patient quality of life that is also of economic importance\(^{20-25}\).

### METHODS

We analysed the treatment results of 81 patients with chronic wounds of different aetiology – namely, venous leg ulcers (VLUs): 8 patients; ulcers of mixed aetiology (UMEs): 20 patients; leg ulcers with underlying diabetic foot syndrome (DFS): 20 patients; post-traumatic and postoperative ulcerated scars and trophic ulcers (STUs): 19 patients; and decubital ulcers (DUs): 14 patients.

The exclusion criteria were as follows: suspicion of ulcer malignisation, presence of systemic vasculitis, oncologic condition or haematologic disorder, or low adherence of patients to their treatment.

Following the bacteriological testing, all of the patients were administered treatment against the main disease and topical treatment aimed at bacterial clearance and decontamination of the wound. The microbial landscape at baseline is presented in Table 1.

All of the patients were divided randomly into two groups at admission. Patients who did not meet the inclusion and exclusion criteria were excluded from the study.

Forty-four patients in phase II of wound healing (i.e., the study group that included 17 men and 27 women with an average age of 56.0 ± 3.1 years and VLU (3 patients), UME (8 patients), DFS (12 patients), STU (14 patients) or DU (7 patients), with an average wound area of 90.2 ± 14.1 cm\(^2\) received PRP flat clot applications. Different methods for PRP preparation have been described (e.g., double- or single-spin centrifuge harvesting). However, a common algorithm exists for PRP preparation that comprises three stages: blood collection, PRP isolation from whole blood using centrifugation and activation of platelets contained in the PRP\(^{20}\). We used the method described by Eduardo Anitua and BTI equipment (Spain) to obtain PRP in the form of a gel (flat clot)\(^{23}\). The volume of blood drawn depends on the size of the wound and is approximately half of the wound area in cm\(^2\). For example, with a wound area of approximately 100 cm\(^2\) and

### Table 1. Microbiological characteristics of the pathological focus (day 1 of treatment)

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Study group n=44</th>
<th>Reference group n=37</th>
</tr>
</thead>
<tbody>
<tr>
<td>St. aureus MSSA</td>
<td>6 (13.6%)</td>
<td>6 (16.2%)</td>
</tr>
<tr>
<td>MRSA</td>
<td>3 (6.8%)</td>
<td>-</td>
</tr>
<tr>
<td>Enterococcus spp.</td>
<td>4 (23.5%)</td>
<td>1 (2.7%)</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>8 (18.2%)</td>
<td>1 (2.7%)</td>
</tr>
<tr>
<td>Acinetobacter baumannii</td>
<td>-</td>
<td>2 (5.4%)</td>
</tr>
<tr>
<td>Klebsiella pneumoniae</td>
<td>2 (4.5%)</td>
<td>2 (5.4%)</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>4 (9.1%)</td>
<td>5 (13.5%)</td>
</tr>
<tr>
<td>Proteus spp.</td>
<td>2 (4.5%)</td>
<td>7 (18.9%)</td>
</tr>
<tr>
<td>Microbial association</td>
<td>9 (20.5%)</td>
<td>8 (21.6%)</td>
</tr>
<tr>
<td>Microbial growth not revealed</td>
<td>6 (13.6%)</td>
<td>5 (13.5%)</td>
</tr>
<tr>
<td>Average bacterial load in the wound</td>
<td>106</td>
<td>106</td>
</tr>
</tbody>
</table>
a PRP clot thickness of about 1-2 mm, 45-50 ml of whole blood would be required. The volume of PRP obtained on average is 20-25% of the original volume per individual, depending on the rheological properties of the blood of each patient. The time from the moment of blood collection to wound dressing was 20-30 minutes. The PRP flat clot was covered with an atraumatic mesh dressing and a secondary dressing on top of the former. The dressing frequency was once in 7 days, allowing patient transition from inpatient to outpatient care.

Thirty-seven patients in phase II of wound-healing (the reference group that included 17 men and 20 women with an average age of 69.5 ± 2.2 years with VLU (5 patients), UME (12 patients), DFS (8 patients), STU (5 patients) or DU (7 patients), with an average wound area of 79.6 ± 12.3 cm²) received traditional topical therapy such as povidone-iodine gel, Olasol spray, Actovegin gel and modern interactive wound dressing materials.

Planimetry of the wounds of all of the patients was performed every seventh day from the time the patient was enrolled in the study. After discharge from the hospital, all of the patients were followed up in an outpatient setting with a frequency of visits of once a week.

RESULTS

The method that we used enabled us to obtain plasma with a platelet content of approximately 338% higher than that of whole blood. Previously, we studied the effect of PRP on the proliferative activity of human cells in vitro using M-22 human fibroblast cell culture (the study was carried out jointly with the Laboratory of Cell transplantation and Immunotyping of the Sklifosovsky Scientific Research Institute of Emergency Medicine), and we have confirmed the effectiveness of this method in terms of the PRP stimulation of regeneration processes[27-29].

At the Purulent Surgical Department of City Clinical Hospital no. 13, we conducted a randomised controlled study to evaluate the efficacy of PRP use for the treatment of chronic non-healing wounds of different aetiology. Considering the presence of wound defects mainly in the soft tissues, we used PRP in the form of a flat, gel-like clot. Results were evaluated over a 3-month period.

In the study group, the average number of applications of PRP in one patient was 6.0 ± 0.6. In three patients, the large size of the wound defect after 3-4 applications made the transplant free split the skin flap over the wound; complete epithelialisation of chronic wounds was achieved in 35 patients (85.4%) in 46.4 ± 4.3 days. The method was not effective in five patients (1 VLU, 1 UME, and 3 STUs); full epithelialisation was achieved in one patient within a period of more than 90 days. In the comparison group, skin grafting was achieved in three patients, and epithelialisation of the wound up to 3 months was attained in only four patients (11.8%). Treatment failure – i.e., lack of epithelialisation of the wound within a period of 90 days – was observed in 23 patients (62.2%) in the comparison group: 2 VLUs, 9 UMEs, 6 DFSs and 6 STUs.

The average duration of hospitalisation was 11.0 ± 2.5 days in the study group and 23.1 ± 1.5 days in the comparison group. Importantly, the average duration of hospital treatment was 7.5 days in patients with a high content of platelets with grains in the plasma (300-600,000/ml) and 12.7 days in patients with secondary (150-290,000/ml) and low (100-130,000/ml) content of platelets on average – i.e., the efficiency of treatment with autologous PRP depends on the content of the functionally suitable platelets. The average cost of treatment for one treated patient differed by more than two fold and amounted to (at the rates of 2012) 785.25 Euros and 1649.02 Euros in the experimental and control groups, respectively. The study results are presented in Table 2.

CASE REPORT

Patient P., an 18-year-old male, presented to the outpatient department with a postoperative ulcerated scar and trophic ulcer in the interscapular region. In 2006, he had undergone surgical endocorrection of scoliosis using a single-plate endocorrector that was removed in 2011 due to the occurrence of multiple purulent fistulas. The wound defect was corrected by plastic repair that later resulted in scar formation and trophic ulceration. Upon primary examination, the wound defect had dimensions of 63 × 54 mm, and the wound bed was filled with sluggish granulations. No microorganisms were detected in the wound before the initiation of treatment with PRP. The PRP applications
Science, Practice and Education

and wound dressings were carried out with 7-day intervals. During wound dressing, the PRP clot was covered with atraumatic Atrauman Ag silver-impregnated wound dressing and gauze pads. The duration of treatment was 21 days and included three dressings using PRP. Treatment resulted in complete re-epithelialisation of the ulcer by day 28 of the treatment (Fig. 1).

DISCUSSION

PRP therapy is the preferable treatment option in patients with chronic non-healing wounds of different aetiology and localisation, particularly when other more conventional therapies lack evidence of effectiveness or when radical surgical treatment is not possible or contraindicated.

The use of PRP not only reduces the duration and cost of treatment but also decreases the number of dressings, shortens the inpatient hospital stay (because most of the patients can be followed up on an outpatient basis with intervals between dressing changes of 6-8 days) and improves the patients’ quality of life. Notably, all of the patients demonstrated reduced sensitivity to pain after the PRP treatment had started.

The advantages of using an autologous PRP include no risk of disease transmission, introduction of growth factors and cytokines directly into the wound, restoration of metabolic processes, neoangiogenesis, improvement of cellular metabolism and activation of local immunity[30-32].

References


22. Obolensky V. PRP in treating patients with chronic wounds. // Bone Marrow Transplantation. – Vol. 47. – Suppl. 1. – April 2012. – P. 5308 - 5309.


30. Greenglag D.G. The role of growth factors in wound healing. // Trauma. – 1996. – no. 41. – P.159-167.


The EWMA UNIVERSITY CONFERENCE MODEL (UCM) in Madrid

At the EWMA-GNEAUPP 2014 Conference students of wound management from six institutions of higher education will be attending the UCM activities, planned to take place during the conference.

The UCM programme in Madrid offers networkingopportunities between students from many countries, a UCM Lecture as well as assignments and workshops arranged specifically for the UCM students.

Participation in EWMA UCM is available to all teaching institutions that offer wound management courses for health professionals.

Yours sincerely

Dubravko Huljev
Chair of the Education Committee

UCM Activities 2014:

Wednesday 14th May:
08:45-09:15 Room N115: Official Welcome by the Chair of the EWMA Education Committee
15:30-17:00 Room N115: Article Critiquing Exercise

Thursday 15th May:
12:15-13:15 Room N115: International Practice Development
13:15-14:15 Room N115: Symposia Review

Friday 16th May
08:00-09:30 Room N113: EWMA UCM Lecture, “Seeking and finding the evidence” by G. McCabe
09:30-10:00 Room N113: Student Feedback Session

For further information about the EWMA UCM, please visit the Education section of the EWMA website www.ewma.org or contact the EWMA Secretariat at ewma@ewma.org
References:
1. Kalowes P. et al. Use of a soft silicone, self-adherent, bordered foam dressing to reduce pressure ulcer formation in high risk patients: a randomized clinical trial. Poster presentation at Symposium on Advanced Wound Care Fall, Baltimore, Maryland, United States of America. 2012.
9. *In addition to current prevention protocols.

Find out more
www.molnlycke.com/puprevention

PROVEN PREVENTION

Can you afford the impact of not using our proven prevention?

✔ The only dressing supported by results of randomised controlled trials1,2
✔ Significant reduction in pressure ulcer incidence3,4,5,*
✔ Substantial cost savings4,6,*
✔ Combats 4 extrinsic causes of pressure ulcers7,8,9,*

Leading the way
SETTING THE STANDARD FOR INNOVATION & EVIDENCE

Mepilex® Border Sacrum

References:
1. Kalowes P. et al. Use of a soft silicone, self-adherent, bordered foam dressing to reduce pressure ulcer formation in high risk patients: a randomized clinical trial. Poster presentation at Symposium on Advanced Wound Care Fall, Baltimore, Maryland, United States of America. 2012.
9. *In addition to current prevention protocols.
Results from the world’s largest telemedicine project
– the Whole System Demonstrator

Summary
Telemedicine is highlighted as a solution to future healthcare challenges, but currently extant research is criticized for not being sufficient and of poor quality. The Whole System Demonstrator (WSD) is the largest and most comprehensive research project performed to date, that evaluated telemedicine effectiveness and costs in patients with chronic diseases including lung disease, heart disease, and diabetes. The trial was initiated in 2008 as a cluster randomized study including 3,230 patients from 179 general practices from three regions in the UK. The objective of the present review is to summarize the results from the WSD based on study data published to date. Results from five publications show that telehealth reduces mortality (odds ratio 0.54), the number of hospital admissions during a 12-month observation period, and patient use of secondary care. However, it is not yet clearly established which specific patient groups will realize these benefits, nor is it known what the underlying mechanisms of these advantageous effects are. The savings achieved by reducing hospital costs are, at least for now, less than the extra costs incurred by using telehealth, which increased overall net healthcare costs by 15%. There remains a strong need to expand focused research into telemedicine technology and applications to enhance the well-being, health outcomes, and quality-of-life of individuals in our rapidly ageing population.

INTRODUCTION
Telemedicine is applied to a number of patient groups on a global level and, among other applications, is used in diagnosing and treating wounds. Politicians and policy makers generally welcome telemedicine as one solution to the challenges imposed by the changing demographics in the western world. However, evidence regarding the clinical outcomes is scarce and more knowledge on patient perception and the organizational and economic consequences of telemedicine is needed.

One systematic review showed that clinical outcomes have been included in less than 5% of over 1,300 trials studying telemedicine. Another review also states that there is a severe lack of randomized controlled studies that have focused on telemedicine. Further, it has been demonstrated that studies on telemedicine use in general do not follow recognized standards for reporting scientific results. A Danish review comprising individuals suffering from chronic lung disease that are treated via telemedicine underlines the need for larger studies of higher quality. Another recent review of 141 randomized studies using telemedicine across several specialties (i.e., asthma, chronic lung disease, heart...
disease, and hypertension) found that in only 65 of the studies a statistically significant effect was found on primary outcomes. A further 43 studies showed significant effects on secondary outcomes. Very few studies have addressed the issue of telemedicine cost-effectiveness. Thus, evidence for using telemedicine to treat individuals with chronic diseases is weak and contradictory. In response to this scarce and scattered evidence on telemedicine effects, the U.K. Department of Health launched a high-quality study of telemedicine in 2008 – the Whole System Demonstrator (WSD). This study was planned to include 6,000 individuals and has been called the world’s largest study of telemedicine.

In the WSD, researchers from six universities evaluated the effects of telehealth and telecare. Telehealth involves the remote exchange of data between patients and health care professionals to assist in diagnosing and managing diverse diseases. The term telecare is used to describe remote, automatic, and passive monitoring of changes in an individual’s condition or lifestyle (including emergencies) in order to manage the risks of independent living. In this article we focus on the study of telehealth. The internal validity of the WSD was assessed by means of the Risk of Bias-tool. A level of significance of 5% was used.

**AIM**
The aim of the WSD was to evaluate whether telehealth for people with chronic diseases can provide cost-effective care to improve health outcomes, maintain independence, achieve significant gains in quality-of-life, and reduce unnecessary acute hospital use and costs. At the same time, the goal was to carry out a large-scale, pragmatic assessment of the impact of a broad range of telemonitoring technologies in the context of routine delivery of NHS care. Table 1 describes the studies in more detail.

### Table 1. Survey on included studies referring to Whole System Demonstrator

<table>
<thead>
<tr>
<th>Reference</th>
<th>Effect measure</th>
<th>N</th>
<th>Follow-up, mdr.</th>
<th>Recruitment</th>
</tr>
</thead>
</table>

CESD=Centre for Epidemiological Studies Depression Scale; CHF=Coronary Heart Failure; EQ-5D=EuroQoL-5 Dimensions; COPD=Chronic Obstructive Pulmonary Disease; SF=Short Form; STAI=State-Trait Anxiety Inventory.
### Inclusion and exclusion criteria

<table>
<thead>
<tr>
<th>Inclusion</th>
<th>Patient characteristics at study start</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients &gt;18 yrs-old suffering from at least one of three chronic diseases: COPD, diabetes, or CHF</td>
<td>Telemedicine</td>
</tr>
<tr>
<td>Patients having cognitive limitations</td>
<td>n=1,625</td>
</tr>
<tr>
<td>took part with help from relatives</td>
<td>Average age=70.9 yrs</td>
</tr>
<tr>
<td>Exclusion</td>
<td>Control group</td>
</tr>
<tr>
<td>Non-English-speaking patients</td>
<td>n=1,605</td>
</tr>
<tr>
<td>Patients without telephone access</td>
<td>Average age=69.7 yrs</td>
</tr>
<tr>
<td>Comorbidity was not an exclusion criterion</td>
<td>Patients with COPD=48%</td>
</tr>
<tr>
<td></td>
<td>Patients with diabetes=24%</td>
</tr>
<tr>
<td></td>
<td>Patients with CHF=28%</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Inclusion</td>
<td></td>
</tr>
<tr>
<td>Patients willing to take part in supplemental questionnaires in addition to the above criteria [8]</td>
<td></td>
</tr>
<tr>
<td>Exclusion</td>
<td></td>
</tr>
<tr>
<td>As above [8]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Inclusion</td>
<td></td>
</tr>
<tr>
<td>Patients willing to take part in supplemental questionnaires in addition to the above criteria [8]</td>
<td></td>
</tr>
<tr>
<td>Exclusion</td>
<td></td>
</tr>
<tr>
<td>Patients with cognitive limitations; otherwise, as above criteria [8]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Inclusion</td>
<td></td>
</tr>
<tr>
<td>Patients who did not want to partake [8]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average age=71 yrs</td>
</tr>
</tbody>
</table>

### RANDOMIZATION

The WSD was designed as a cluster-randomized study. Every general practice (N=238) in three UK regions were requested to take part and 179 of these (75.2%) accepted. Randomization of the general practices was performed centrally using an algorithm that ensured an equal distribution according to practice size, geographic area, deprivation index, proportion of non-white patients, and prevalence of the major chronic diseases (i.e., chronic lung disease, chronic heart disease, and diabetes).

### INTERVENTION

Patients in the control group were offered usual treatment, while patients in the intervention group were additionally offered telehealth. Telehealth includes a broad class of technologies, but all patients had a base unit and tools to measure weight (heart failure), pulse oximetry (COPD), and blood glucose (diabetes). The patients performed measurements up to 5 days per week. Questions regarding symptoms and information concerning patient education were forwarded to all participating individuals. Data from these measurements were sent to monitoring centres and handled by specially educated nurses. Each region was supplied with different technologies and service models.

### RISK OF BIAS

In existing papers on clinical and economic consequences of telemedicine, the randomization sequence is described, data completeness is detailed, and results descriptions are based on the protocol. However, patient allocation is not hidden to investigators and statisticians, and the patients are not blinded to their treatment group.

### CLINICAL EFFECTS

In the study addressing use of secondary care and mortality, the primary endpoint was the number of patients admitted to hospital during a 12-month period. Sample size was calculated from an expected admission reduction of 17.5%, and the study was based on registry data. Between May 2008 and December 2009 a total of 3,230 individuals were recruited. No statistically significant differences among patients in these two groups were found at baseline.

The use of hospital services was generally lower in intervention group versus control group patients (Table 2). The number of admitted patients accordingly was found to be

### Table 2. Hospital use and mortality after 12 months

<table>
<thead>
<tr>
<th></th>
<th>Control group (n=1,584)</th>
<th>Intervention group (n=1,570)</th>
<th>Percentage difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission proportion</td>
<td>48.2%</td>
<td>42.9%</td>
<td>-5.3 (-10.8 -3.7)</td>
</tr>
<tr>
<td>Mortality</td>
<td>8.3%</td>
<td>6.0%</td>
<td>-2.3 (-6.3 -1.3)</td>
</tr>
<tr>
<td>Emergency admissions</td>
<td>0.68</td>
<td>0.54</td>
<td>-0.1 (-2.6 -1.4)</td>
</tr>
<tr>
<td>Elective admissions</td>
<td>0.49</td>
<td>0.42</td>
<td>-0.0 (-0.8 -0.2)</td>
</tr>
<tr>
<td>Outpatient attendances</td>
<td>4.68</td>
<td>4.76</td>
<td>0.1 (+0.8 -1.3)</td>
</tr>
<tr>
<td>Emergency department visits</td>
<td>0.75</td>
<td>0.64</td>
<td>-0.1 (-0.8 -0.2)</td>
</tr>
<tr>
<td>Bed days/person</td>
<td>5.68</td>
<td>4.87</td>
<td>-0.8 (-3.2 -0.3)</td>
</tr>
<tr>
<td>DRG Tariff costs/person</td>
<td>2448b</td>
<td>2260 DKK</td>
<td>-7.7 (-19.4 -4.0)</td>
</tr>
</tbody>
</table>

CI = Confidence interval. *Based on [9, Table 3]. **Price level 2009: 1 GBP=8.232 DKK.
10.8% lower (statistically significant) in the intervention group, corresponding to an odds ratio of 0.82. The difference could be ascribed to the number of patients admitted to hospital within the first 3 months of the study period. Correction for differences in baseline data and patient use-of-services in the 3 years before enrollment did not change the conclusion. Overall mortality in the control group was 8.3% and in the intervention group 4.6% which is a statistically significant difference, corresponding to an odds ratio of 0.5.

**EFFECT ON HEALTH-RELATED QUALITY-OF-LIFE**

In the study examining health-related quality-of-life, the sample size was calculated on the basis of detecting an improvement of 0.3-fold of the standardized average of the effect variables, and included a total of 1,650 patients. Health-related quality-of-life was measured with the Health Survey Short Form SF-36 v2™. Data were collected by personal interview at the time of baseline measurement acquisition and also by postal questionnaires after 4 and 12 months of enrollment. A total of 1,573 patients took part in the measurements at inclusion. After 12 months 62% returned the questionnaire.

The trial showed that patients using telemedicine had no statistically significant better effect on quality-of-life, fear, or depression. The authors concluded that the study did not demonstrate any detrimental effect of using telemedicine on patient health-related quality-of-life.

**ECONOMIC EFFECTS**

The purpose of the economic analysis was to estimate the costs and cost-effectiveness of telehealth. Data from questionnaires to patients and health professionals taking part in the study were used. The study adopted a health and social services perspective including use of hospitals, primary care clinics, and other sources of community care. Concerning the costs of the intervention, the following were assessed: Telemedicine equipment, licenses, mounting of equipment and its maintenance, and personnel used in the telehealth monitoring teams. The drop-out rate from questionnaire return to investigators was 38%. The authors estimated that the groups were comparable overall even though there were some statistically significant differences. For example the proportion of patients with heart failure was higher in the usual care group whereas the proportion of patients with COPD was higher in the telemedicine group. Table 3 shows that the costs per patient in the telehealth group were 15% higher compared to the control group (during a 3-month period before the 12-month study enrollment). The main reason is that the average annual cost per participant for the telehealth equipment and support was £1,847 per patient for whom cost data were available at the 12-month final follow-up. These costs more than outweighed the savings in hospital costs. However, none of these results were significantly different between the two patient groups.

Two sensitivity analyses were performed on the consequences of an 80% reduction of telehealth equipment and an assumption of full utilization of equipment capacity. Both scenarios show a reduction in the costs per patients using telehealth by 7–8%, but the costs remained higher than in the control group. The authors calculated the incremental costs per gained quality-adjusted life-year to be £92,000 and concluded that telehealth is not cost-effective when used as an add-on to standard patient support and treatment.

**ORGANIZATIONAL EFFECTS**

An evaluation of the organizational factors having an impact on telehealth implementation was performed in parallel to the randomized study, as a longitudinal case-study. Data collection was performed by triangulating data from interviews with health personnel and administrator, from observations during implementation, and from document analysis. This evaluation showed that the implementation lessons and organizational learning amongst the trial sites were hindered by the requirements of the randomized trial design. An example of this includes the possible lack of directed intervention to patients with special needs and the lack of experienced-based adjustment during the trial among the healthcare professionals. The full organizational potential is thus not expected to be achieved.
BARRIERS TO PATIENT
As part of the WSD, interviews were performed with patients who declined to participate in the intervention. In the WSD, 36.7% of invited individuals did not want to take part after receiving a home visit and being provided information on study goals and inclusion requirements. Of the patients that declined to participate in the study only 22 of 61 patients accepted to go through an interview regarding their reasons for not taking part in the trial. The answers obtained from the interview can be categorized into the following:

Requirements for technical competence and operation of equipment.
Some patients declined because they felt that they were unable to operate equipment in a satisfactory manner. As an example some found it difficult to get the equipment to work and others had problems with false alarms due to faulty readings.

Threats to identity, independence, and self-care.
Some patients felt that the required medical equipment contributed to a feeling of morbidity, and furthermore, thought that the equipment should be used by sicker individuals. Some patients also found that the regular measurements required posed a threat to their independence.

Expectations of and experienced disruptions to health and social care services.
Some patients were quite satisfied with their current treatment approaches and health care professionals, and they did not want to make any changes to these arrangements.

The authors concluded that forthcoming projects related to telemedicine must assure that intervention does not threaten patient self-perception of independence, their ability to use required equipment, or inadvertently cause individuals feel sicker than they actually are. Also, time should be spent on thoroughly introducing and clarifying of all potential sources of uncertainty among the patients.

DISCUSSION
The WSD trial has demonstrated reduced mortality from 8.3 to 4.6% by using telemedicine to manage chronic diseases (i.e., chronic lung disease, chronic heart disease, and diabetes). The number of hospital admissions was reduced by 11% during a 12-month period. Patient health-related quality-of-life remained unchanged. The achieved savings however, were less than the costs related to establishing and implementing telehealth approaches, and overall costs per patient was increased by 15%

Central to interpreting the methodology and results of the WSD is the choice of patient sample, which included a heterogeneous group of individuals with either of three chronic diseases, i.e., diabetes, chronic obstructive lung disease, or chronic heart disease. So far, the WSD study organizers have published the effects of telehealth on the group as a whole, and uncertainty remains on disease-specific outcomes within the specific patient subgroups. Important issues have thus not yet been addressed in the primary articles.

The WSD was criticized in a BMJ commentary for not being precise in describing the influence caused by the sponsor (i.e., the Department of Health). Also, criticism has been raised that the Ministry of Health presented preliminary study data in a fairly positive manner before these data underwent rigorous peer-review and publication. Although the randomized design can secure the study design internal validity, it can also be potentially problematic. There is a danger that organizational gains are overlooked because improvements of the organization were not allowed during the trial. A lack of blinding of information on participating patients and healthcare professionals can additionally lead to bias in favor of telemedicine benefits.

If an á priori expectation is that telemedicine will contribute strongly in solving imminent demographic challenges in the healthcare system, the results from WSD are disappointing. The study did not show an overall reduction in costs per patient; nor did it show cost-effectiveness of using telemedicine. On the other hand, the study demonstrated a health gain by a significant reduction in patient mortality in the telemedicine group versus conventionally treated patients. Therefore, more clinical trials are needed before we can definitively assess the potential of telemedicine use for special patient subgroups, and to increase our knowledge of specific telemedicine mechanisms that govern health outcomes. Furthermore, it is important to stress that the technologies studied in the WSD are fairly old, having been selected for this project in May of 2008.

The WSD thus fits nicely into the overall picture of telemedicine that was clarified in a review from 2012. Telemedicine may have positive clinical impact, but only rarely will it, in its current format, reduce overall healthcare costs. Should we overtly reject the idea of telemedicine being a possible solution for the future problems of healthcare delivery in an increasingly elderly population? Should we simply discount the initiatives for testing new telemedicine solutions for people suffering from chronic
heart disease, chronic lung disease, diabetes, or chronic wounds? We think not. From observing the evolution of other kinds of technologies, it is clear that technical development experiences often follow a "hype cycle". That is, an initial phase that provides great expectations of a new technology typically is followed by a period of disillusionment when it becomes clear that not all goals can be reached in a satisfactory manner, or as rapidly as first envisioned. This phase is then substituted by a period in which more accumulated knowledge and re-evaluated approaches provide novel insight to improving the cost-effectiveness, and overall outcomes, of that technology.

In this particular scenario, we have substantiated the need for performing more research into integrating telemedicine into the healthcare system, including the importance of identifying patients that will most benefit from telemedical technology. Along these lines, a Danish study (i.e., TEL-EKAT) showed that a group of patients with chronic lung disease found that home monitoring was a "pseudo" setup that had negligible impact on their perceived rehabilitative benefits. In the Southern Denmark region, we are finalizing a study on diabetic foot ulcers that will provide us with information on the utility of telemedicine in the treatment and follow-up of this patient group. Ulcers of any type would a priori seem to be an obvious target for a telemedicine setup, and as of January 2014 telemedicine wound treatment has been disseminated to all regions in Denmark. We expect that this study will allow us to better qualify the technologies that are most suitable to managing this severe ulcer type.

As of today we have solutions that work from a technical point of view. However, we need to adjust the whole organization and the workflows to optimize the telemedicine approach to improving healthcare outcomes. Furthermore, we need to develop new technologies that minimize costs per patient, and make sure that these cost savings (e.g., caused by reducing the number of readmissions) are not completely spent on technical equipment costs.

**CONCLUSION**

Critically assessing the existent WSD studies shows that, although applied telemedicine technology appears to have a major effect on decreasing mortality, this major beneficial effect is confounded by other less-positive results. Overall, the implemented technology and the organization behind telemedicine systems are not yet cost-effective. We require a steady supply of additional studies that implement newer telehealth technologies with well-defined patient populations. The WSD studies contain fine examples of how to evaluate telemedicine in a design that secures high internal validity. We deem these approaches to be highly relevant for the wound society members and we advocate initiating clinical randomized studies using a comparable multidisciplinary setup as, for example, the Model for Assessment of Telemedicine applications – MAST.
What you see is what you get.

Cutimed® Siltec Sorbact® offers you safe infection control and visible absorption built right in.

Cutimed® Siltec Sorbact® offers you safe infection control and reliable fluid management in one dressing.

- Bacteria are removed with each dressing change to reduce overall bacterial load
- No chemicals are released into wound bed which could cause cytotoxicity or resistance
- Vertical absorption draws excess exudate away from wound bed
- Super-absorbers retain fluid, even under compression
- Transparent PU top film allows easy saturation monitoring

www.cutimed.com
Vivano®
Safety. And Simplicity.

The VivanoTec negative pressure unit by HARTMANN is the central component of the Vivano system for successful negative pressure treatment of wounds. Its low weight means it can be used either on the move or in hospitals. Thanks to its intuitive menu navigation, the VivanoTec negative pressure unit combines easy usage with highly precise treatment settings and the necessary reliability, thus guaranteeing a high level of safety and user-friendly handling.
Nutrition and chronic wounds

This technical document was based on a comprehensive and systematic review of the literature. It was submitted for consensus agreement by the National Advisory Group for the Study of Pressure Ulcers and Chronic Wounds (GNEAUPP). The result was a 68-page document that included 201 bibliographic references with two appendices of nutritional screening tools.

The document is divided into four (4) sections:

1. **Introduction.** This section defines the concept of wounds and wound variants as well as different treatment modalities, including the concepts of food, nutrition, and how they affect treatment. It also defines the broader concept of malnutrition, which is caused by unhealthy diets that may have an excess or deficit of food energy. Thus, malnutrition can occur in obese or underweight individuals, and in both cases, results in deficiencies of essential nutrients.

2. **Current state of knowledge.** This section reviews current knowledge on nutrition, pressure ulcers, and wound prevention and treatment.

The first subsection refers to epidemiology and existing reports published in the literature on nutritional status and chronic wounds. Specifically, it focuses on the epidemiology of malnutrition and wounds, and their relationship according to wound aetiology. A distinction is made between nutritional status and pressure ulcers (the type of wound most referenced in the literature and related to nutrition), and nutritional status and leg ulcers. Here, there are few references in the literature. This subsection concludes with an exploration of nutritional status and wound dehiscence.

Scientific evidence, obtained primarily from observational studies, links malnutrition directly to pressure ulcer severity and incidence. Regarding diabetic foot ulcers, good glycaemic control is thought to be important in neuropathic ulcer healing; however, little evidence exists to support this idea. Regarding ulcers of venous aetiology, few studies have investigated the role of nutrition in healing. One study reported that people with this pathology have lower levels of vitamins A and E, carotenes, and zinc; however, to date, no evidence has been presented to confirm that supplementation with these micronutrients improves healing. Regarding wound dehiscence, it is known that this complication is 8 times more common in vitamin C-deficient patients than in patients with normal vitamin C levels. In addition, obese patients are thought to have more infections and delayed wound healing, as well as a greater incidence of dehiscence.

The second subsection deals with the assessment, screening, and diagnosis of malnutrition, with special emphasis on nutritional screening and assessment tools. A description is provided of steps to follow in nutritional assessment, as recommended in the guidelines of leading societies dedicated to nutrition science. Regarding nutritional assessment and screening, recommendations are made about the collection of clinimetric data for the various instruments and tools, which are validated and based on research.

Assessment consists of two parts: nutritional screening and the nutritional assessment itself. The purpose of screening is to identify malnourished individuals or those at nutritional risk. For these individuals, a complete assessment is required.

The guidelines of the European Society for Clinical Nutrition and Metabolism (ESPEN) for nutritional screening recommend a series of steps that must be considered for all hospitalised patients:
Upon admission, a simple nutritional screening method must be used to identify patients at nutritional risk.

Patients identified as being at nutritional risk require a complete nutritional assessment.

The patient’s individual nutritional requirements should be evaluated, and patient care and nutritional therapy should be planned.

The monitoring and definition of targeted outcomes should be determined.

Finally, screening results, full assessment, planning, and monitoring should be communicated to the other professionals involved, especially when the patient is transferred to the community or to another institution.

Rasmussen et al. recommend a series of steps for assessing nutritional risk and detecting malnutrition:

**Detection: The purpose of nutritional screening**

This step is to identify patients at risk of malnutrition so that nutritional interventions can be considered. Identification of an altered nutritional state enables the adjustment of patient care so that nutrition can be optimized.

**Assessment: the screening methodology**

The screening can be performed using various available methods. The ideal test is one that has high sensitivity (i.e. if it tests positive in patients with the condition) and high specificity (i.e. if it tests negative in patients without the condition), but it is also important that the tool has a positive predictive value (which would avoid overdiagnosis). In short, the method used should offer the best validity and reliability at the lowest cost possible, i.e. it should be easy and fast to do.

**ESPEN has developed guidelines for screening tools**

Screening tools should detect caloric and protein malnutrition and/or predict the likelihood of malnutrition developing or worsening of the patient’s condition. From this perspective, it should meet four principles:

i. What is the patient’s current condition? Body mass index (BMI) can provide important information about nutritional status, although this measure may be less useful for children, adolescents, and elderly individuals. Weight and height can be used to calculate BMI. Alternatively, the mid-portion of the upper arm (between the acromion and the olecranon) can be measured and compared with a table of percentiles for a particular population according to age and sex.

ii. Is the patient’s condition stable? Obtain information about the patient’s history of weight loss by asking the patient directly or, if possible, consulting medical records. Unintentional weight loss greater than 5% of total body weight over 3 months is considered significant. This approach may be helpful when malnutrition cannot be identified by calculating BMI, e.g. weight loss in obese people. Furthermore, weight loss may be predictive of subsequent nutritional deterioration.

iii. Will the patient’s condition worsen? This question could be answered by determining whether food intake has recently decreased, and if so, approximately how much and for how long. This can be confirmed by measuring the food intake of hospitalised patients or through use of a diet diary. If it is determined that food intake is lower than typically required to maintain normal weight, then weight loss will likely occur.

iv. Will the condition of nutritional deterioration accelerate? In addition to decreased appetite, the patient’s nutritional requirements may increase because of metabolic stress associated with severe illness. For example, major surgery, sepsis, or multiple traumas, which may be accompanied by chronic wounds, may cause nutritional status to worsen quickly or may result in malnutrition.

**EWMA values your opinion and would like to invite all readers to participate in shaping the organisation.**

Please submit possible topics for future conference sessions.

**EWMA** is also interested in receiving book reviews, articles etc.

Please contact the EWMA Secretariat at ewma@ewma.org

**NUTRITIONAL SCREENING TOOLS**

In recent years, various tools to assess nutritional status have been developed, validated, and implemented, although not all are available in Spanish. The following tools were developed specifically for elderly people: the Payette instrument; Nutrition Risk Score; Nutritional Risk Index; Sadness, Cholesterol, Albumin, Loss of Weight,
Eating problems, Shopping and Cooking problems (SCALES); Global Subjective Assessment; Malnutrition Universal Screening Tool (MUST), Mini Nutritional Assessment (MNA); and Nutrition Risk Screening 2002 (NRS 2002).

The NRS 2002 is recommended for use in hospitals, whereas the MUST tool is intended for general use. The MNA is the only tool validated in Spanish.

The third subsection presents key scientific evidence for the role of nutrition in chronic wound prevention and treatment, examining mechanisms underlying physiological and metabolic processes. Topics include energy intake; protein and/or specific amino acid intake and fatty acid intake and their potential immunomodulatory effects; liquid intake; and intake of micronutrients (zinc, iron, copper, alpha lipoic acid, and vitamins A, C, K, and E). A section focuses on nutritional interventions and their role in wound prevention and treatment.

The conclusion highlights the important role of nutrition in wound care, emphasising that nutritional screening and assessment have been, thus far, overlooked in the field of wound research. Although substantial scientific evidence is beginning to appear in this field, further research is needed.

3. Recommendations for clinical practice. Recommendations are presented with the level of supporting evidence based on the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group guidelines. Recommendations take into account questions that clinicians should ask such as: When should nutritional status be assessed? Who should assess nutritional status? How should nutritional risk be assessed? Which nutritional interventions can prevent and treat chronic wounds?

4. Recommendations for researchers. Recommendations are presented to provide researchers with guidance in fields for which further research is needed.

This document therefore provides a broad analysis of this topic and identifies existing gaps in knowledge of the relationships among nutritional status, nutritional interventions, and wound management.

3. Recommendations for clinical practice. Recommendations are presented with the level of supporting evidence based on the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group guidelines. Recommendations take into account questions that clinicians should ask such as: When should nutritional status be assessed? Who should assess nutritional status? How should nutritional risk be assessed? Which nutritional interventions can prevent and treat chronic wounds?

4. Recommendations for researchers. Recommendations are presented to provide researchers with guidance in fields for which further research is needed.

This document therefore provides a broad analysis of this topic and identifies existing gaps in knowledge of the relationships among nutritional status, nutritional interventions, and wound management.

3. Recommendations for clinical practice. Recommendations are presented with the level of supporting evidence based on the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group guidelines. Recommendations take into account questions that clinicians should ask such as: When should nutritional status be assessed? Who should assess nutritional status? How should nutritional risk be assessed? Which nutritional interventions can prevent and treat chronic wounds?

4. Recommendations for researchers. Recommendations are presented to provide researchers with guidance in fields for which further research is needed.

This document therefore provides a broad analysis of this topic and identifies existing gaps in knowledge of the relationships among nutritional status, nutritional interventions, and wound management.
Abstract
The concept of biofilms has emerged in the clinical setting during the last decade. Infections involving biofilms have been documented in all parts of the human body, and it is currently believed that the presence of biofilm-forming bacteria is equivalent to chronic infection. A quick Pubmed search reveals the significance of biofilms, as evidenced by a dramatic increase in scientific publications on the topic, as well as in publications concerning wounds with biofilms, which reached 600 publications in 2013.

Judged from the number of publications, it appears that biofilms play a significant role in wounds. However, the impact of biofilms is often debated, because infected wounds were also treated before the concept of biofilms was coined. In this short review, we will address the significance of biofilms and their role in wounds, and discuss the future tasks of the biofilm challenge.

BIOFILMS IN SHORT
Bacteria are found in at least two distinct states – planktonic and sessile cells. Planktonic cells are classically defined as “free flowing bacteria in suspension” as opposed to the sessile biofilm state, which is defined as “a structured community of bacterial cells enclosed in a self-produced polymeric matrix and adherent to an inert or living surface”1.

Until the last decade, microbiologists have focused and emphasized the planktonic state over the biofilm state. However, the importance of the biofilm mode of growth is becoming increasingly evident with the availability of improved methods to study sessile bacteria; hence the subsequent accumulation of evidence for its widespread presence2-3.

Biofilms were discovered by one of the first microbiologists, the Dutch scientist Antoine van Leeuwenhoek, in the 1650s, but the actual breakthrough regarding this phenomenon occurred 328 years later when Costerton and colleagues published their work on “How Bacteria Stick” in 19784. Since 1978, research on biofilm bacteria has exploded (Figure 1).

It has now been established that most biofilm-growing bacteria cause chronic infections5, which are characterized by persistent inflammation and tissue damage6. These chronic infections, including wound and foreign body infections, are infections that “1) persist in spite of antibiotic therapy and the innate and adaptive immune and inflammatory response of the host and 2) which, in contrast to colonization, are characterized by the immune response and persisting pathology”7.

Traditionally, biofilms were considered as being attached to a surface. However, in situ hybridization (FISH) and confocal laser scanning microscopy (CLSM) of different infection sites have shown that the bacteria do not need to be attached to surfaces to establish a chronic infection. Instead, bacteria generate non-attached microcolonies by aggregating with their fellow bacteria through matrix components, and they appear to put up an impenetrable barrier to host immune cells (e.g., phagocytic cells)6,8-10.

The challenge faced with regard to biofilms in chronic infections lies in their significant tolerance to treatment with antibiotics and to the host’s immune response11. The antibiotic tolerance of the biofilm has been investigated in numerous in vitro models; these studies show that the biofilm can withstand treatment with very high dosages of antibiotics that are up to 1000 times the minimal inhibitory concentration12.
As mentioned above, probably the most important trait of the biofilm is its innate tolerance to antimicrobials and antiseptics. Here, slow growth and matrix molecules are of the utmost significance. The biofilm matrix is composed of macromolecules such as proteins, extracellular DNA, and polysaccharides. This matrix surrounding the bacteria in the biofilm has been shown to reduce penetration and bind protruding antibiotics.

In addition to the matrix, it appears that the biofilm population consists of bacteria with different physiologies, e.g., some are dormant and some are actively growing. With this knowledge, treatment regimens with combinations of different antibiotics have successfully been designed to target these different sub-populations. The administration of such combinations to patients has been successful to some extent and seems to suppress biofilm infection; however, in most cases, the eradication of biofilm infections has proven impossible and the infection recurs when treatment is stopped.

For wound care, antiseptics are preferred over antibiotics. In our hands, most antiseptics (including silver and PHMB) are very effective against planktonic bacteria and immature biofilms. However, when applied on mature biofilms (i.e., those older than 24 hours) with low growth rates and a solid matrix, they can only inhibit further growth and prevent bacteria from spreading beyond the biofilm (unpublished observations), and do not resolve the infection. This increasing tolerance with age has also been reported for traditional antibiotics.

Biofilm tolerance to the host immune response is also characteristic of chronic infections. Polymorphonuclear leukocytes (PMNs) are normally the first cells appearing at the site of infection, and their role is to phagocytize microorganisms and foreign materials. Despite being part of the acute inflammatory response, PMNs are still seen in chronic infections often surrounding the biofilm. Investigations of P. aeruginosa biofilms have shown that these PMNs are either paralyzed or killed (lysed) by a virulence factor produced by P. aeruginosa, called rhamnolipids. The lysis of PMNs causes further inflammation and attracts additional PMNs, and this cycle contributes to chronic P. aeruginosa infection.

As mentioned, the cells of a biofilm have been shown to be embedded in a self-produced matrix consisting of polysaccharides, proteins, and DNA. The matrix also plays a role in the tolerance of the biofilm by decreasing the penetration of PMNs and antibiotics. Interestingly, DNA released from dead PMNs has been shown to enhance initial biofilm development, thereby enhancing the biofilm fortress.

BIOFILMS IN WOUNDS
Wounds are disposed to infection, as the loss of skin integrity provides a wet, warm, and often nutrient-rich setting that is beneficial for microbial colonization. Bacterial infections have been shown to prevent wound healing. Data suggest that the presence of certain bacteria (e.g., P. aeruginosa) in these ulcers can induce ulcer enlargement and delayed healing. Recent analyses from chronic wounds have identified the presence of biofilm-growing bacteria, thereby explaining why these wounds persist.

Publications regarding biofilms and wounds reached a total of 600 last year. This number is impressive and indicates that biofilms play an important role in wound healing (Figure 2). However, it is unclear whether the delay in wound healing is caused by bacteria present in biofilms in the slough at the surface of the wound or if bacteria situated deeper cause this effect. Hurlow et al. concluded from a small series of cases that the appearance of biofilms in wounds is quite different from the slough and requires different management strategies for its control. In 2009, Fazli et al. found that the distance of the P. aeruginosa biofilm from the wound surface was significantly greater than that of S. aureus biofilms, suggesting that the distribution of the biofilms in wounds is non-random and that important biofilms are situated deeper in the wound bed. It was thus suggested that biofilms (i.e., P. aeruginosa) located in the deeper regions of the wound might play a role in arresting the wound at a stage dominated by inflammatory processes. Bjarnsholt et al. have proposed that these biofilms keep the wound in a chronic inflammatory state, which corresponds to findings showing that a persistent influx of PMNs, elevated matrix metalloproteases, and imbalances in several cytokines are found in chronic wounds.
wounds. Wolcott and colleagues showed in 2008 that an intensive biofilm-based wound-care strategy significantly improved healing frequency. The findings demonstrate that effectively targeting bacteria in chronic wounds is an important component of transforming ‘non-healable’ wounds into healable wounds.

THE CHALLENGING BIOFILM

From the above studies it appears that biofilms are evident in wounds. Biofilms were also addressed in the 2013 EWMA document “Antimicrobials and Non-healing Wounds Evidence, controversies and suggestions”. The conclusions in the document were that further studies elucidating the precise role of biofilms are urgently needed since the nature of biofilms make their study very difficult and therefore their impact a little controversial.

Diagnosing biofilm infections is extremely difficult, and therefore evaluating the impact of biofilms and novel anti-biofilm treatments is equally difficult. The difficulties in diagnosing biofilms are in large part due to their very small size. A recent literature study showed that biofilms that cause inflammation rarely grow to sizes larger than 100 μm. When considering that the spatial distribution of such small biofilms is highly heterogeneous in a wound, one can imagine that the chance of finding and detecting the bacteria are small. In addition to the low chance of ‘hitting’ a biofilm when sampling from a wound, the bacteria also need to be released from the matrix. In addition to these difficulties, the method of detection might also influence the diagnosis. Culturing bacteria has been the gold standard, but many wound pathogens are very difficult to culture (even if grown anaerobically) and persistent cells from the biofilm might even be impossible to culture. Molecular methods are generally more sensitive if used with care; however, they also have their limitations and the detection of 16s rRNA has also proved difficult in non-growing biofilms (unpublished data).

Due to the above complications, in vitro biofilm studies have widely been applied in the study of anti-biofilm treatment strategies as an obvious alternative to clinical trials. Such studies are much needed and yield much important information if used with care. Until recently, such treatment strategies have been tested on fast growing bacteria in shaking cultures; these studies did not therefore involve biofilm-growing bacteria. Now, the use of biofilm models is becoming more common. The downside of in vitro models is that it is impossible to mimic a clinical biofilm; nevertheless, the lack or addition of host components such as proteins and immune cells should always be considered. Another challenge researchers should be aware of is the false dogma stating that surface attachment per se makes the biofilm tolerant. This is not true, because young surface-attached biofilms still have high growth rates and only a limited matrix shield and are therefore highly susceptible to most antimicrobials. In our hands, biofilms across species and models become tolerant between 20 hours and 48 hours after inoculation, but continue to develop this tolerance.

RETHINKING DIAGNOSIS AND TREATMENT

Despite the above difficulties in the study of biofilms, it appears that tolerant biofilms do impact wound healing as they impact other chronic infections. As suggested for other biofilm infections, there is an urgent need to rethink both the diagnosis and treatment strategies. Wound expert Keith Cutting wrote a review on the challenge of wound cleansing, in which he proposed that we need to rethink our approach to wound cleansing: he suggested more reflection on individual needs and thereby a reflection of the need to use anti-biofilm treatment strategies.

When studying the impact of biofilms and their treatment in patients, it is important to combine several methods of detection to avoid false negatives. Studying the healing of chronic wounds is further complicated by the challenge and longevity of non-healing wounds.

As mentioned above, eradicating biofilm-forming bacteria is almost impossible, and the best option is to remove the infected area if possible. Infected implants and catheters can be removed, infected lungs of cystic fibrosis patients can be explanted, and wounds can be debrided; however, even in these cases, biofilms seem to recur, and hence it is very important to find and develop new strategies to combat bacteria in wounds. Much research is ongoing within anti-biofilm strategies, and a number of patents on single compounds are pending.

In our hands, one of the most promising strategies across all biofilm-related infections is biofilm disruption combined with an antimicrobial agent. Biofilm disruption and dispersal experiments suggest that biofilm tolerance is readily reversible, whereas classic resistance due to mutations is not. Upon physical disruption the biofilm, the bacteria inside the biofilm suddenly find themselves outside of the protective matrix with fresh access to nutrients and oxygen, which might induce growth. Thus, a potential anti-biofilm strategy could be either mechanical or enzymatic disruption of the wound biofilm. Several patent applications are already pending on the anti-biofilm effects of a biofilm destabilizing compound used together with common antimicrobials in wound dressings.

Furthermore, a good fraction of the latest wound biofilm publications have been focused on novel treatment strategies as proteins and immune cells should always be considered.
strategies and novel models of wound infection involving disruption of the biofilm alone or in combination with antimicrobial agents.

Disruption of biofilms has been demonstrated with ultrasound waves. Although the endpoint of most studies has been surface release from young biofilms (i.e., not necessarily equal to a reduced infection); some studies have managed to prove that ultrasound waves can effectively enhance the efficacy of antimicrobials [45-50]. Clinical studies of ultrasound wound debridement have also shown good effects [51,52]; however, the decrease in bacterial counts were not significant [53]. This non-significant decrease in bacterial burden could be explained by the difficulties in detecting biofilms, but it has also been suggested that the positive effect arises from a multitude of factors such as cellular recruitment and stimulation, collagen synthesis, angiogenesis, and fibrinolysis [53,54]. However, non-published data from our laboratory and the recent knowledge of biofilms in non-healing wounds has led to the hypothesis that ultrasound, in addition to the above mentioned parameters, aids biofilm disruption and thereby wound healing [55].

Maggot debridement therapy of non-healing wounds was approved in 2004 by the FDA and has been shown to possess an antibacterial effect in combination with other wound healing properties [56-59]. An interesting study has recently shown that larvae actually combine physical disruption with enzymatic destabilization of wound biofilms [50]. As mentioned in the introduction, DNA stabilizes all biofilms. Apparently, in addition to physically grazing, the biofilm larvae secrete DNases that degrade DNA and thereby further weaken the biofilm structure. As with the ultrasound, larvae also have secondary positive effects on wound healing immunomodulation, angiogenesis, and tissue remodelling and regeneration, and this may explain their beneficial effects on wound healing. Another example of combining disruption of biofilms with positive secondary effects is negative pressure therapy [60-63]. The authors found that negative pressure disrupted the matrix of biofilms on porcine skin implants, making them more susceptible to antiseptics [61].

As observed with other biofilm infections, targeting several factors in wound biofilms seems to be a solid strategy worth investigating. In the case of wound healing, the secondary effects as discussed above might even be more pronounced and thus constitute a promising strategy.

THE TASKS

From the above discussion of the impact of biofilms, it is clear that we have a number of tasks to solve. First of all, in order to prove that biofilm plays the role it is believed to do, we need to improve diagnostic methods. This task is also paramount when evaluating anti-biofilm strategies in vivo. Secondly, the study of possible treatment strategies for biofilm infections needs to be expanded and the in vitro models need to be aligned to simulate the wound in the best possible way.

For these tasks to be solved, it is important that scientists, doctors, and wound healing specialists communicate and share their thoughts and concerns on the issue. If we combine the knowledge of wound care professionals and basic scientists, we can hopefully take a giant leap towards turning non-healing wounds into healing wounds. Such multidisciplinary communication between doctors and biofilm researchers has contributed significantly to the treatment of chronic lung infections in patients with the genetic disorder cystic fibrosis [64,65]. Communication through research journals is significant; however, it is our experience that the most fruitful results and collaborations come from live discussions and consensus debates at conferences. At the EWMA conference in 2013, the topic of biofilms was for the first time denoted in an EWMA document; furthermore, a number of abstracts dealt with biofilms in addition to the popular workshop. In particular, at the workshop, we had a great discussion on the future of biofilm research. It is our hope that even more people, from all branches of wound care, will attend the biofilm workshops at EWMA GNEAU0P 2014 in Madrid, so we can discuss the best approach to finding better ways to study, diagnose, and treat biofilm-infected wounds.

58


BIOFILM COURSES 2014

■ MADRID, SPAIN 13 MAY 2014

Full-day course in Biofilm

Learning objectives:
The importance of the bacterial biofilm mode of growth is becoming increasingly renowned as improved methods to study sessile bacteria have become available. The course will focus on the impact of biofilms in wounds, and implant associated areas, as well as addressing difficulties in diagnosis and treatment.

Lectures:
- Brief introduction to bacterial biofilm and its characteristics
- Impact of biofilms in wounds and on implants
- Pitfalls and guidelines in diagnosis of biofilm infections
- Treatment strategies of biofilm infections in wounds and implants
- Future treatment strategies

■ COPENHAGEN, DENMARK 4-5 JUNE 2014

2nd practical course in Biofilm Procedures

The biofilm course will introduce the participants to the topic of biofilm and its huge impact on chronic infections. Through lectures and a full day of hands on experiments, the participants will gain a vast understanding of biofilms and usable knowledge of how and why to implement biofilms into their research or product portfolio.

The biofilm groups and the Biofilm Test Facility at the University of Copenhagen and Rigshospitalet have been investigating bacterial biofilms for 15 years and are regarded as leading pioneers in the field.

For registration and more information on both courses, please see

WWW.BIOFILMCOURSES.EU

Contact
Biofilm Course Secretariat:
EWMA Secretariat/CAP Partner
Nordre Fasanvej 113, 2.
DK-2000 Frederiksberg
Tel.: +45 70 20 03 05
info@cap-partner.eu
In January 2013, the United Kingdom’s National Institute for Health Research (NIHR) established eight new Healthcare Technology Co-operatives (HTCs) to act as centres of expertise to focus on clinical areas or themes of high morbidity and unmet needs of National Health Service (NHS) patients with the aim of fostering innovation in these areas. Working collaboratively with industry, the HTCs aim to develop new medical devices, healthcare technologies, or technology-dependent interventions, which improve patient treatment and quality of life.

The eight HTCs cover a diverse array of clinical problems ranging from mental health to cardiovascular disease management. One of the key areas to benefit from the NIHR’s recognition of unmet need was wound care, with Bradford Teaching Hospital’s NHS Foundation Trust designated as the host organisation for the NIHR Wound Prevention and Treatment HTC (NIHR WoundTec HTC).

The NIHR WoundTec HTC is led by Professor Peter Vowden, the HTC’s Clinical Director, and builds on an established strategic partnership between wound care experts in King’s College Hospital London, Queen Elizabeth II Hospital Birmingham, and the universities of Leeds, Bradford, Wolverhampton, and Southampton (Table 1). Together, these experienced clinicians and academics have a proven track record in wound prevention and treatment, acute and chronic wound management, patient-focused care, patient-led device design, and clinical trial management.

TOWARDS COST-EFFECTIVE WOUND CARE

The management and prevention of skin breakdown is a major cost burden for health care providers and a common area for litigation, yet wound prevention and treatment can often be an area of relatively unregulated clinical practice with a poor evidence base for practice. Variation in clinical outcome across a wide spectrum of health care providers and within diverse national health care systems are well recognised and have led to the adoption of pressure ulcer prevention standards and wound healing rates as quality indicators for clinical care provision.

Funding constraints within all health care systems have led to increasing recognition of cost, in addition quality, as a driver for change in practice. Wound care products form a major subsector of the medical devices industry, and along with staff costs, constitute a major cost burden for healthcare providers. It is therefore understandable that development of new, “advanced”, and more effective medical devices aimed at improved wound care provision is desirable but must be achieved within the constraints of cost effectiveness. In order to aid in the understanding of current wound care

---

Table 1: Strategic partners in the NIHR WoundTec HTC

| Bradford Teaching Hospital’s NHS Foundation Trust, led by Professor Peter Vowden |
| Specialises in: Industry links, patient focus, clinical trial delivery, clinical care, and education. |

| King’s College London, led by Dr. Patricia Grocott and Professor Glen Robert |
| Specialises in: Clinical data capture, identification of unmet needs, co-design of novel medical devices with users and manufacturers, and proof-of-concept testing. |

| University of Southampton, led by Professor Dan Bader |
| Specialises in: Sensor development, device and support system assessment, and end-user evaluation. |

| University of Leeds, led by Professors A Nelson and J Nixon |
| Specialises in: Evidence review and clinical trial design and evaluation. |

| University Hospital Birmingham’s NHS Foundation Trust, led by Dr. Carol Dealey, Lt Col Steven Jefferies, and Professor Sir Keith Porter |
| Specialises in: Acute and chronic wound management, clinical trial and care evaluation, and horizon scanning. |

| University of Bradford, led by Professors Stephen Britland (currently at University of Wolverhampton) and Des Tobin |
| Specialises in: Laboratory and cellular research to understand the biological action of devices. |
practice within the United Kingdom, WoundTec HTC has commissioned, largely through funding obtained from the wound care medical device industry, a health economic and outcome project, which aims to assess the current “real-life” cost and outcome of wound care delivered to a randomly selected population within the United Kingdom. This data will hopefully assist in informing future wound care developments and policies.

AIM OF WOUNDTEC HTC
The successful NIHR HTC model has already raised the profile of wound care within the United Kingdom and now provides the opportunity for healthcare professionals to propel forward a patient-focused, centralised, and coordinated wound care strategy supported by relevant research. The aim of NIHR WoundTec HTC is to be inclusive and encourage participation; with wider input and ideas for innovation, it is more likely to succeed in its goal of advancing the cause and improving the quality of life of patients with wounds, accelerating innovation, development, adoption, and diffusion of wound-related medical devices within healthcare systems.

WoundTec HTC is already working with patients and staff to identify unmet needs within wound care and translate these needs into innovations relevant to NHS and the wider healthcare community. Wound care has often lacked an effective voice and a logical implementation strategy; this development will seek to rectify this by fostering and coordinating device and system development led by patient and clinician needs rather than being largely industry pushed.

WoundTec HTC will:
- Identify patient and clinical needs
- Act as a platform for innovation
- Identify and develop promising concepts for medical devices derived from an established network of patients, clinicians, academics, and industry
- Provide theoretical, methodological, and design expertise, as well as a clinical base to develop these concepts into testable interventions and devices
- Offer advice on testing the feasibility, effectiveness, cost effectiveness, and acceptability of proposed innovations in NHS settings and various care pathways and promote the spread of best practice
- Work with industry to foster need-driven product innovation

INVOLVING THE END USERS
Securing greater patient and public involvement in healthcare service delivery and research is a central theme of health policy in many countries and are key areas for all of the HTCs. A model developed by the University of Leeds and piloted in Bradford with patients with chronic leg ulcers demonstrated that a patient-led approach to innovation is valuable to industry, health providers, and higher education as it can help identify new market opportunities (McNichol 2012, Elberse 2012).

Through adoption of these principles, NIHR WoundTec HTC has already supported a number of successful innovative grant applications, taken areas of need identified by patients to academics, established working relationships with industry, and established partnership arrangements with two other NIHR HTCs (Devices for Dignity (Sheffield) and Trauma management (Birmingham)). Opportunities for co-operation with similarly focused European-based national organisations utilising the infrastructure support of pan-European groups such as the European Wound Management Association will allow access to additional funding streams, including Horizon 2020 for wound-related research and medical device development. The themes for 2014 within the Horizon 2020 are outlined in Table 2 and provide scope to develop wound-related projects.

For further information on the NIHR Wound Prevention and Treatment HTC, visit our web site or contact Emma Martin (e.martin@medilink.co.uk).

Table 2: Seven themes for Horizon 2020

<table>
<thead>
<tr>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding health, aging, and disease</td>
</tr>
<tr>
<td>Effective health promotion, disease prevention, preparedness, and screening</td>
</tr>
<tr>
<td>Improving diagnosis</td>
</tr>
<tr>
<td>Innovative treatments and technologies</td>
</tr>
<tr>
<td>Advancing active and healthy aging</td>
</tr>
<tr>
<td>Integrated, suitable, citizen-centred care</td>
</tr>
<tr>
<td>Improving health information and data exploitation, and providing an evidence base for health policies and regulations</td>
</tr>
</tbody>
</table>

References
“An integrated part of wound management.”

Debrisoft®

- removes debris effectively in a quick and easy way
- stimulates wound healing by protecting newly formed tissue
- improves quality of life being almost painless
TARGET GROUPS FOR SWAN-ICARE NPWT

The device is expected to be used primarily by patients with diabetic foot ulcers (DFU) or venous leg ulcers (VLU).

**SWAN-ICARE PROJECT**

To enable monitoring and treatment of patients in their own home environment or long term care, the SWAN-iCare project aims to develop a Smart Negative Pressure Device (SNPD) (Figure 1). This device will integrate non-invasive sensors that allow objective, continuous, real-time monitoring of critical parameters with personalised therapy tailored to supporting the patient’s wound condition. In addition, the device will have the potential to remotely release active agents to assist in the wound healing process. To facilitate distant monitoring and support provided by centralised specialists to patients being cared for outside of the hospital environment, the device will be equipped with information and communication technologies (ICT).

The SWAN-iCare device will:

- Collect data and monitor several wound parameters via non-invasive integrated micro-sensors
- Offer the opportunity to provide innovative personalised therapy in combination with the negative pressure wound therapy
- Allow health care providers to be remotely aware of the patient’s condition and receive alerts highlighting situations that require direct actions

**TARGET GROUPS FOR SWAN-ICARE NPWT**

The device is expected to be used primarily by patients with diabetic foot ulcers (DFU) or venous leg ulcers (VLU).

Chronic ulcerative skin lesions affect approximately 1.5% of the population and represent a considerable medical and social problem. The patient affected by this pathology is generally geriatric and likely to suffer from concomitant illnesses. Chronic ulcers have different causes and can be divided into the following main categories: vascular ulcers (venous, arterial, mixed), diabetic foot ulcers, pressure ulcers, and ulcers of different aetiology. The above pathologies refer to chronic and invalidating conditions that profoundly affect the patients’ quality of life and often lead to psychological disorders such as depression.

New treatments for these pathologies have led to improvements in lesion management and in the quality of assistance provided by medical and paramedical staff, but methodologies for monitoring lesions have not kept pace with this progress.

Effective and accurate monitoring of skin lesions should be performed by measuring the complete status and evolution of the skin lesion in an objective, precise, and reproducible way. The main goal of the SWAN-iCare project is to design a system that can monitor the qualitative and quantitative evolution of a skin lesion with an easy-to-use technological system.
Only a small proportion of patients with chronic ulcers are currently being treated by NPWT. This number is expected to grow in the next few years as the cost of NPWT decreases. The SWAN-iCare device will offer an optimised NPWT treatment for chronic ulcers characterised as “hard-to-heal”, allowing distant monitoring of the wound healing process in specific situations where the healing is expected to be more uncertain and more challenging.

**EXPECTED BENEFITS**

The development of products with sensors and ICT that allow remote monitoring of wound conditions may lead to benefits for patients and medical support teams at numerous different points along the patient’s treatment pathway.

The expected benefits can be summarised as follows:

**Improved clinical outcomes:**
- Earlier identification of wound infections and wound deterioration, encouraging hope of a lower amputation rate
- Better control and monitoring of exudate and compression
- Access to detailed real-time quantitative data will contribute to evaluation of treatment effectiveness and wound healing progress and allow for individualised and fine-tuned treatment regimes

**More efficient use of resources**
- Reduced healthcare costs as a consequence of fewer complications and faster healing
- Reduced healthcare costs as a consequence of a reduced need for hospitalisation and fewer visits to specialist wound centres through remote monitoring
- Reduced time spent on dressing changes during nursing visits, allowing more time to be focused on other medical needs
- Less potential waste of dressing materials as a result of a reduction in “unnecessary” dressing changes
- Reduced cost to the social system and minimised loss of productivity associated with the patient returning to work earlier due to an improved wound management process

**Increased patient satisfaction and quality of life**
- Reduced disturbance to the patient’s life and possible reduced need for hospitalisation due to early identification of wound deterioration and faster healing
- Personalised treatment adjusted on a daily basis to meet each patient’s individual needs
- Patients can stay out of hospital while receiving treatment and thus feel more comfortable while at the same time being reassured that their condition is being safely and remotely monitored by specialist carers
- Less dependency on clinical visits will reduce time and resources spent on transportation to specialist care units

**Better monitoring and documentation**
- Detailed and continuous data collection on central parameters important for wound healing will increase the level of knowledge and competence among the different service providers involved in wound care
- A research dimension will be integrated into the project to develop a deeper understanding of wound healing through correlation and analysis of multiple wound parameter measurements

**HOW FAR ARE WE FROM REALISING THESE GOALS**

By the end of the project period a clinically proven prototype SNPD will have been developed. However, as with other eHealth services, the technological development is itself only one part of the challenge of getting these types of systems integrated into routine care provision.

Large-scale deployment and real-market uptake requires additional work to understand how implementation of these ICT systems will affect current workflows and any potential changes to the roles and responsibilities of staff involved in service provision throughout the treatment pathway. If this is not understood and accounted for, implementation could be hindered simply because organisations and staff are not ready to transform the way routine care is being provided.

Another aspect is the business model. Clarification of where the reimbursement of such a system is to come from in different health care settings is a challenge that has hampered the uptake of similar products. For patients that end up receiving treatment and care from multiple sectors, the impact on budget for all the different levels of service providers will not be easy to establish. It may not always be obvious that the ones bearing the costs are the ones benefitting from the savings generated.

To meet these challenges, part of the project deliverables will be to establish detailed stakeholder analysis as well as impact and cost effectiveness analyses that will lead to different roadmaps for adoption strategies based on the customers’ needs and expectations.

---

**PROJECT FACTS**

**Funding program:** Seventh framework program: Large scale Integrating project proposal – ICT call 8 (FP7-ICT-20118)

**Project period:** 01.09.2012 - 01.09.2016 (4 years)

For more information see: www.swan-icare.eu/
INTRODUCTION
To spur and support the active involvement of users in design and innovation processes EWMA in collaboration with the Danish Technological Institute are launching two training activities focusing on user driven innovation.

The activities compromise:
- 2 day course, Autumn 2014, Copenhagen
- Workshop, EWMA conference May 2014, Madrid
The activities can be joined independently of each other.

BACKGROUND AND OBJECTIVES
The involvement of end users has become increasingly important during the process of inventing and designing new products and service delivery models. By systematically involving end users in innovation processes, there are good chances of developing products and services that meet real needs and make real impact. New products and services that are developed by a user-driven approach are likely to achieve rapid and widespread market uptake and customer engagement. Despite the increasing focus on user involvement, many companies still lack the proper methodology for integrating this approach into routine product and service development procedures. The objectives of this course are to inspire and update all industry partners on the newest trends within user-driven innovation processes, especially those who are involved in critical aspects of product and service innovation.

TARGET GROUP
The course targets clinicians and industry representatives who want to learn more about user-driven product design, as well as the development and implementation of new service delivery models. Both experienced and less-experienced employees are invited to attend, especially those who are involved in R&D, marketing, and/or business development. For some modules, the group will be divided by the level of experience.

2 DAY COURSE IN COPENHAGEN – OBJECTIVES AND PROGRAM

Title: Innovation for future healthcare: Participation, collaboration, and value creation.

Course Objectives: The goals of the course are to present and discuss different aspects of innovation, from the involvement of different partners to value creation and business model development. Through a series of modules, participants will be introduced to the barriers and benefits of different approaches to product and service development, as well as practical experience and cases. Hands-on exercises will be used to illustrate the presented concepts. In these exercises, the participants will work in groups to develop concrete solutions based on different cases from both industry and applied R&D projects. This methodology will allow participants to be able to lay the ground for future work with innovation in the context of their own company. The course is intended to provide updates on the latest developments within the field of user-driven innovation, and it will also discuss subjects that are related to new trends within the healthcare sector.

Course content: Each module will comprise of theories, hands-on exercises, and case examples. The course will be delivered by the Danish Technological Institute and invited experts in wound innovation.

Duration: 2 Days
Date: 3-4 September 2014
Place: Denmark, Copenhagen (Venue tbc.)
Registration open: 15 April 2014
Registration deadline: 15 June 2014
Registration fee: 1,995 EUR
Language: English
Maximum of 40 participants
For more information: www.userdriveninnovationcourse.org
Entitlements: Registration fee include course literature (compendium), coffee breaks, and lunch
**Module 1: User-driven innovation**

**Module 1: Introduction** (for all participants)
- Rapid innovation: Participants will engage in the product development process and try all steps of a generic process, from user interviews to the prototype/model building of their solution.

**Module 1a: User-driven innovation – the basics** (for participants who are new to user-driven innovation)
Participants will be introduced to the following aspects of user-driven innovation:
- What is user-driven innovation? (Basic concepts: process and methods)
- Why should we care about user-driven innovation?
- What are the types of user-driven innovation and their characteristics, including product design and the development/implementation of service delivery models?

**Module 1b: User-driven innovation – new approaches** (for participants with previous practical experience in user-driven innovation)
Participants will be presented with the newest trends regarding user involvement:
- What are the types of user-driven innovation and their characteristics, including product design and the development/implementation of service delivery models?
- How can users be involved in new approaches, such as community-based innovation, online development forums, and need-based focus processes, in existing networks?

**Module 2: From needs to value creation**
One side of user-driven innovation is identifying the users’ unmet needs. However, translating these needs to ideas that create value for the end users is another key area of expertise that requires training and experience.
- How can unmet needs be converted into innovation? (examples within wound care)
- Who are we creating value for in an innovation process?
- Who should be involved in the development process, and when should it be done? (for example, end users and industry)

**Module 3: Organisational and work-practice challenges in the implementation of user-driven innovation processes**
Implementing new innovation methods into everyday R&D can lead to the development of new work practices and the training of employees.
- How do we integrate new innovation methods into established work practices?
- Why must user-driven innovation be an integrated part of corporate strategy and philosophy instead of isolated projects?

**Module 4: Generation of a business model that is focused on collaboration and value creation**
Opening up to new innovation methods can create new ways to see one’s company and develop how business models should be created for new solutions. The involvement of external partners can help identify new ways to define revenue structures, share expenses, and invite input to service delivery. However, navigating the complex constellation of private and public partners can present many challenges.
- How do we involve partners when we are setting up our business model? (examples from the field of eHealth, e.g., telemedicine and exchange of patient data)
- What tools for business model generation can have sustainable and long-term effects?
- How can we establish collaborative innovation between public and private sectors using telemedicine ecosystems?

**Module 5: Trends in healthcare development: eHealth, telemedicine, and all that jazz**
New trends appearing within the healthcare sector involve telemedicine and independent living technologies. The traditional roles of healthcare partners are being challenged, and the demands from users continuously change. Therefore, it will be important to keep up with developmental trends in order to always stay one step ahead.
- How can the industry become an active player in creating patient empowerment for chronic patients?
- What is an example of innovation in service delivery? (case: Telemedicine in wound care)
- What are the new trends and development paths in the regulatory field?
Taking the users on board  
Workshop, EWMA 2014 conference, Madrid

Join the workshop on user driven innovation at the EWMA conference in Madrid to get an introduction to the topic of user driven innovation in product development and get a flavour of what the 2 day course in Copenhagen has to offer.

Title: Innovation for user value creation – Trends in collaboration, empowerment and technological development.

Workshop objective: Join this workshop to learn more about how different types of innovation within the healthcare sector can answer future development challenges. Whether this means user involvement or implementation of new technologies and approaches to service delivery such as assistive living technologies or eHealth, collaboration and value creation is the key for success. The workshop will answer questions as to why, when and how user driven design can add value to innovation processes and introduce different innovation models. Also the workshop will focus on how new partnerships can create new solutions to everyday challenges. The workshop will in addition to theoretical presentations also include case example presented by invited experts. The workshop will also give a short introduction to the two-day course on the same topic offered by EWMA and the Danish Technological Institute, September 2014. The course offers more in-depth knowledge about the topics presented at the workshop and will in addition to theoretical presentations also include case examples and hands-on exercises.

The session includes contributions from Peter Vowden, Clinical Director, NIHR Bradford Wound Prevention and Treatment Health Care co-operative and Rod Hulme Customer Insights Specialist, Advanced Wound Management Smith&Nephew.

Duration: 1½ H  
Date: Thursday 15 May, 08:00-09:30  
Place: At the EWMA-GNEAUPP 2014 Conference in Madrid  
Hosted by: Danish Technological Institute and invited wound innovation experts  

For detailed update on the workshop program please visit www.ewma2014.org

Stay informed by visiting the conference website, www.ewma2014.org, to see registration opportunities or obtain further information about the programme. You can also get your updates on EWMA’s social media platforms:

Facebook:  
www.facebook.com/EWMA.Wound

LinkedIn:  
www.linkedin.com/company/european-wound-management-association

Twitter: @ewmatweet

The Danish Technological Institute has over 100 employees working with healthcare innovation in various areas, such as technology development, organisational development, user training in new technologies, user studies, idea generation with users (both patients and healthcare professionals), technology foresights, and product development. These training activities are led by the Business and Society Division, which works specifically with user-driven innovation projects. The team of design engineers, anthropologists, and project managers is highly experienced in technology management, occupational health, social science, design engineering, safety, and risk management in emerging health technologies.
With PolyMem®, finger and toe injuries don’t have to slow you down.

Save time with PolyMem Finger/Toe dressings, which are easy to apply – even for patients themselves – and often require fewer dressing changes thanks to their unique design. Simply roll the dressing onto the injured digit and let PolyMem do the work. PolyMem dressings help reduce edema, bruising, pain and inflammation when applied to open or closed injuries.

THE IDEAL CHOICE FOR MANAGING:
- Sprains
- Strains
- Contusions
- Abrasions
- Lacerations
- Burns
- Ulcers
- Matricectomies

NEW, BIGGER sizes available – ideal for large toes!
NEW SPEAKERS CONFIRMED!

The conference committee are very excited to announce that the opening plenary session on Thursday morning will feature Dr Phil Hammond, GP and Private Eye's medical correspondent, although you may know him better from appearing in numerous TV and radio productions including Trust Me, I’m a Doctor; The Music Group, Have I Got News For You, The News Quiz; The Now Show as well as having sell-out shows at Edinburgh Fringe and author of three best-selling books.

Other confirmed keynote speakers include:
- Dr David De Berker, Consultant Dermatologist, Bristol Royal Infirmary
- Professor Hylton Menz, Senior Research Fellow, National Health and Medical Research Council, Leader of the Lower Extremity and Gait Studies Program, La Trobe University, Melbourne, Australia
- Professor Mark Nixon, Professor of Computer Vision, University of Southampton
- Dr Michael Turner, former Chief Medical Advisor to the British Horseracing Authority
- Dr David Coppini, Consultant Diabetologist, Poole Hospital
- Debbie Sharman, Consultant Podiatrist and Visiting Lecturer, University of Southampton
- Dr Tony Berendt, Deputy Medical Director, Oxford University Hospitals NHS Trust, Oxford; and Consultant in Infectious Diseases, Bone Infection Unit, Nuffield Orthopaedic Centre, OUH, Oxford
- Professor Chris Bunker, Consultant Dermatologist, University College London Hospitals NHS Foundation Trust and President, British Association of Dermatology

Call for papers - deadline reminder

This high profile opportunity to present your work at Europe’s largest podiatry conference should not be missed. Submissions of scientific research, case studies or general practice for oral or poster presentation are welcomed from all areas of podiatric practice.

**Submission deadlines:**
- Oral presentations – 27 April 2014
- Poster presentations – 7 September 2014

For further information visit www.scpconference.com, call +44(0)20 3725 5840 or email scp@profileproductions.co.uk
ABSTRACTS OF RECENT COCHRANE REVIEWS

Dressings and topical agents for preventing pressure ulcers
Zena EH Moore, Joan Webster


Copyright © 2013 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

ABSTRACT

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

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

Search methods: In February 2013 we searched the following electronic databases to identify reports of relevant randomised clinical trials (RCTs): the Cochrane Wounds Group Specialised Register; the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library); Database of ABSTRACTs of Reviews of Effects (The Cochrane Library); Ovid MEDLINE; Ovid MEDLINE (In-Process & Other Non-Indexed Citations); Ovid EMBASE; and EBSCO CINAHL.

Selection criteria: We included RCTs evaluating the use of dressings, topical agents, or topical agents with dressings, compared with a different dressing, topical agent, or combined topical agent and dressing, or no intervention or standard care, with the aim of preventing the development of a pressure ulcer.

Data collection and analysis: We assessed trials for their appropriateness for inclusion and for their risk of bias. This was done by two review authors working independently, using pre-determined inclusion and quality criteria.

Main results: Five trials (940 participants) of unclear or high risk of bias compared a topical agent with a placebo. Four of these trials randomised by individual and one by cluster. When results from the five trials were combined, the risk ratio (RR) was 0.78 (95% CI 0.47 to 1.31; P value 0.35) indicating no overall beneficial effect of the topical agents. When the cluster randomised trial was omitted from the analysis, use of topical agents reduced the pressure ulcer incidence by 36%; RR 0.64 (95% CI 0.49 to 0.83; P value 0.0008). Four trials (561 participants), all of which were of high or unclear risk of bias, showed that dressings applied over bony prominences reduced pressure ulcer incidence; RR 0.21 (95% CI 0.09 to 0.51; P value 0.0006).

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

Plain language summary: Dressings or topical agents for preventing pressure ulcers

Pressure ulcers, sometimes known as bedsores or pressure sores, commonly occur in people who cannot, or find it difficult to, move themselves. Pressure ulcers are hard to heal, so it is important to try to prevent them from occurring in the first place. Various cream and lotions (topical agents) have been used for this purpose; the idea is that pressure ulcers are less likely to occur when the skin is healthy and nourished. A number of different types of dressings are also used to pro-

Sally Bell-Syer, MSc
Managing Editor
Cochrane Wounds Group
Department of Health Sciences
University of York
United Kingdom
Correspondence: sally.bell-syer@york.ac.uk
Conflict of interest: none
tect the skin from damage. We reviewed studies that compared topical agents or dressings with other methods for preventing pressure ulcers. We found nine trials that investigated these that included 1501 people. These showed that the evidence concerning the use of topical agents or dressings for preventing pressure ulcers is not clear. The reason why the evidence is not clear is because the quality of trials was low and most had manufacturer sponsorship, which introduces potential biases, such as overestimating the effectiveness of the product. Consequently, further trials are needed to confirm results of this review.

**Publication in The Cochrane Library Issue 9, 2013**

**Early versus delayed dressing removal after primary closure of clean and clean-contaminated surgical wounds**

Clare D Toon, Rajarajan Ramamoorthy, Brian R Davidson, Kurinchi Selvan Gurusamy


Copyright © 2013 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

**ABSTRACT**

**Background:** Most surgical procedures involve a cut in the skin that allows the surgeon to gain access to the deeper tissues or organs. Most surgical wounds are closed fully at the end of the procedure. The surgeon covers the closed surgical wound with either a dressing or adhesive tape. The dressing can act as a physical barrier to protect the wound until the continuity of the skin is restored (within about 48 hours) and to absorb exudate from the wound, keeping it dry and clean, and preventing bacterial contamination from the external environment. Some studies have found that the moist environment created by some dressings accelerates wound healing, although others believe that the moist environment can be a disadvantage, as excessive exudate can cause maceration (softening and deterioration) of the wound and the surrounding healthy tissue. The utility of dressing surgical wounds beyond 48 hours of surgery is, therefore, controversial.

**Objectives:** To evaluate the benefits and risks of removing a dressing covering a closed surgical incision site within 48 hours permanently (early dressing removal) or beyond 48 hours of surgery permanently with interim dressing changes allowed (delayed dressing removal), on surgical site infection.

**Search methods:** In July 2013 we searched the following electronic databases: The Cochrane Wounds Group Specialised Register; The Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library); Database of ABSTRACTs of Reviews of Effects (DARE) (The Cochrane Library); Ovid MEDLINE; Ovid MEDLINE (In-Process & Other Non-Indexed Citations); Ovid EMBASE; and EBSCO CINAHL. We also searched the references of included trials to identify further potentially-relevant trials.

**Selection criteria:** Two review authors independently identified studies for inclusion. We included all randomised clinical trials (RCTs) conducted with people of any age and sex, undergoing a surgical procedure, who had their wound closed and a dressing applied. We included only trials that compared early versus delayed dressing removal. We excluded trials that included people with contaminated or dirty wounds. We also excluded quasi-randomised studies, and other study designs.

**Data collection and analysis:** Two review authors independently extracted data on the characteristics of the trial participants, risk of bias in the trials and outcomes for each trial. We calculated risk ratios (RR) with 95% confidence intervals (CI) for binary outcomes and mean difference (MD) with 95% CI for continuous outcomes. We used RevMan 5 software to perform these calculations.

**Main results:** Four trials were identified for inclusion in this review. All the trials were at high risk of bias. Three trials provided information for this review. Overall, this review included 280 people undergoing planned surgery. Participants were randomised to early dressing removal (removal of the wound dressing within the 48 hours following surgery) (n = 140) or delayed dressing removal (continued dressing of the wound beyond 48 hours) (n = 140) in the three trials. There were no statistically significant differences between the early dressing removal group and delayed dressing removal group in the proportion of people who developed superficial surgical site infection within 30 days (RR 0.64; 95% CI 0.32 to 1.28), superficial wound dehiscence within 30 days (RR 2.00; 95% CI 0.19 to 21.16) or serious adverse events within 30 days (RR 0.83; 95% CI 0.28 to 2.51). No deep wound infection or deep wound dehiscence occurred in any of the participants in the trials that reported this outcome. None of the trials reported quality of life. The hospital stay was significantly shorter (MD -2.00 days; 95% CI -2.82 to -1.18) and the total cost of treatment significantly less (MD EUR -36.00; 95% CI -59.81 to -12.19) in the early dressing removal group than in the delayed dressing removal group in the only trial that reported these outcomes.

**Authors’ conclusions:** The early removal of dressings from clean or clean contaminated surgical wounds appears to have no detrimental effect on outcomes. However, it should be noted that the point estimate supporting this statement is based on very low quality evidence from three small randomised controlled trials, and the confidence intervals around this estimate were wide. Early dressing removal may result in a significantly shorter hospital stay, and significantly reduced costs, than covering the surgical wound with wound dressings beyond the first 48 hours after surgery, according to very low quality evidence from one small randomised controlled trial. Further randomised controlled trials of low risk of bias are necessary to investigate whether dressings are necessary after 48 hours in different types of surgery and levels of contamination and investigate whether antibiotic therapy influences the outcome.

**Plain language summary:**

**Early versus delayed dressing removal for people with surgical wounds**

Most surgical procedures involve a cut in the skin that allows the surgeon to gain access to the deeper tissues or organs. Most surgical wounds are closed fully at the end of the procedure. The surgeon covers the closed surgical wound with either a dressing...
or adhesive tape. The dressing can act as a physical barrier to protect the wound until the continuity of the skin is restored (within about 48 hours). It can also absorb exudate from the wound, keeping it dry and clean, and preventing bacterial contamination from the external environment. Some studies have found that the moist environment created by some dressings accelerates wound healing, although others believe that it is a disadvantage, as excessive exudate can cause softening and deterioration of the wound and surrounding healthy tissue. We reviewed the medical literature up to July 2013 and identified four randomised controlled trials that investigated early (permanent removal of dressings within 48 hours of surgery) versus delayed removal of dressings (permanent removal of dressings after 48 hours of surgery when the wound is changing). In people with surgical wounds, the levels of bias across the studies were mostly high or unclear, i.e. flaws in the conduct of these trials could have resulted in the production of incorrect results. A total of 280 people undergoing planned surgery were included in this review. One-hundred and forty people had their dressings removed within 48 hours following surgery and 140 people had their wounds dressed beyond 48 hours. The choice of whether the dressing was removed early (within 48 hours) or retained for more than 48 hours was made randomly by a method similar to the toss of a coin. No significant differences were reported between the two groups in terms of superficial surgical site infection (infection of the wound), superficial wound dehiscence (partial disruption of the wound that results in it re-opening at the skin surface) or the number of people experiencing serious adverse events. There were no deep wound infections or complete wound dehiscence (complete disruption of wound healing, when the wound reopens completely) in the studies that reported these complications. However, the studies were not large enough to identify small differences in complication rates. None of the studies reported quality of life. Participants in the group that had early removal of dressings had significantly shorter hospital stays and incurred significantly lower treatment costs than those in the delayed removal of dressings group, but these results were based on very low quality evidence from one small randomised controlled trial. We recommend further randomised controlled trials are performed to investigate whether dressing of wounds beyond 48 hours after surgery is necessary, since the current evidence is based on very low quality evidence from three small randomised controlled trials.

Interventions for helping people adhere to compression treatments for venous leg ulceration

Carolina D Weller, Rachelle Buchbinder, Renea V Johnston


Copyright © 2013 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

ABSTRACT

Background: Chronic venous ulcer healing is a complex clinical problem that requires intervention from skilled, costly, multidisciplinary wound-care teams. Compression therapy has been shown to help heal venous ulcers and to reduce the risk of recurrence. It is not known which interventions help people adhere to compression treatments.

Objectives: To assess the benefits and harms of interventions designed to help people adhere to venous leg ulcer compression therapy, and thus improve healing of venous leg ulcers and prevent their recurrence after healing.

Search methods: In May 2013 we searched The Cochrane Wounds Group Specialised Register; The Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library); Ovid MEDLINE; Ovid MEDLINE (In-Process & Other Non-Indexed Citations); Ovid EMBASE; EBSCO CINAHL; trial registries, and reference lists of relevant publications for published and ongoing trials. There were no language or publication date restrictions.

Selection criteria: We included randomised controlled trials (RCTs) of interventions that help people with venous leg ulcers adhere to compression treatments compared with usual care, or no intervention, or another active intervention. Our main outcomes were number of people with ulcers healed, recurrence, time to complete healing, quality of life, pain, adherence to compression therapy and number of people with adverse events.

Data collection and analysis: Two review authors independently selected studies for inclusion, extracted data, assessed the risk of bias of each included trial, and assessed overall quality of evidence for the main outcomes in ‘Summary of findings’ tables.

Main results: Low quality evidence from one trial (67 participants) indicates that, compared with home-based care, a community-based Leg Club® clinic that provided mechanisms for peer-support, assistance with goal setting and social interaction did not result in superior healing rates at three months (12/28 people healed in Leg Club clinic group versus 7/28 in home-based care group; risk ratio (RR) 1.71, 95% confidence interval (CI) 0.79 to 3.71); or six months (15/33 healed in Leg Club group versus 10/34 in home-based care group; RR 1.55, 95% CI 0.81 to 2.93); or in improved quality of life outcomes at six months (MD 0.85 points, 95% CI -0.13 to 1.83; 0 to 10 point scale). However, the Leg Club resulted in a statistically significant reduction in pain at six months (MD -12.75 points, 95% CI -24.79 to -0.71; 0 to 100 point scale), although this was not considered a clinically important difference. Time to complete healing, recurrence of ulcers, adherence and adverse events were not reported.

Low quality evidence from another trial (184 participants) indicates that, compared with usual care in a wound clinic, a community-based and nurse-led self-management programme of six months’ duration promoting physical activity (walking and leg exercises) and adherence to compression therapy via counselling and behaviour modification (Lively Legs®) may not result in superior healing rates at 18 months (51/92 healed in Lively Legs group versus 41/92 in usual care group; RR 1.24 (95% CI 0.93 to 1.67)); may not result in reduced rates of recurrence of venous leg ulcers at 18 months (32/69 with recurrence in Lively Legs group versus 38/67 in usual care group; RR 0.82 (95% CI 0.59 to 1.14)); and may not result in superior adherence to compression therapy at 18 months (42/92 people fully adherent
Leg Club®, a community-based clinic, may not significantly improve healing of ulcers. Low quality evidence from two trials was identified: one promoting adherence via socialisation and support (Leg Club®), and the other promoting adherence to compression, leg exercises and walking via counselling and behaviour modification (Lively Legs®). These trials did not reveal a benefit of community-based clinics over usual care in terms of healing rates, prevention of recurrence of venous leg ulcers, or quality of life. One trial indicated a small, but possibly clinically unimportant, reduction in pain, while adverse events were not reported. The small number of participants may have a hidden real benefit, or an increase in harm. Due to the lack of reliable evidence, at present it is not possible either to recommend or discourage nurse clinic care interventions over standard care.

Authors’ conclusions: There is a paucity of trials of interventions that promote adherence to compression therapy for venous ulcers. Low quality evidence from two trials was identified: one promoting adherence via socialisation and support (Leg Club®), and the other promoting adherence to compression, leg exercises and walking via counselling and behaviour modification (Lively Legs®). These trials did not reveal a benefit of community-based clinics over usual care in terms of healing rates, prevention of recurrence of venous leg ulcers, or quality of life. One trial indicated a small, but possibly clinically unimportant, reduction in pain, while adverse events were not reported. The small number of participants may have a hidden real benefit, or an increase in harm. Due to the lack of reliable evidence, at present it is not possible either to recommend or discourage nurse clinic care interventions over standard care.

Plain language summary: Interventions for helping people adhere to compression bandages to aid healing of venous leg ulcers

Venous leg ulcers take weeks – or months – to heal, cause distress, and are very costly for health services. Although compression, using bandages or stockings, helps healing and prevents recurrence, many people do not adhere to compression therapy. Therefore, interventions that promote the wearing of compression should improve healing, and prevent recurrence of venous ulcers.

We found two studies of low quality evidence, so further studies may change the review findings.

Leg Club®, a community-based clinic, may not significantly improve healing of venous leg ulcers or quality of life more than nurse home-visit care does, but probably results in less pain after six months. Seventeen more people out of 100 were healed after participating in Leg Club (46/100 people in Leg Club healed compared with 29/100 people having usual home care). Leg Club participants rated their quality of life 0.85 points better than those receiving home care, assessed on a 10 point scale. Leg Club participants rated their pain at six months 12.75 points lower than the home care group, assessed on a 10 point scale. This trial did not report whether Leg Club clinics improve adherence to compression, time to healing, or prevent recurrence more than home care.

Lively Legs®, a community-based self-management programme, may not significantly improve healing of ulcers or decrease recurrence after 18 months any more than usual care in a wound clinic. Ten more people out of 100 were healed at 18 months after participating in Lively Legs (55/100 Lively Legs participants healed versus 45/100 people having usual care). Ten fewer people out of 100 had a recurrent leg ulcer 18 months after participating in Lively Legs (47/100 Lively Legs participants had recurrence compared with 57/100 people having usual care). The same number of people adhered to compression therapy after participating in Lively Legs (45/100 participants in both groups). The trial did not report whether the Lively Legs self-management programme clinics improve time to healing of ulcers, reduce pain, or improve quality of life any more than usual care in a wound clinic.

We found no studies investigating other potential interventions, such as education programs. We know that compression therapy is effective, but do not know which interventions improve adherence to compression therapy.

Publication in The Cochrane Library Issue 10, 2013

Negative pressure wound therapy for treating foot wounds in people with diabetes mellitus

Jo C Dumville, Robert J Hinchliffe, Nicky Cullum, Fran Game, Nikki Stubbs, Michael Sweeting, Frank Peinemann


Copyright © 2013 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

ABSTRACT

Background: Foot wounds in people with diabetes mellitus (DM) are a common and serious global health issue. Negative pressure wound therapy can be used to treat these wounds and a clear and current overview of current evidence is required to facilitate decision-making regarding its use.

Objectives: To assess the effects of negative pressure wound therapy compared with standard care or other adjuvant therapies in the healing of foot wounds in people with DM.

Search methods: In July 2013, we searched the following databases to identify reports of relevant randomised controlled trials (RCTs): Cochrane Wounds Group Specialised Register; The Cochrane Central Register of Controlled Trials (CENTRAL); The Database of ABSTRACTs of Reviews of Effects (DARE); The NHS Economic Evaluation Database; Ovid MEDLINE; Ovid MEDLINE (In-Process & Other Non-Indexed Citations); Ovid EMBASE; and EBSCO CINAHL.

Selection criteria: Published or unpublished RCTs that evaluate the effects of any brand of negative pressure wound therapy in the treatment of foot wounds in people with diabetes, irrespective of publication date or language of publication. Particular effort was made to identify unpublished studies.

Data collection and analysis: Two review authors independently performed study selection, risk of bias assessment and data extraction.

Main results: We included five studies in this review randomising 605 participants. Two studies (total of 502 participants) compared negative pressure wound therapy with standard moist wound dressings. The first of these was conducted in people with DM and post-amputation wounds and reported that significantly more people healed in the negative pressure wound therapy group compared with the moist dressing group: (risk ratio 1.44; 95% CI 1.03 to 2.01). The second study, conducted in people with debrided foot ulcers, also reported a statistically significant increase in the proportion of ulcers healed in the negative pressure wound therapy group compared with the moist dressing group: (risk ratio 1.49; 95% CI 1.11 to 2.01). However, these
studies were noted to be at risk of performance bias, so caution is required in their interpretation. Findings from the remaining three studies provided limited data, as they were small, with limited reporting, as well as being at unclear risk of bias.

Authors’ conclusions: There is some evidence to suggest that negative pressure wound therapy is more effective in healing post-operative foot wounds and ulcers of the foot in people with DM compared with moist wound dressings. However, these findings are uncertain due to the possible risk of bias in the original studies. The limitations in current RCT evidence suggests that further trials are required to reduce uncertainty around decision making regarding the use of NPWT to treat foot wounds in people with DM.

Plain language summary: Negative pressure wound therapy for treating foot wounds in people with diabetes mellitus

Diabetes mellitus is a common condition that leads to high blood glucose concentrations, with around 2.8 million people affected in the UK (approximately 4.3% of the population). Some people with diabetes can develop ulcers on their feet. These wounds can take a long time to heal, be painful and become infected. Ulceration of the foot in people with diabetes can also lead to a higher risk of amputation of parts of the foot or leg. Generally, people with diabetes are at a higher risk of lower-limb amputation than people without diabetes. Negative pressure wound therapy is a wound treatment which involves applying suction to a wound; it is used increasingly around the world but it is not clear how effective it is. It also expensive compared with treatments such as dressings. We found five randomised controlled trials that compared negative pressure wound therapy with other treatments. We found some preliminary evidence that negative pressure wound therapy increases the healing of foot wounds on people with diabetes compared with other treatments. However, the findings are not conclusive and more, better quality randomised controlled trials are required.

Early versus delayed post-operative bathing or showering to prevent wound complications

Clare D Toon, Sidhartha Sinha, Brian R Davidson, Kurinchi Selvan Gurusamy

Toon CD, Sinha S, Davidson BR, Gurusamy KS. Early versus delayed post-operative bathing or showering to prevent wound complications. Cochrane Database of Systematic Reviews 2013, Issue 10. Art. No.: CD010075. DOI: 10.1002/14651858.CD010075.pub2.

Copyright © 2013 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

ABSTRACT

Background: Many people undergo surgical operations during their life-time, which result in surgical wounds. After an operation the incision is closed using stitches, staples, steri-strips or an adhesive glue. Usually, towards the end of the surgical procedure and before the patient leaves the operating theatre, the surgeon covers the closed surgical wound using gauze and adhesive tape or an adhesive tape containing a pad (a wound dressing) that covers the surgical wound. There is currently no guidance about when the wound can be made wet by post-operative bathing or showering. Early bathing may encourage early mobilisation of the patient, which is good after most types of operation. Avoiding post-operative bathing or showering for two to three days may result in accumulation of sweat and dirt on the body. Conversely, early washing of the surgical wound may have an adverse effect on healing, for example by irritating or macerating the wound, and disturbing the healing environment.

Objectives: To compare the benefits (such as potential improvements to quality of life) and harms (potentially increased wound-related morbidity) of early post-operative bathing or showering (i.e. within 48 hours after surgery, the period during which epithelialisation of the wound occurs) compared with delayed post-operative bathing or showering (i.e. no bathing or showering for over 48 hours after surgery) in patients with closed surgical wounds.

Search methods: We searched The Cochrane Wounds Group Specialised Register; The Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library); The Database of ABSTRACTs of Reviews of Effects (DARE) (The Cochrane Library); Ovid MEDLINE; Ovid MEDLINE (In-Process & Other Non-Indexed Citations); Ovid EMBASE; EBSCO CINAHL; the metaRegister of Controlled Trials (mRCT) and the International Clinical Trials Registry Platform (ICTRP).

Selection criteria: We considered all randomised trials conducted in patients who had undergone any surgical procedure and had surgical closure of their wounds, irrespective of the location of the wound and whether or not the wound was dressed. We excluded trials if they included patients with contaminated, dirty or infected wounds and those that included open wounds. We also excluded quasi-randomised trials, cohort studies and case-control studies.

Data collection and analysis: We extracted data on the characteristics of the patients included in the trials, risk of bias in the trials and outcomes from each trial. For binary outcomes, we calculated the risk ratio (RR) with 95% confidence interval (CI). For continuous variables we planned to calculate the mean difference (MD), or standardised mean difference (SMD) with 95% CI. For count data outcomes, we planned to calculate the rate ratio (RR) with 95% CI. We used RevMan 5 software for performing these calculations.

Main results: Only one trial was identified for inclusion in this review. This trial was at a high risk of bias. This trial included 857 patients undergoing minor skin excision surgery in the primary care setting. The wounds were sutured after the excision. Patients were randomised to early post-operative bathing (dressing to be removed after 12 hours and normal bathing resumed) (n = 415) or delayed post-operative bathing (dressing to be retained for at least 48 hours before removal and resumption of normal bathing) (n = 442). The only outcome of interest reported in this trial was surgical site infection (SSI). There was no statistically significant difference in the proportion of patients who developed SSIs between the two groups (857 patients; RR 0.96; 95% CI 0.62 to 1.48). The proportions of patients who developed SSIs were 8.5% in the early bathing group and 8.8% in the delayed bathing group.
**Plain language summary:** Post-operative bathing and showering to prevent wound complications

Many people undergo surgical operations during their life-time. After an operation the surgical wound is closed using stitches, staples, tape (steri-strips) or an adhesive glue. Usually, towards the end of the surgical procedure and before the person leaves the operating theatre, the surgeon covers the closed surgical wound using gauze and adhesive tape, or an adhesive tape containing a pad that covers the surgical wound. This is called a wound dressing. There is currently no guidance about when wounds can be made wet by bathing or showering post-operatively. Early bathing may encourage the person to move about, which is good after most types of surgery. Avoiding post-operative bathing or showering for two to three days may result in the accumulation of sweat and dirt on the body, but early washing of the wound may have a bad effect on healing by irritating the wound and disturbing the healing environment. We reviewed all the available evidence from the medical literature (up to July 2013) on this issue. In particular, we sought information from randomised controlled trials, which, if conducted well, provide the most accurate information.

We identified only one randomised controlled trial. This trial was at high risk of bias, i.e. there were flaws in the way it was conducted that could have given incorrect results. This trial included 857 people undergoing minor skin operations performed at a General Practitioner (GP) surgery. No steri-strips were used in this trial, as the wounds were stitched. The people running the trial used a method similar to the toss of a coin to decide which group participants went into. One group of 415 people was advised to keep the dressing on for at least 48 hours and then to bathe normally. The only outcome of interest reported in this trial was wound infection. The authors reported no statistically significant difference in the proportion of people who developed wound infection in the two groups (8.5% in the early bathing group and 8.8% in the delayed bathing group). There is currently no conclusive evidence available from randomised trials about the benefits, or harms, with regard to wound complications of early or delayed post-operative showering or bathing. We recommend further randomised controlled trials to compare early versus delayed post-operative showering or bathing.

**Authors’ conclusions:** There is currently no conclusive evidence available from randomised trials regarding the benefits or harms of early versus delayed post-operative showering or bathing for the prevention of wound complications, as the confidence intervals around the point estimate are wide, and, therefore, a clinically significant increase or decrease in SSI by early post-operative bathing cannot be ruled out. We recommend running further randomised controlled trials to compare early versus delayed post-operative showering or bathing.

**Plain language summary:** Antibiotics and antiseptics for venous leg ulcers

Venous leg ulcers are a type of chronic wound affecting up to 1% of adults in developed countries at some point during their lives. Many of these wounds are colonised by bacteria or show signs of clinical infection. The presence of infection may delay ulcer healing. Two main strategies are used to prevent and treat clinical infection in venous leg ulcers: systemic antibiotics and topical antibiotics or antiseptics.

**Objectives:** The objective of this review was to determine the effects of systemic antibiotics and topical antibiotics and antiseptics on the healing of venous ulcers; review authors also examined the effects of these interventions on clinical infection, bacterial flora, bacterial resistance, ulcer recurrence, adverse effects, patient satisfaction, health-related quality of life and costs.

**Search methods:** In May 2013, for this second update, we searched the Cochrane Wounds Group Specialised Register (searched 24 May 2013); the Cochrane Central Register of Controlled Trials (CENTRAL 2013, Issue 4); Ovid MEDLINE (1948 to Week 3 May 2013); Ovid MEDLINE (In-Process & Other Non-indexed Citations, 22 May 2013); Ovid EMBASE (1980 to Week 20 2013); and EBSCO CINAHL (1982 to 17 May 2013). No language or publication date restrictions were applied.

**Selection criteria:** Randomised controlled trials (RCTs) recruiting people with venous leg ulceration, evaluating at least one systemic antibiotic, topical antibiotic or topical antiseptic that reported an objective assessment of wound healing (e.g. time to complete healing, frequency of complete healing, change in ulcer surface area) were eligible for inclusion. Selection decisions were made by two review authors while working independently.

**Data collection and analysis:** Information on the characteristics of participants, interventions and outcomes was recorded on a standardised data extraction form. In addition, aspects of trial methods were extracted, including randomisation, allocation concealment, blinding of participants and outcome assessors, incomplete outcome data and study group comparability at baseline. Data extraction and validity assessment were conducted by one review author and were checked by a second. Data were pooled when appropriate.

**Main results:** Forty-five RCTs reporting 53 comparisons and recruiting a total of 4486 participants were included. Many RCTs were small, and most were at high or unclear risk of bias. Ulcer
infection status at baseline and duration of follow-up varied across RCTs. Five RCTs reported eight comparisons of systemic antibiotics, and the remainder evaluated topical preparations: cadexomer iodine (11 RCTs reporting 12 comparisons); povidone-iodine (six RCTs reporting seven comparisons); peroxide-based preparations (four RCTs reporting four comparisons); honey-based preparations (two RCTs reporting two comparisons); silver-based preparations (12 RCTs reporting 13 comparisons); other topical antibiotics (three RCTs reporting five comparisons); and other topical antiseptics (two RCTs reporting two comparisons). Few RCTs provided a reliable estimate of time to healing; most reported the proportion of participants with complete healing during the trial period.

Systemic antibiotics: More participants were healed when they were prescribed levamisole (normally used to treat roundworm infection) compared with placebo: risk ratio (RR) 1.31 (95% CI 1.06 to 1.62). No between-group differences were detected in terms of complete healing for other comparisons: antibiotics given according to antibiogram versus usual care; ciprofloxacin versus standard care/placebo; trimethoprim versus placebo; ciprofloxacin versus trimethoprim; and amoxicillin versus topical povidone-iodine.

Topical antibiotics and antiseptics: Cadexomer iodine: more participants were healed when given cadexomer iodine compared with standard care. The pooled estimate from four RCTs for complete healing at four to 12 weeks was RR 2.17 (95% CI 1.30 to 3.60). No between-group differences in complete healing were detected when cadexomer iodine was compared with the following: hydrocolloid dressing; paraffin gauze dressing; dextranomer; and silver-impregnated dressings.

Povidone iodine: no between-group differences in complete healing were detected when povidone-iodine was compared with the following: hydrocolloid; moist or foam dressings according to wound status; and growth factor. Time to healing estimates for povidone-iodine versus dextranomer, and for povidone-iodine versus hydrocolloid, were likely to be unreliable.

Peroxide-based preparations: four RCTs reported findings in favour of peroxide-based preparations when compared with usual care for surrogate healing outcomes (change in ulcer area). There was no report of complete healing.

Honey-based preparations: no between-group difference in time to healing or complete healing was detected for honey-based products when compared with usual care.

Silver-based preparations: no between-group differences in complete healing were detected when 1% silver sulphadiazine ointment was compared with standard care/placebo and tripeptide copper complex; or when different brands of silver-impregnated dressings were compared; or when silver-impregnated dressings were compared with non-antimicrobial dressings.

Other topical antibiotics: data from one RCT suggested that more participants healed at four weeks when treated with an enzymatic cleanser (a non-antibiotic preparation) compared with a chloramphenicol-containing ointment (additional active ingredients also included in the ointment): RR 0.13 (95% CI 0.02 to 0.99). No between-group differences in complete healing were detected for framycetin sulphate ointment versus enzymatic cleanser; chloramphenicol ointment versus framycetin sulphate ointment; mupirocin ointment versus vehicle; and topical antibiotics given according to antibiogram versus an herbal ointment.

Other topical antiseptics: data from one RCT suggested that more participants receiving an antiseptic ointment (ethacridine lactate) had responsive ulcers (defined as > 20% reduction in area) at four weeks when compared with placebo: RR 1.45 (95% CI 1.21 to 1.73). Complete healing was not reported. No between-group difference was detected between chlorhexidine solution and usual care.

Authors’ conclusions: At present, no evidence is available to support the routine use of systemic antibiotics in promoting healing of venous leg ulcers. However, the lack of reliable evidence means that it is not possible to recommend the discontinuation of any of the agents reviewed. In terms of topical preparations, some evidence supports the use of cadexomer iodine. Current evidence does not support the routine use of honey- or silver-based products. Further good quality research is required before definitive conclusions can be drawn about the effectiveness of povidone-iodine, peroxide-based preparations, ethacridine lactate, chloramphenicol, framycetin, mupirocin, ethacridine or chlorhexidine in healing venous leg ulceration. In light of the increasing problem of bacterial resistance to antibiotics, current prescribing guidelines recommend that antibacterial preparations should be used only in cases of clinical infection, not for bacterial colonisation.

Plain language summary:

Antibiotics and antiseptics to help healing venous leg ulcers

Venous leg ulcers are a type of wound that can take a long time to heal. These ulcers can become infected, and this might cause further delay to healing. Two types of treatment are available to treat infection: systemic antibiotics (i.e. antibiotics taken by mouth or by injection) and topical preparations (i.e. treatments applied directly to the wound). Whether systemic or topical preparations are used, patients will also usually have a wound dressing and bandage over the wound. This review was undertaken to find out whether using antibiotics and antiseptics works better than usual care in healing venous leg ulcers, and if so, to find out which antibiotic and antiseptic preparations are better than others. In terms of topical preparations, some evidence is available to support the use of cadexomer iodine (a topical agent thought to have cleansing and antibacterial effects). Current evidence does not support the use of honey- or silver-based products. Further good quality research is required before definitive conclusions can be drawn about the effectiveness of antibiotic tablets and topical agents such as povidone-iodine, peroxide-based products and other topical antibiotics and antiseptics in healing venous leg ulceration.
The Biofilm-forming capacity of staphylococcus aureus from chronic wounds can be useful for determining Wound-Bed Preparation methods
Y. Yaretz, L. Rubanov, I. Novorka, N. Shevchenko
The use of topical antibiotic containing silver nanoparticles against methicillin-resistant bacteria
M. Hajkó, L. Slobodnáková, H. Hupková, J. Kolter
The mTOR inhibitors and the skin wound healing
F. Benhadou, V. del Marmol
A Review of Evidence for Negative Pressure Wound Therapy (NPWT) use Post Spinal Surgery
R. A. Atkinson, K. J. Ousey, S. Lui, J. B. Williamson
A randomized study on the effectiveness of a pressure-relieving mattress overlay for the prevention of pressure ulcers in elderly patients at risk
E. Ricci, C. Roberto, A. Ippolito, A. Bianco, M. T. Scalise
Motorcycle ride position, venous return, and symptoms of chronic venous insufficiency
Ellie Lindsay, P. Woyden, K. Woyden, J. Megson
Archagathus – History’s first wound expert
E. Ricci

Volume 12, no 3, October 2012
Therapeutic strategies for diabetic foot ulceration
RJ Hinchcliffe, JRW Brownrigg
Offloading the diabetic foot: Evidence and clinical decision making
S.A. Bus
Soft-tissue complications during treatment of children with congenital clubfoot
A. Bandurazhvi, V. Kano, Y. Stepanova
An evolution in Medical Tapes: From Latex to Acrylic
L. Gryson
Bacteria and fungus binding mesh in negative pressure wound therapy – A review of the biological effects in the wound bed
M. Malmotj, S. Lindstedt, R. Ingemansson, L. Gustafsson

Volume 11, no 2, May 2012
A structured approach to surgical treatment in deep infection in diabetic foot
Cedomir S Vucetic, et.al.
Endothelial progenitor cells, a unipotent stem cell, involved in neovascularization of wound healing in diabetic foot ulcer
Jacqueline C. Chor Wing Tama, et.al.
Bacteriophages for the treatment of severe infections: – a ‘new’ option for the future?
Daniel De Vos, et.al.
Developing evidence-based ways of working: – Employing interdisciplinary team working to improve patient outcomes in diabetic foot ulceration – our experience
Kristen Van Acker
Exploring the characteristics of a venous leg ulcer that contribute to the emotional distress experienced by patients
Jessica Walburn, et.al.

The EWMA Journals can be downloaded free of charge from www.ewma.org
Clinical Characteristics and Medical Costs in Patients With Diabetic Amputation and Nondiabetic Patients With Nonacute Amputation in Central Urban Hospitals in China
Ai Hong Wang, Zhong Gong Xu, Yiming Mu, Linong Ji

The Influence of the Length of the First Metatarsal on the Risk of Reulceration in the Feet of Patients With Diabetes
Raul Juan Malines-Barroso, et al.

Outcomes After 294 Transatlantic Amputations With the Posterior Myocutaneous Flap
Benjamin Jacob Brown, et al.

Inhibition of biofilms of Pseudomonas aeruginosa by Medic honey in vitro
R. Cooper, L. Jenkins, S. Hooper

Evaluation of two fibrous wound dressings for the management of leg ulcers: Results of a European randomised controlled trial (EARTH RCT)
S. Meaume, et al.

Laboratory evaluation of Dravetex Hydroconductive Dressing with LevaFiber technology
V. Edwards-Jones, V. Vishnyakov, P. Spruce

Do ready-made compression stockings fit the anatomy of the venous leg ulcer patient?
S. Närregaard, S. Bermark, F. Gottrup

A clinical algorithm for wound biofilm identification
D.G. Metcalf, P. Bowier, J. Hurtow

Photographic assessment of burn size and depth: reliability and validity
M.J. Hop, et al.

Novel materials for moist wound management: Alginate-psyllium hybrid fibres
R. Mahsood, M. Miraftab

The value of clinical nutrition in the wound healing
Stanislaw Klek

Reflectance confocal microscopy – a new diagnostic method
Kamila Bialek-Galas, Dorota Welko-Wysoka-Szybinska, Anna Wojas-Pelc

The treatment and the nursing of decubital wounds at the unconscious patient in the department of the intensive health care
Joanna Rudek, Anna Majda, Joanna Zalewska-Puchała

Effect of different methods of compression on blood viscosity in patients with chronic venous disease
Monika Han, Kryształ Paruzi, Marek Kucharzewski, Karol Monkos, Ludmila Sowińska-Lożyńska

Wounds as the cause of death of Polish rulers
Katarzyna Więckowska-Kucharzewska, Marek Kucharzewski, Magdalena Potempa, Paweł Jonczyk, Katarzyna Wilemska-Kucharzewska, Marek Kucharzewski, Kasia Husman

Offering nationwide telemedicine wound assessment of patients with cancer wounds
Betina Lund-Nielsen

Clothing and hygiene when healing wounds and in nursing
Maria Piaschke

Illness, normality and self-care: diabetic foot ulcers and the logic of freedom of choice
Signe Lindgård Andersen, Vibeke Steffen

The pH of skin care products in the area of skin nuisances
Signe Lindgård Andersen, Vibeke Steffen

Thromboembolic complications and the importance of thrombophilia in pregnancy
L. Gorser, A. Strölin

Diagnosis and treatment of venous thromboembolism during pregnancy and the postpartum period
E. Randanarisoa, H. Abele; B. Ballotshofer

Therapy of pudendal varicosities with sclerotherapy
M. Stücker, M. Dörfer

The recalcitrant venous leg ulcer – a never ending story?
S. W. I. Reeder, et al.

Leg venous ulcer healing process after application of membranous dressing with silver ions
M. Kucharzewski, et al.

Évaluation des ischémies cutanées et interdisciplinarité dans une unité de soins intensifs
E. Randanarisoa, H. Abele; B. Ballotshofer

The treatment and the nursing of decubital wounds at the unconscious patient in the department of the intensive health care
Joanna Rudek, Anna Majda, Joanna Zalewska-Puchała

Effect of different methods of compression on blood viscosity in patients with chronic venous disease
Monika Han, Kryształ Paruzi, Marek Kucharzewski, Karol Monkos, Ludmila Sowińska-Lożyńska

Wounds as the cause of death of Polish rulers
Katarzyna Więckowska-Kucharzewska, Marek Kucharzewski, Magdalena Potempa, Paweł Jonczyk, Katarzyna Wilemska-Kucharzewska, Marek Kucharzewski, Kasia Husman

Offering nationwide telemedicine wound assessment of patients with cancer wounds
Betina Lund-Nielsen

Clothing and hygiene when healing wounds and in nursing
Maria Piaschke

Illness, normality and self-care: diabetic foot ulcers and the logic of freedom of choice
Signe Lindgård Andersen, Vibeke Steffen

The pH of skin care products in the area of skin nuisances
Signe Lindgård Andersen, Vibeke Steffen

Thromboembolic complications and the importance of thrombophilia in pregnancy
L. Gorser, A. Strölin

Diagnosis and treatment of venous thromboembolism during pregnancy and the postpartum period
E. Randanarisoa, H. Abele; B. Ballotshofer

Therapy of pudendal varicosities with sclerotherapy
M. Stücker, M. Dörfer

The recalcitrant venous leg ulcer – a never ending story?
S. W. I. Reeder, et al.

Leg venous ulcer healing process after application of membranous dressing with silver ions
M. Kucharzewski, et al.

Wounds as the cause of death of Polish rulers
Katarzyna Więckowska-Kucharzewska, Marek Kucharzewski, Magdalena Potempa, Paweł Jonczyk, Michał Janerka

Offering nationwide telemedicine wound assessment of patients with cancer wounds
Betina Lund-Nielsen

Clothing and hygiene when healing wounds and in nursing
Maria Piaschke

Illness, normality and self-care: diabetic foot ulcers and the logic of freedom of choice
Signe Lindgård Andersen, Vibeke Steffen

The pH of skin care products in the area of skin nuisances
Signe Lindgård Andersen, Vibeke Steffen

Thromboembolic complications and the importance of thrombophilia in pregnancy
L. Gorser, A. Strölin

Diagnosis and treatment of venous thromboembolism during pregnancy and the postpartum period
E. Randanarisoa, H. Abele; B. Ballotshofer

Therapy of pudendal varicosities with sclerotherapy
M. Stücker, M. Dörfer

The recalcitrant venous leg ulcer – a never ending story?
S. W. I. Reeder, et al.

Leg venous ulcer healing process after application of membranous dressing with silver ions
M. Kucharzewski, et al.

Wound Repair and Regeneration, vol. 22, no 1, 2014

Perspective Articles

Altered TGF-β signaling in fetal fibroblasts: What is known about the underlying mechanisms?
Marialle Wathraven, et al.


Erythropoetin, a novel repurposed drug: An innovative treatment for wound healing in patients with diabetes mellitus
Saher Hamed, et al.

Chronic venous leg ulcer treatment: Future research needs
Gerald Lazarus, et al.

A randomized controlled trial of larval therapy for the debridement of leg ulcers: Results of a multicenter, randomized, controlled, open, observer blind, parallel group study
Elizabeth Mudge, et al.

Wounds (SAR) vol. 21, no 4, 2013

Offering nationwide telemedicine wound assessment of patients with cancer wounds
Betina Lund-Nielsen

Clothing and hygiene when healing wounds and in nursing
Maria Piaschke

Illness, normality and self-care: diabetic foot ulcers and the logic of freedom of choice
Signe Lindgård Andersen, Vibeke Steffen

The pH of skin care products in the area of skin nuisances and wounds
Magne Skjervheim

First experiences with Optima pH 4 gel
Boa Gunther

Wound Management, vol. 8, no 2, 2014

English abstracts are available from www.mhp-verlag.de

Zur Sauerstoffpartialdruckmessung bei chronischen Wunden

Major-Amputationen in Deutschland

Standard für die Publikation von Fallstudien

Sich Kümmern und interdisziplinäre Zusammenarbeit – Ein Fallbeispiel aus der Hausarztpraxis

Das Icw. e. V. Wundseigel – Zertifizierung von Wundbehandlungsseinrichtungen

Wund Management, vol. 8, no 2, 2014

Perspective Articles

Altered TGF-β signaling in fetal fibroblasts: What is known about the underlying mechanisms?
Marialle Wathraven, et al.


Erythropoetin, a novel repurposed drug: An innovative treatment for wound healing in patients with diabetes mellitus
Saher Hamed, et al.

Chronic venous leg ulcer treatment: Future research needs
Gerald Lazarus, et al.

A randomized controlled trial of larval therapy for the debridement of leg ulcers: Results of a multicenter, randomized, controlled, open, observer blind, parallel group study
Elizabeth Mudge, et al.

Wounds (SAR) vol. 21, no 4, 2013

Offering nationwide telemedicine wound assessment of patients with cancer wounds
Betina Lund-Nielsen

Clothing and hygiene when healing wounds and in nursing
Maria Piaschke

Illness, normality and self-care: diabetic foot ulcers and the logic of freedom of choice
Signe Lindgård Andersen, Vibeke Steffen

The pH of skin care products in the area of skin nuisances and wounds
Magne Skjervheim

First experiences with Optima pH 4 gel
Boa Gunther

Wound Management, vol. 8, no 2, 2014

English abstracts are available from www.mhp-verlag.de
EWMA-GNEAUPP 2014
CONFERENCE IN MADRID, SPAIN
The 24th Conference of the European Wound Management Association (EWMA-GNEAUPP 2014) will be a historic event in many ways. The scientific programme has expanded significantly and will consist of varied key sessions, workshops, lectures, full-day streams, and satellite symposia, with scientists from Europe as well as the rest of the world. The 2014 conference is organised in cooperation with the Spanish Group for the Study and Advise on Pressure Ulcers and Chronic Wounds (GNEAUPP).

Expectations for this conference are high, as more than 1,050 abstracts have been submitted, of which 148 have been invited as oral presentations in the free paper sessions, and 754 for poster presentations. In total, there will be more than 320 oral presentations, and over 1,130 scientific presentations by international key speakers, free paper presenters, poster presenters, workshops facilitators, and speakers in satellite symposia. A record number of participants are expected and the exhibition is likely to be the largest in the history of EWMA.

This year, the programme will have three simultaneous key sessions on clinical, evidence, and organisational topics. Furthermore, two separate workshop streams are integrated into the programme structure; one focused on practical “hands on” approaches and another dedicated to theoretical approaches. This will accommodate both the organisational and clinical topics, providing a better fit for the growing number of participants and satisfying the diverse interests in EWMA.

The conference theme, Innovation, know-how, and technology in wound care, reflects both the technological and organisational need for high-quality services with the limited resources available for wound care. Health care systems throughout Europe must address the challenges of aging populations, and of more people living with chronic conditions, which have created a growing demand for optimising wound care with the help of innovative procedures and practises. The theme will be reflected in the opening plenary session as well as in a number of workshops and other sessions throughout the conference.

In addition, a special session this year will be the Honorary Session in which Professor Christina Lindholm will be celebrated for her long-standing work and achievements in wound management.
MADRID

A city where you will find everything, Madrid is home to cutting-edge facilities, devoted professionals, and modern infrastructure, allowing you to easily adhere to the most demanding standards of quality. Furthermore, you will find a booming culture, a thriving lifestyle, and warm, friendly, passionate people. Madrid is a thriving cosmopolitan city in which a perfect balance has been struck between entertainment and business. Thanks to all this, the EWMA 2014 conference promises to be a unique experience.

The 2014 programme will offer guest sessions from several organisations active in thematic issues related to wound healing and management. Guest sessions include, among others, a joint session between the European Pressure Ulcer Advisory Panel (EPUAP) and EWMA, as well as sessions by the Dystrophic Epidermolysis Bullosa Research Association (DEBRA), the European Society for Clinical Nutrition and Metabolism (ESPEN), the European Tissue Repair Society (ETRS), and the Ibero-Latin American Society of Ulcers and Wounds (SILAUHE).

The full-day streams are extremely popular among EWMA conference delegates and will offer more in-depth presentations and discussions within particular fields of knowledge. At the EWMA-GNEAUPEP 2014 full-day symposia, the topics will be Diabetic Foot/Pie Diabetico Day, e-Health Day, and Veterinary Wound Healing. In addition, a Spanish Symposium will be offered at the conference.

DIABETIC FOOT DAY/PIE DIABETICO SYMPOSIUM

A key diabetic foot activity is the 1-day symposium scheduled for Thursday, 15 May 2014. Current diagnostic and intervention strategies for diabetic foot ulcers and amputation prevention in Spain, which has one of the highest amputation rates in people with diabetes, will be presented and discussed. Multidisciplinary care by specialized units has proved useful in preventing major amputations in patients with complicated foot ulcers. However, major challenges remain in establishing this model in Spain, and some of these obstacles will be discussed at the symposium. The symposium also offers the opportunity to review state-of-the-art concepts and techniques within the field of saving the diabetic foot through achieving better treatment outcomes and health economic savings in multidisciplinary treatment structures, as recommended in the international consensus guidelines. On this occasion, central stakeholders from the International Working Group on the Diabetic Foot (IWGDF), Spanish and international diabetes organisations, as well as policymakers and politicians, will participate in panel discussions and presentations to discuss how current treatment plans are conducted and to identify future strategies toward achieving better standards of care for diabetic foot patients.

eHEALTH SYMPOSIUM – eHealth in wound care – From pilot projects to routine care

More and more often, eHealth is being introduced as an important means to solve the future challenges our health care systems are facing. eHealth solutions are perceived as essential tools to enable more care to be provided outside of hospitals and to facilitate interdisciplinary collaboration and communication across units and sectors to optimise continuity of care. The hope is that using these technologies will lead to responsive care of higher quality at lower
costs. What we see now is rapid development of available technologies with ever-increasing examples of regions and countries where eHealth is already part of routine care. eHealth is here to stay and will forever change the way care is delivered.

As these changes and developments will also affect wound care provision, EWMA finds it exceedingly important to, for the second time, address this topic with a full-day symposium.

The symposium will delve into current trends and developments at the policy level, the current implementation status of telemedicine in wound care, and recent technological developments. The symposium will conclude with a key session exploring the barriers and facilitators related to large-scale implementation of eHealth and discuss the challenges related to generating evidence on clinical effectiveness and cost efficiency.

EWMA has invited some of Europe’s leading experts, researchers, and experienced practitioners within the field of eHealth and wound care to guide the audience through these topics. The eHealth symposium at this years conference is one of the activities that EWMA and The European Health Telematics Association (EHTEL) have committed to deliver as consortium partners in the EU funded project, United4Health.

VETERINARY WOUND MANAGEMENT AND ANTIMICROBIAL RESISTANCE SYMPOSIUM

We are proud to announce the launch of this new symposium organised in association with the Veterinary Wound Healing Association (VWHA). The symposium is based on the One Health Approach and will include talks from leading veterinary practitioners, researchers, and health professionals with expertise in antimicrobial resistance. The objectives of the EWMA/VWHA symposium are to provide a unique platform from which scientists and other experts from veterinary and human wound management and public health can share new knowledge, to identify interfaces between veterinary and human wound research and management and build the capacity to draw on their synergies, and to build an interdisciplinary, international network with a multidimensional perspective on wound management.

Let’s join forces in bringing together the European wound healing community in its mission to raise awareness of wound management and drive the wound management agenda forward across Europe. We look forward to welcoming you in Madrid!
Clean one-piece removal – high wet strength\textsuperscript{1,2}

High absorbency – up to 7-day wear time\textsuperscript{1,2}

Minimal dressing shrinkage – may help sustained coverage\textsuperscript{1,4}

Minimal lateral wicking – may help to reduce the risk of peri-wound maceration\textsuperscript{2,5}


Gentle on the budget\textsuperscript{3}
ADVOCACY ACTIVITIES UPDATE

THE PATIENT SAFETY AND PRESSURE ULCERS PREVENTION AGENDA

EWMA plays an important role in the continuous effort to raise awareness about wound prevention and effective wound care within relevant EU institutions such as the European Parliament and the European Commission.

Since the latest update in October 2013 about EWMA’s advocacy activities, I am happy to announce an important achievement regarding the Patient Safety and Pressure Ulcers prevention agenda, which EWMA has been pursuing in collaboration with the Eucomed Advanced Wound Care Sector (AWCS) group.

Furthermore, EWMA has now joined the newly initiated Joint Action on Chronic Disease (CHRODIS-JA) programme of the European Commission.

Multidisciplinary wound care and pressure ulcer prevention mentioned in the European Parliament report

In October 2013, the European Parliament (EP) adopted the own-initiative report by MEP Oreste Rossi on “Patient Safety including the prevention and control of healthcare associated infections”\(^1\). The report specifically mentions multidisciplinary wound care and prevention of pressure ulcers, and urges member states to implement or increase measures to support multidisciplinary wound care and pressure ulcer prevention.

EWMA has actively contributed to the work process that has led to the adoption of MEP Rossi’s own-initiative report. Earlier in 2013, a EWMA policy paper on Patient Safety and Pressure Ulcers (which is available for download at www.ewma.org) was elaborated by previous EWMA President Prof. Zena Moore, who also presented on the Prevention of Healthcare Associated Infections in a May 2013 workshop hosted by the EP and MEP Rossi. Materials from this meeting are available at www.europarl.europa.eu/document/...

| T66710EN.pdf |

EWMA recognises that the adoption of the report by the EP sends a strong signal of support and increased awareness of these matters to the Member States.

European Chronic Disease Collaboration launched in January 2014

The Joint Action on Chronic Disease (CHRODIS-JA) programme of the European Commission (EC) was initiated at a kick-off meeting in Madrid 29-30 January 2014. EWMA has been invited to join the programme as a Collaborating Partner Organisation, and has accepted this invitation with the objective to advocate for increased focus on diabetes complications, in particular diabetic foot ulcers.

The CHRODIS-JA integrates a large number of European health care partners, including national authorities, European associations, and research institutions. EWMA expects to join forces with these other associations to advocate for actions to improve the prevention and treatment of the major complications of diabetes.

Continued participation in the Innovation Partnership on Active and Healthy Ageing

EWMA continues to participate in the European Innovation Partnership on Active and Healthy Ageing (EIP-AHA). EWMA has been a partner of the action group on Integrated Care since the beginning of 2012.

Interest in the EIP-AHA has grown tremendously, and the partnership now includes several hundred representatives from regional development organisations, health care authorities, research institutions, and non-governmental associations. Activities are divided into several working groups, of which EWMA continues to follow those of the Workforce Development and Care Pathways.

During the spring of 2014, EWMA will continue its networking activities within the EIP-AHA. Amongst other activities, the final versions of the two documents on “Home Care Wound Care” and “Managing Wounds as a Team” will be shared with the working groups.

---

\(^{1}\) This report is a reaction to the 2009 European Commission recommendation on “Patient safety, including the prevention and control of healthcare associated infections” and how this recommendation has been implemented by the Member States. The full text of the report is available at www.europarl.europa.eu/...=EN&ring=A7-2013-0320
Now available –
DURAFIBER Ag with antimicrobial silver

Strong when wet\(^1\-^3\)

Gentle on the budget\(^4\)

- **Sustained antimicrobial activity** *(in vitro)* – for up to 7 days against a broad spectrum of pathogens\(^5\-^7\)
- **Clean one-piece removal** – high wet strength\(^1\-^3\)
- **High absorbency** – up to 7-day wear time\(^1\-^3\)
- **Minimal dressing shrinkage** – may help sustained coverage\(^1\)

Request a free sample at: www.tryDURAFIBERAg.com

References:
1. DOF DS/10/060/R1. 2. OR-DOF/28. 3. DS/12/093/DOF. 4. DOF DS/014/051/R. 5. DOF 1004007. 6. DOF 1009011. 7. DOF 1009012.

*Trademark of Smith & Nephew
© Smith & Nephew February 2014 48171

For patients. For budgets. For today.*
Christina has inspired those around her with her gentle, passionate, unassuming, and yet powerful, way of being. It is said that in the quiet you are enabled to hear the dreams of others. Christina exemplifies this saying in her unique ability to listen to those around her, enabling her to fully understand their experiences and help guide them through their clinical and professional practice more effectively.

With her enormous energy, Christina has pushed the boundaries of research and practice, trail blazing her way towards improving clinical practice for the benefit of patients in Sweden and beyond. Indeed, Christina co-authored a ground-breaking research paper that changed the perception of how painful leg ulcers are for patients. Through this work, Christina stressed the importance of clinicians understanding the patients' experience, thereby bringing to the fore the significance of adopting a “human” approach to wound care.

Christina is an internationally acclaimed professor of nursing and former research chief at the Karolinska University Hospital in Sweden. Her PhD in 1993 comprised five studies on leg ulcer epidemiology, treatment, health economics, and quality of life. Her later research has focused on wound infections, infection control, and pressure ulcers.

In leading and influencing at an international level, Christina has been at the centre of a broad range of international ventures. She was the editor-in-chief of the previously published Swedish Wound Journal “Sår”, a council member (and first president) of the Swedish Association of Tissue Viability Nurses (SSiS), one of the founders of the European Pressure Ulcer Advisory Panel (EPUAP) and a member of the EWMA Council from 1994-2008. During her years in the EWMA Council, Christina made significant contributions to the activities and development of EWMA. In 2000, she was responsible for a very successful EWMA Conference, held in Stockholm, Sweden. This conference became the starting point for the development of the EWMA Cooperating Organisations programme. Christina played a crucial role in this and has subsequently contributed to the development of multidisciplinary wound management organisations in the Balkans and the Baltic States.

In 2014, Christina is hosting another European wound conference in Stockholm, the 17th Annual Meeting of EPUAP held 27-29 August.

Throughout the years, Christina has ensured a good collaboration between EWMA and EPUAP with the objective to promote high quality wound management. Her work on “Stop Pressure Ulcer Day” has yielded particular success in raising awareness of pressure ulcers and highlighting the real difference that collaborative work can make in achieving successful reduction in both the prevalence and incidence of pressure ulcers.
Christina Lindholm is a registered nurse, PhD in Medicine (Dermatology & Surgery), senior professor at Sophiahemmet University, and a wound consultant to the Karolinska University Hospital and Dalen Geriatric hospital. She is a member of the executive board of European Pressure Ulcer Advisory Panel (EPUAP). Christina has published more than 70 scientific papers and 10 scientific reports on wound management and received several scientific awards. She has published the Scandinavian textbook on wounds, and several chapters in national and international textbooks. She is a well-recognised international lecturer. Her main scientific interest is pressure ulcers and wound microbiology.

During her long engagement in EWMA and the EWMA Education Committee, Christina has contributed significantly to the educational activities and has given numerous presentations and lectures at the EWMA conferences. She has also written the leading schoolbook “Sår” (Wounds) that is used in all nursing education and wound education in Sweden.

Christina is a credit to the nursing profession and an inspirational leader. She was Director of Research and Development in Nursing at Uppsala University Hospital, a director of research in Caring Sciences at the Karolinska University Hospital, and held a professorial chair at the University of Kristianstad. Christina has supervised five PhD students, and is presently supervising an additional three. She is an expert nurse in the International Council of Nurses and a consultant to the National Institute of Health and Social Society in Sweden. In addition, she is a member of the editorial committee of the Journal of Wound Care and frequently reviews papers for many other scientific journals. Christina lectures on pressure ulcers and wound management worldwide and is currently a professor at Högskolan Kristianstad University in Sweden.

Aristotle once wrote: “We are what we repeatedly do. Excellence, then, is not an act, but a habit.” This quotation truly captures the essence of Christina Lindholm.
Infection is one of the most frequent complications in wound care. Consequently, both antibiotics and non-antibiotic antimicrobial agents are readily used in the treatment of wounds. However, the remarkable healing power of antibiotics in particular has invited widespread and often inappropriate use. This misuse and overuse of antibiotics has led to resistance among bacteria and consequent treatment complications, increased healthcare costs, and general concern for the societal healthcare consequences.

EWMA believes that advanced modern wound care can complement antibiotic treatment. Therefore, we are actively advocating prudent and appropriate use of antibiotics in wound care. We also advocate that a clear discrimination between the use of antibiotics and non-antibiotic antimicrobial agents should be made.

Last year, EWMA made a sizeable contribution to the resistance debate by publishing the position document Antimicrobials and Non-healing Wounds. In this document, leading wound experts described the controversies surrounding the use of both antibiotics and non-antibiotic antimicrobial agents in wound management and aimed to raise interest in how to solve these problems for future use of antimicrobials.

However, publishing Antimicrobials and Non-healing Wounds is not the end of EWMA’s activities in the field of antimicrobials. As discussed below, EWMA is committed to ending the inappropriate use of antibiotics and defusing the ticking time bomb of antimicrobial resistance.

PROMOTING THE APPROPRIATE USE OF ANTIMICROBIALS IN WOUND MANAGEMENT

The World Health Organisation has identified the following key factors that contribute to the general misuse of antimicrobials: diagnostic uncertainty, lack of skills and failure to properly utilise clinical guidelines. As a clinical discipline, wound management comprises all of these factors. Healthcare professionals need guidance and education regarding structured management of antimicrobial treatment in wound care. They need to understand that, to be effective, antimicrobial treatment should be targeted to both the appropriate wound and the appropriate patient. Guidelines for the management of specific wound types do exist. However, a guidance tool with a key focus on treatment with antibiotics and non-antibiotic antimicrobial agents is lacking but much sought after by health professionals.

These issues are addressed in a new EWMA project that sets sail this year. The overall aim of the project is to develop a clinical decision support tool that will facilitate the appropriate use of antimicrobials in wound management. Although it is expected to aid in clinical decision-making, the tool will also present an outline of identified best practices of treatment with antibiotics and non-antibiotic antimicrobial agents. EWMA believes that providing this approach can reduce mistakes in those hectic moments when decisions are made. In support of this viewpoint, our goal is to make the tool as hands-on as possible and to offer health professional decision support at the bedside. The first step is to make a ‘pocket guide’ (flowchart), but the possibility of a software application for smartphones and tablet computers will also be investigated.

THE ONE HEALTH APPROACH

Focusing on antimicrobial use in humans alone is not adequate. EWMA believes that the challenge of antimicrobial resistance must be faced using the One Health Approach. Only through the collaborative effort of multiple disciplines—working locally and globally—will there be a chance to combat the rise and spread of antimicrobial resistance. In support of this viewpoint, EWMA is now working to build alliances with veterinary wound initiatives and other interdisciplinary initiatives concerning antimicrobial resistance.

Therefore, we are very proud to welcome you to the Symposium on Veterinary Wound Management and Antimicrobial Resistance, which
will be held at this year’s EWMA Conference in Madrid. The symposium is a collaborative initiative between the Veterinary Wound Healing Association and EWMA who share the goal of promoting education and research into the scientific basis and clinical management of wounds. The objective of the symposium is to provide a unique platform from which scientists and other experts in the veterinary and human wound management disciplines, as well as public health professionals, can share knowledge, identify interfaces and build the capacity to draw on the synergies.

EWMA’S EU ADVOCACY ACTIVITIES RELATED TO ANTIMICROBIAL RESISTANCE

Even within the European Union, scientific policies on the use of antimicrobial agents vary greatly and result in diverse practices in the local healthcare systems. Thus, both political incentives and scientific strategies are needed to stimulate changes in practice. To facilitate change, the EU is now calling upon its member states to develop and ensure awareness among public and health professionals of the threat of antimicrobial resistance and measures available to counter the problem.

In February, EWMA responded to a public consultation regarding the use of nanosilver. The public consultation was launched by the European Commission’s Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR). In the response, it was expressed that EWMA believe in the use of non-antibiotic antimicrobial agents as the first line of defence against topical infections and that this approach could help save valuable antibiotics for urgent and last-resort treatment of life-threatening conditions. However, to improve the evidence base, large-scale clinical studies to investigate the clinical efficacy of non-antibiotic antimicrobial agents (antiseptics), including silver, are needed and should be encouraged and incentivised.

EWMA is continuously contributing to the EU’s commitment to face the challenges of antimicrobial resistance. Read more about the advocacy activities of EWMA in this issue.

BIOFILM COURSES

Last year, EWMA offered its first practical course on biofilm. The cause was developed in association with the University of Copenhagen. It was a great success; for 2014, two courses are planned that would include even more individual hands-on experiments in the laboratories. The biofilm courses introduce the participants to the topic of biofilms and their huge impact on chronic infections. Through lectures and a full day of hands-on experiments, the participants gain an understanding of biofilms and useable knowledge of how and why to implement biofilms into their research or product portfolio.

UPCOMING INITIATIVES IN 2014-2015

EWMA leg ulcer recommendations
The objective of this project is to produce a practical guidance document on leg ulcer treatment, that may be applicable within the different clinical settings for leg ulcer treatment in Europe.

EWMA recommendations on Negative Pressure Wound Therapy (NPWT)
These recommendations will describe the available NPWT devices (including their application and use), the health economic aspects of use of NPWT technology and the eHealth perspectives on the use of NPWT technology.

Promoting Appropriate Use of Antibiotics and Non-Antibiotic Antimicrobial Agents in Wound Care
The goal of this project is to develop a clinical decision support tool. The tool will facilitate appropriate use of antibiotics and non-antibiotic antimicrobial agents in wound management.

Wound survey Germany
The objective of the survey will be to identify the number and type of wounds under treatment, and provide an estimate of the resource consumption directly attributable to wound care at an organisational level. This will be carried out in collaboration with the German Wound Organisation ICW.

Home Care-Wound Care UK
A guideline for wound care within the UK home care services will be developed, based on the recommendations provided by the EWMA Home Care - Wound Care document. This will be done in collaboration with relevant organisations in the UK.

EWMA recommendations for nurse education
The recommendations will define learning outcomes related to the different levels of education. The objective is to eliminate inconsistencies in wound care education within European nurse education programmes.
At the EWMA-GNEAUPP 2014 Conference in Madrid (14-16 May), EWMA is launching a new document that will highlight the challenges of managing and providing modern, advanced wound care outside the controlled clinical environment in patients’ own homes. The Home Care-Wound Care document will be presented at a key session on Friday 16 May, 08:00-09:30.

With this document EWMA aims to generate critical discussion and debate regarding the prerequisites, conditions, and knowledge/skills of healthcare practitioners that are required to manage wounds at home. In addition, the document provides specific recommendations for wound care at home. These recommendations are presented from the organisational, patients’, and health care professionals’ points of view.

The background for Home Care-Wound Care is the dramatic shift in location of health care delivery from hospital towards the home care setting that has taken place during the past decade. Because health economic considerations have lead to an earlier discharge of hospitalised patients, more patients with a complex pathological picture (including wounds) are being treated at home. The challenges of providing wound care in the home care setting is underscored by patient chronicity: 76% of patients with chronic wounds have three or more comorbid conditions including hypertension, vascular disease, and arthritis and up to 46% have diabetes. Furthermore, evidence suggests that many patients receiving health care services at home never receive a diagnosis of wound aetiology.

EWMA has recognised that there is a paucity of research focusing on the subject of home care wound care from a clinical perspective. This gap can best be illustrated by the fact that there are no guidelines or recommendations of minimum requirements for providing best care to patients with wounds and their families in the home care setting.

With this background in mind, EWMA initiated the development of the Home Care-Wound Care document. To provide a multi-country perspective on the provision of home care wound care across Europe, we collaborated with the German Wound Association, Initiative Chronische Wunden e.V. (ICW), and British Tissue Viability Society (TVS), with support from the non-profit organisation HomeCare Europe.

The authors are:
- Sebastian Probst, Zurich University of Applied Sciences ZHAW, Department of Health, Winterthur, Switzerland
- Salla Seppänen, Senior Lecturer, Mikkeli University of Applied Sciences, Department of Health Care, Mikkeli, Finland
- Veronika Gerber, Initiative Chronische Wunden e.V, Spelle, Germany
- Georgina Gethin, Senior Lecturer, School of Nursing & Midwifery, NUI Galway, Galway, Ireland
- Alison Hopkins, Tissue Viability Society, CEO Accelerate CIC, Mile End Hospital, London, UK
- Rytis Rimdeika, Kaunas University Hospital, Department of Plastic and Reconstructive Surgery, Kaunas, Lithuania

Als Forum für die europäische phlebologische Wissenschaft widmet sich die CME-zertifizierte Zeitschrift allen relevanten phlebologischen Themen in Forschung und Praxis: Neue diagnostische Verfahren, präventivmedizinische Fragen sowie therapeutische Maßnahmen werden in Original- und Übersichtsarbeiten diskutiert.

AIM OF THE NORDIC DIABETIC FOOT TASK FORCE
The Nordic Diabetic Foot (NDF) Task Force is a network of national and international health care clinicians with different disciplinary backgrounds with the aim of promoting the systematic implementation of guidelines for diabetic foot care in Nordic countries.

PLANNED ACTIVITIES
To reach its aim, the NDF Task Force will initiate and support various activities at the national level that highlight the gap between recommended guidelines and actual clinical practice for diabetic foot care. These activities will be undertaken by national working groups in each country. Findings from these activities will be used to engage local health authorities and national-level policy makers and to push for initiatives that support the further implementation of best practices. The NDF Task Force will also host a biennial NDF symposium to actively promote and support the systematic implementation of best practices in diabetic foot care in Nordic countries.

NETWORK STRUCTURE
The overall strategic planning and prioritization of the NDF project will be undertaken by the steering group of the NDF Task Force. National working groups in each Nordic country will develop and manage project activities (figure 1). These groups will be composed of individuals with clinical expertise in orthopaedic surgery, cardiovascular surgery, plastic surgery, general surgery, endocrinology, and diabetology as well as wound care specialists and podiatrists. Policy makers, health care administrators, and industry representatives will also be involved as dialogue partners.

STEERING GROUP MEETING
The steering group met in Copenhagen on February 14, 2014. This was the first formal meeting since the launch of the initiative at last year’s EWMA conference. The meeting was very productive, with members agreeing and deciding upon how to proceed toward the establishment of national working groups and more detailed planning of the upcoming NDF symposium.
ESTABLISHMENT OF NATIONAL WORKING GROUPS

One of the main priorities in the near future is the establishment of national working groups. An initial step is to map and describe the current diabetic foot care situation in each Nordic country. Although these descriptions may be similar across countries, they are also expected to reveal national variations in how diabetic foot care is organised and provided. The next step will be to develop advocacy strategies for moving toward implementing nationwide best practices in diabetic foot care as described by clinical guidelines for each Nordic country.

SYMPOSIUM

At the steering group meeting, a draft program was created for the NDF symposium, which is planned for November 5-6, 2014.

Specifically, the symposium will:
1) Offer up-to-date educational information on current best practices in various aspects of diabetic foot treatment, and
2) Set an agenda for moving toward implementing best practices in diabetic foot care in Nordic countries.

This symposium is a unique opportunity to gather clinicians with different disciplinary backgrounds who have an interest in actively developing the organisation and quality of care for diabetic foot patients in their regions and municipalities. Primary target groups for the symposium are:
- Representatives of multidisciplinary foot care teams at diabetic foot centers and/or hospital units responsible for diabetic foot treatment,
- Doctors and nurses in orthopaedic surgery, cardiovascular surgery, plastic surgery, endocrinology, and diabetology as well as wound care specialists and podiatrists,
- Representatives from general practice organisations,
- Policy makers and health care administrators, and
- Industry representatives.

After invitation of speakers and final revision, the program will be announced at www.nordicdiabeticfoot.org/. Those who sign up to receive newsletters will be notified when the program is available.

For further information, please contact the NDF Conference Secretariat at info@cap-partner.eu.
INTRODUCTION
A comparison of international prevalence rates of diabetic foot issues reveals that Austria has a tremendous need for improvement. The Austrian amputation rate of 19/100,000 patients compared to international levels of 3/100,000 indicates that systemic changes are urgently needed to effectively treat diabetic foot patients. Such changes will reduce the risk of limb loss in individual patients. International data also indicates that enormous cost savings can be achieved by reducing the numbers diabetic foot ulcers and major amputations. To reduce the Austrian amputation rate, long-standing members of the Austrian Wound Association have launched a strategy with five aims, each designed to address a specific intervention area.

AIM 1 – PREVENTION
Reduce the risk of diabetic foot syndrome by periodic screening.
General practitioners currently treat 80% of Austria’s diabetic patients. Unfortunately, the national health insurance company does not reimburse physicians for the costs of performing neuropathy and blood flow screenings. A small disease management programme in Austria achieved a rapid decrease in the number of diabetic foot ulcers by paying for screening and educating practitioners. Therefore, reimbursed screening is the first step toward reducing the number of diabetic foot syndromes in Austria. Based on current international evidence, paid screening and intensive staff training on screening methods, diagnosis, and diabetic foot treatment can reduce the diabetes foot syndrome rate. Assuming that every major amputation costs approximately 50,000 €, the Austrian health system could save about 120 Mio € by implanting proper preventive measures.¹

AIM 2 – INCREASE AWARENESS
Enhance patient education regarding “living with diabetes” and risk management to reduce diabetic foot problems.
Despite the strong efforts of several national and international institutions, the consequences of diabetes are not well known in Austrian society. To address this problem, further awareness campaigns have to be organised.
To this end, Austria’s ministry of health recently founded a working group focused on enhancing patient education.

AIM 3 – ORGANISATION OF TREATMENT
Improve the treatment of diabetic foot patients by reorganising.
Only a few diabetes centres are established throughout the country, making it difficult to provide comprehensive treatment according to international standards. The planned 2014 restructuring of the Austrian Health Care System will also reorganise diabetic foot treatment. Based on international projects, the treatment should work on three levels.

- Level 1: Basic treatment of diabetic foot syndrome by general practitioners and diabetes nurses
- Level 2: Advanced treatment in specialised diabetes centres by specialised staff (e.g. wound experts, podologists, etc.)
- Level 3: Special treatment in hospitals by a group of medical specialists

Although the screening methods are not very time consuming, the treatment of diabetic patients requires a special environment and trained, qualified staff (nurses), and these are not available throughout Austria.

AIM 4 – EDUCATION
Implement international educational curricula to prevent diabetic foot syndrome.
There is a lack of courses specialised in handling patients with diabetes in Austria. In addition, podology is not defined as an Austria specialty. For situations like this, the IWGDF (International Working Group for Diabetic Foot) provides a curriculum for countries with weak or no diabetic foot treatment concepts. For the first time in Austria, this curriculum will be implemented as the “Diabetic Foot Care Assistant” course; it will start in mid 2014 and provide basic information on how to treat diabetic patients’ feet.
AIM 5 – ANALYSING REGISTER DATA

Analyse nationally collected data to improve access to information. (Austrian Inpatient Quality Indicators)

Austria’s government recently announced the beginning of a widespread analysis of standardised national data to define and visualise quality criteria concerning several health topics. These Austrian Inpatient Quality Indicators (A-IQI) are designed to measure health-care quality based on ICD and individual treatment. They enable the health system to define and test quality against general data. Therefore implementation of the A-IQI should provide an objective view of quality of care concerning diabetes. The A-IQI will facilitate evaluation of the major amputation registry and will elucidate the lack of quality information regarding diabetic foot treatment.

The first results should be available in 2014/15.

DISCUSSION

After long medical discussions and intensive lobbying work by members of AWA (Austrian Wound Association) and the ÖDG (Austrian Society for Diabetes), the “diabetic foot” problem has finally become a political issue in Austria. Some very important changes have been scheduled within the planned restructuring of the health care system to prevent complications in patients with diabetes and improve the treatment of diabetic feet. For four out of five aims set out in the intervention strategy defined by the AWA, initial steps towards improvement have been taken. However, this is only the start. Reimbursement for preventive services in primary care remains to be defined. Within areas where improvement are already taking place, AWA will continue to advocate for political and economic support for initiatives that contribute to further improvement of diabetic foot care in Austria.

Dr Gerald Zöch will provide additional information concerning this topic at the annual 2014 EWMA Congress in Madrid, Spain. (15th May, 13:15-14:15, “International perspectives on implementation”)

Literature:

On March 1, 2014 the European Union of Medical Specialists (UEMS) invited EWMA to the first meeting for European Scientific Societies. The objective was to uncover areas and activities of mutual interest between participating societies and the UEMS. EWMA Council member Rytis Rimdeika represented EWMA at the meeting. In this article, he reports his reflections from the meeting.

EUROPEAN REFERENCE NETWORKS

From the perspective of the UEMS, the primary objective of the meeting was to discuss a proposal from the UEMS to establish a number of European Reference Networks. The initiative was presented by Dr. Andrzej Rys, Director, and Dr. Enrique Terol, Policy Officer and Directorate General for Health and Consumers, of the European Commission.

These networks should secure high-quality treatment of rare diseases (defined as a prevalence of \( \leq 5/10,000 \)) for all EU citizens. The establishment of these networks is an initiative related to the EU Directive 2011/24 on the application of patients' rights in cross-border healthcare. The UEMS and the European Scientific Societies have been requested to provide their input with respect to this directive. Specifically, input was requested on the identification of domains and groups of diseases, ways to establish networks with a multidisciplinary and multi-speciality approach, and selection criteria for European Reference network centres. In addition to rare diseases, there is a focus on complex and cost-intensive treatment that requires a particular concentration of expertise.

The networks are also intended as focal points for medical training and research, registries, information dissemination, and evaluation. The directive lists six basic criteria for defining reference centres, as follows:

- Have knowledge and expertise in diagnostics, follow up, and patient management (documented via evidence and good outcomes);
- Follow a multidisciplinary approach;
- Offer a high level of expertise and have the capacity to produce good practice guidelines and implement outcome measures and quality control;
- Make a contribution to research;
- Organise teaching and training activities;
- Collaborate closely with centres of expertise as well as national and international networks.

Inclusion of wound specialists may be relevant to some of these networks. EWMA will therefore follow the continued work and propose involvement wherever relevant.

FURTHER EWMA PERSPECTIVES ON THE UEMS COLLABORATION

Through this meeting, EWMA has initiated a more formal contact with the UEMS. UEMS is primarily composed of single-specialty sections (e.g., surgery) and sub-speciality subdivisions (e.g., surgical oncology). However, the organisation also includes Multidisciplinary Joint Committees and Thematic Federations that include several specialities. A list of specialities and committees can be found at the UEMS website: www.uems.eu/about-us/medical-specialties. The EWMA Council will discuss the opportunity to suggest establishment of a multidisciplinary joint committee on wounds within the UEMS organisation.

About the European Union of Medical Specialists

UEMS is the representative organisation of the National Associations of Medical Specialists in Europe. The UEMS Council is working through 39 Specialist Sections and their European Boards. They address topics related to continuing medical education and professional development, the harmonisation of postgraduate training, and the organisation of European examinations. Through this collaboration, the UEMS sets the standards for high-quality healthcare practice and transmits recommendations to the Authorities and Institutions of the EU and the National Medical Associations.
Journal of Wound Care (JWC) is the leading source of tissue viability research and information. JWC is essential reading for all specialists who wish to enhance their practice and stay ahead of developments in wound management and tissue viability.

The journal is internationally renowned for its cutting edge and state-of-the-art research and clinical articles, as well as its coverage of management, education and novel therapies.

JWC has been associated with an Impact Factor (IF) of 1.906 for 2012, corresponding to a total number of citations of 1327.

The journal is indexed on Medline, Scopus, CINAHL and the Thomson Reuters’ Science Citation Index-Expanded and Current Contents/Clinical Medicine.

“The Journal of Wound Care is an extremely valuable resource that contains a wealth of peer-reviewed papers detailing the latest advances in wound care research. A must read for clinicians, academics and researchers who want to advance their own knowledge/practice and keep abreast of the wound care literature.”

Caroline McIntosh, Head of Podiatry, National University of Ireland

SAVE 10% – SUBSCRIBE TODAY

Obtain access to the online archive containing all content published in JWC since 1999 with an online subscription†. EWMA members quote EWMA14 to receive your discount*.

†Online archive accessible only via a online only OR print and online subscription. *Promotional code required

Visit: www.magsubscriptions.com/jwc
or call us on: +44 (0) 1722 716 997

Join us for debate and discussion: Journal of Wound Care
The Dutch organisation for Wound Professionals aims at improving cooperation and organisation in woundcare to achieve optimal multidisciplinary structured woundcare.

This will advance all levels of care, to benefit both practitioners and patients.

Multidisciplinary cooperation: The necessity and challenge to achieve

Our new name: Dutch Organisation for Wound Professionals
Managing Wounds as a Team – Exploring the concept of a Team Approach to Wound Care

The World Health Organisation argues that a group of professionals who actively bring the skills of different individuals together with the aim of clearly addressing the health care needs of patients and the community will strengthen the health system and lead to improved clinical and health-related outcomes. Indeed, a number of systematic reviews have noted a positive impact from the use of interdisciplinary interventions for chronic diseases such as heart failure or mental illness, and in individuals at risk of poor nutrition. However, when it comes to wound care, available evidence for the team approach is fragmented. This project, which explores the concept of a team approach to wound care, was conceptualised in the context of this background.

In this document, AAWC, AWMA, and EWMA focus on the development of a universal model for the adoption of a team approach to wound care. To achieve this goal the document explores existing evidence for the team approach to wound care and discusses the barriers and facilitators for a successful team approach to wound care.

“Managing Wounds as a Team” is for everyone involved in wound care – from carers to decision makers.

KEY SESSION AT EWMA-GNEAUPP 2014 CONFERENCE
This spring, the author group will be busy presenting their work and they are proud to invite you to take part in a Key Session that is entirely focused on the team approach to wound care, during which the findings of the project will be presented. The Key Session will be held on Thursday 15 May, 16:55-17:55 at the EWMA-GNEAUPP Conference in Madrid.

In addition, the document will be presented at several other international conferences including ICIC 14, Brussels, Belgium; AAWC Spring, Orlando, USA; AWMA 2014, Gold Coast, Australia; and EFFORT 2014, London, UK.
Corporate Sponsors

Corporate A

BSN medical GmbH
www.bsnmedical.com
www.cutimed.com

Coloplast
www.coloplast.com

Convatec
Convatec Europe
www.convatec.com

Flen Pharma
Flen Pharma NV
www.flenpharma.com

Hartmann
Paul Hartmann AG
www.hartmann.info

KCI
KCI Europe Holding B.V.
www.kci-medical.com

Lohmann & Rauscher
Lohmann & Rauscher
www.lohmann-rauscher.com

Mölnlycke Health Care Ab
www.molnlycke.com

PolyMem
Ferris Mfg. Corp.
www.PolyMem.eu

Smith & Nephew
Wound Management
Smith & Nephew Medical Ltd
www.smith-nephew.com/wound

Sorbion AG
www.sorbion.com

Corporative B

3M Health Care
www.mmm.com

Abbott Nutrition
Abbott Nutrition
www.abbottnutrition.com

ABIGO Medical AB
www.abigo.se

AOTI Ltd.
www.aotinc.net

ArgoHuntleigh
ArjoHuntleigh
www.ArjoHuntleigh.com

DryMax
DryMax
www.absorbest.se/drymax-woundcare

MediWound Ltd.
www.mediwound.com

Nutricia Advanced Medical Nutrition
www.nutricia.com

SastoMed
www.sastomed.com

SOFAR S.p.A.
www.sofarfarm.it

Söring
Söring Gmb
www.soering.com

Stryker
www.stryker.com

Laboratoires Urgo
www.urgomalaskincare.com

Welcare Industries SPA
www.welcaremedical.com
<table>
<thead>
<tr>
<th>Conferences 2014</th>
<th>Theme</th>
<th>Month</th>
<th>Days</th>
<th>City</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Conference of the Tissue Viability Society (TVS)</td>
<td></td>
<td>Apr</td>
<td>1-2</td>
<td>York</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>Spring Symposium on Advanced Wound Care and Wound Healing Society (SAWC)</td>
<td></td>
<td>Apr</td>
<td>23-27</td>
<td>Florida</td>
<td>USA</td>
</tr>
<tr>
<td>Deutscher Pflegekongress /Deutscher Wundkongress</td>
<td></td>
<td>May</td>
<td>7-8</td>
<td>Bremen</td>
<td>Germany</td>
</tr>
<tr>
<td>2014 Conference of the Leg Ulcer Forum</td>
<td></td>
<td>May</td>
<td>8</td>
<td>Harben</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>10th National Conference of the Australian Wound Management Association (AWMA)</td>
<td>A gold standard: Research and clinical practice</td>
<td>May</td>
<td>7-10</td>
<td>Queensland</td>
<td>Australia</td>
</tr>
<tr>
<td>24th Conference of the European Wound Management Association (EWMA)</td>
<td></td>
<td>May</td>
<td>14-16</td>
<td>Madrid</td>
<td>Spain</td>
</tr>
<tr>
<td>11th European Academy of Dermatology and Venereology (EADV) Spring Symposium</td>
<td></td>
<td>May</td>
<td>22-25</td>
<td>Belgrade</td>
<td>Serbia</td>
</tr>
<tr>
<td>2nd Practical Course in Biofilm Procedures</td>
<td>in collaboration with the University of Copenhagen</td>
<td>Jun</td>
<td>4-5</td>
<td>Copenhagen</td>
<td>Denmark</td>
</tr>
<tr>
<td>15th European Federation of National Associations of Orthopaedics and Traumatology (EFORT) Congress</td>
<td></td>
<td>Jun</td>
<td>4-6</td>
<td>London</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>XXVI National Congress of Vascular Nursing and Wounds (AEEVH)</td>
<td></td>
<td>Jun</td>
<td>5-6</td>
<td>Madrid</td>
<td>Spain</td>
</tr>
<tr>
<td>2014 International Lymphoedema Framework (ILF) Conference</td>
<td></td>
<td>Jun</td>
<td>5-7</td>
<td>Glasgow</td>
<td>Scotland</td>
</tr>
<tr>
<td>17. Jahreskongress (DGfW)</td>
<td></td>
<td>Jun</td>
<td>27-28</td>
<td>Bochum</td>
<td>Germany</td>
</tr>
<tr>
<td>The 2nd International course on the Neuropathic Osteoarthropathic Foot</td>
<td>Charcot Foot Course</td>
<td>Jul</td>
<td>3-5</td>
<td>Rheine</td>
<td>Germany</td>
</tr>
<tr>
<td>3rd Euro-Asian Forum (The Association for Wound management in Bosnia &amp; Herzegovina (URuBiH), in cooperation with Doctors Chamber of Canton Sarajevo)</td>
<td>Traditional and Western Medicine in the service of human well-being</td>
<td>Aug</td>
<td>18-22</td>
<td>Sarajevo</td>
<td>Bosnia and Herzegovina</td>
</tr>
<tr>
<td>17th Annual European Pressure Ulcer Advisory Panel Meeting (EPUAP)</td>
<td></td>
<td>Aug</td>
<td>26-29</td>
<td>Stockholm</td>
<td>Sweden</td>
</tr>
<tr>
<td>User Driven Innovation Course</td>
<td>in collaboration with the Danish Technological Institute</td>
<td>Sep</td>
<td>3-4</td>
<td>Copenhagen</td>
<td>Denmark</td>
</tr>
<tr>
<td>33rd annual meeting of the European Bone and Joint Infection Society (EBJIS)</td>
<td></td>
<td>Sep</td>
<td>11-13</td>
<td>Utrecht</td>
<td>The Netherlands</td>
</tr>
<tr>
<td>24th European Tissue Repair Society Annual Meeting (ETRS)</td>
<td></td>
<td>Sep</td>
<td>11-13</td>
<td>Edinburgh</td>
<td>Scotland</td>
</tr>
<tr>
<td>Conference on Science and Training of the Polish Wound Healing Society (PWMA)</td>
<td></td>
<td>Sep</td>
<td>11-13</td>
<td>Mikolajki</td>
<td>Poland</td>
</tr>
<tr>
<td>Diabetic Foot Study Group (DFSG) 2014</td>
<td></td>
<td>Sep</td>
<td>12-14</td>
<td>Bratislava</td>
<td>Slovakia</td>
</tr>
<tr>
<td>16. Jahrestagung of the Austrian Wound Association (AWA)</td>
<td></td>
<td>Sep</td>
<td>19-20</td>
<td>Graz</td>
<td>Austria</td>
</tr>
<tr>
<td>DEBRA International Annual Congress</td>
<td></td>
<td>Sep</td>
<td>19-21</td>
<td>Paris</td>
<td>France</td>
</tr>
<tr>
<td>1st Joint Conference of the Swiss Wound Care Societies (SAIW)</td>
<td></td>
<td>Sep</td>
<td>24-25</td>
<td>Biel-Benne</td>
<td>Switzerland</td>
</tr>
<tr>
<td>2014 Lindsay Leg Club Conference</td>
<td></td>
<td>Sep</td>
<td>24-25</td>
<td>Worcester Rugby Club</td>
<td>UK</td>
</tr>
<tr>
<td>Pisa International Diabetic Foot Courses 2014</td>
<td></td>
<td>Oct</td>
<td>1-4</td>
<td>Pisa</td>
<td>Italy</td>
</tr>
<tr>
<td>National multidisciplinary Conference for Wound Professionals (NOWW)</td>
<td>Wound Ecology</td>
<td>Oct</td>
<td>7</td>
<td>Ede</td>
<td>The Netherlands</td>
</tr>
<tr>
<td>23rd European Academy of Dermatology and Venereology (EADV) Congress</td>
<td>Building Bridges</td>
<td>Oct</td>
<td>8-12</td>
<td>Amsterdam</td>
<td>The Netherlands</td>
</tr>
<tr>
<td>Fall Symposium on Advanced Wound Care and Wound Healing Society (SAWC)</td>
<td></td>
<td>Oct</td>
<td>16-18</td>
<td>Las Vegas</td>
<td>USA</td>
</tr>
<tr>
<td>II Congress for Chronic Wounds Management of the Serbian Wound Healing Society (SWHS)</td>
<td></td>
<td>Oct</td>
<td>24-25</td>
<td>Belgrade</td>
<td>Serbia</td>
</tr>
<tr>
<td>Conference of the Canadian Association of Wound Care (CAWC)</td>
<td>Action 2014: Skin Health For Canada</td>
<td>Oct</td>
<td>30</td>
<td>Toronto</td>
<td>Canada</td>
</tr>
<tr>
<td>Nordic Diabetic Foot Symposium</td>
<td></td>
<td>Nov</td>
<td>5-6</td>
<td>Malmö</td>
<td>Sweden</td>
</tr>
<tr>
<td>VII Ibero-Latin American Congress about Ulcers and Wounds (SILAUHE)</td>
<td></td>
<td>Nov</td>
<td>5-8</td>
<td>Tucuman</td>
<td>Argentina</td>
</tr>
<tr>
<td>Annual meeting of the Danish Wound Healing Society</td>
<td></td>
<td>Nov</td>
<td>20-21</td>
<td>Kolding</td>
<td>Denmark</td>
</tr>
</tbody>
</table>

**Conferences 2015**

| 25th Conference of the European Wound Management Association (EWMA) | Wound Care – Shaping the Future | May | 13-15 | London | United Kingdom |
| 7th International Symposium on the Diabetic Foot (ISDF) | | May | 20-23 | The Hague | The Netherlands |

For web addresses please visit www.ewma.org
Thank you for the opportunity to provide the readers of the EWMA journal with updated news about the Association for the Advancement of Wound Care (AAWC). As my term as President comes to an end this April, I am pleased to note that we have concentrated on the escalating epidemic of diabetic foot complications over the last two years. In an effort to foster amputation prevention, two new guidelines are under development for wound infection and diabetic foot ulcers.

We are honored to be partnered with EWMA and the Australian Wound Management Association (AWMA) to soon finalize a paper on the multidisciplinary approach to wound care. Further, we continue our partnership with Health Volunteers Overseas (HVO) to provide wound and lymphedema education in Haiti, Peru, Cambodia and India. We continue to work with US-based organisations such as National Pressure Ulcer Advisory Panel (NPUAP) and the Alliance of Wound Care Stakeholders. These opportunities strengthen dialogue and cohesiveness among professional organisations and societies involved in the wound care space.

Made possible by an unrestricted grant from Shire, the Association for the Advancement of Wound Care (AAWC) is pleased to award two $50,000 fellowship support grants for the 2014-2015 academic year. The grants will provide salary and benefit support for two (2) physician fellows (MD, DO, DPM) who will conduct research in settings that are dedicated to the multidisciplinary approach to wound care. Winners will be announced at the SAWC Spring Opening Ceremony opening ceremony on April 24th.

Among our strategic objectives is to educate the generalist practitioner. In coordination with AAWC’s Corporate Advisory Panel (CAP), AAWC is developing an “access portal” where the public can obtain wound care accredited education. This education is intended to help new wound care practitioners and non-wound care specialists learn the most current, evidence-based practices in wound care. Based on a wound care pathway, the educational links can be accessed at www.aawconline.org/education-for-the-generalist.

Help AAWC “WIN” the fight against chronic wounds!
AAWC is offering this 11x17 inch patient-focused, educational poster (shown to the left) for free from the AAWC online store. A small shipping/handling fee is all that is required. Order your poster today at www.aawconline.org and help your patients “take part” in their wound prevention and care.

Last but not least, AAWC is proud to announce a tremendous increase in membership over the last two years. With nearly 2300 members, our commitment to community, collaboration and equal partnership is still paramount. AAWC provides numerous educational benefits to our professional and patient/lay-caregiver members. Unique benefits apply to both groups and can be viewed at www.aawconline.org.

Thank you so much for allowing me to share our current activities and projects with our global partners.
Clinical Symposium on Advances in Skin & Wound Care
The Conference for Prevention and Healing
The Mirage Hotel | Las Vegas, Nevada

PRECONFERENCE WORKSHOPS:
27-28 September 2014

MAIN CONFERENCE:
28 September – 1 October 2014

For more information on topics, speakers, continuing education credit, submitting a poster presentation, registration fees, and more, go to...

WWW.SYMPOSIUMONWOUNDCARE.COM
**EB-CLINET**

– Clinical Network of EB Centres and Experts

Epidermolysis bullosa (EB) is a severe and rare skin disease. EB-CLINET was launched in 2011 to establish a clinical network of EB centres and experts across all European countries and beyond.

Epidermolysis Bullosa (EB)

Approximately 30,000 people in Europe live with EB. The symptoms of EB include blisters, wounds, and scars that form not only on the skin but also on the mucous membranes, including those of the mouth, eyes, and gastrointestinal tract, from the slightest mechanical stress. Complications associated with EB include pain, itching, scarring, the fusion of fingers and toes, tooth decay and tooth loss, nutritional and digestive problems, and in some cases, aggressive skin tumours. Life with EB is a tremendous challenge for patients and their families. The disorder does not yet have a cure.

**DEBRA Austria & EB House Austria**

DEBRA Austria was founded in 1995 as a patient support group for those who suffer from EB. In cooperation with the Department of Dermatology in Salzburg, Austria (General Hospital, Paracelsus Medical University), DEBRA Austria set up the EB House Austria in November 2005 with private donations and a one-time subsidy granted by the Austrian government.

The EB House Austria is a centre for cutting-edge medical treatment and targeted research. Its three units (Outpatient Clinic, Research Laboratory, Academy) meet the EU-recommended criteria for a Centre of Expertise (CE). Operation costs continue to be paid by private donations to DEBRA Austria. See www.debra-austria.org and www.eb-haus.org for more details.

**EB-CLINET**

To date, more than 400 patients with EB from 24 countries in Europe and beyond have been diagnosed and/or treated at the EB House Austria. The expertise should travel, however, rather than the patient. EB-CLINET therefore intends to strengthen the collaboration between clinicians and medical centres already specialised in EB. Moreover, EB-CLINET aims to support the development of new EB centres in countries without such services.

At present, EB-CLINET has 52 affiliated partners in 43 countries (including 25 of the 28 EU member states, 6 additional European countries, and 12 countries from outside of Europe). By cross-linking its partners, this network offers the opportunity to work collaboratively on a number of projects, including a global EB register, professional training, and elaboration of clinical practice guidelines.

Moreover, EB-CLINET serves as an information channel to share and exchange relevant news about treatment or research in EB. Online information is distributed via the website (www.eb-clinet.org) and EB-CLINET eNews. Personal exchange is assured through regular workshops, trainings, and conferences, including the two EB-CLINET Conferences in 2012 and 2013, respectively.

Encouraging research results that relate to alleviation and a causative cure of this disabling skin disease are on the horizon. EB-CLINET will be able to support the recruitment of patients for upcoming clinical trials and provide these patients with the chance to receive one of the treatment options. In this way, EB-CLINET hopes to significantly improve the quality of life for patients with EB.

---

**EB-CLINET has 52 affiliated partners in 43 countries (including 25 of the 28 EU member states, 6 additional European countries, and 12 countries from outside of Europe)**

For more details on EB-CLINET see www.eb-clinet.org.
A new therapeutic option for managing open abdomen complicated by enterocutaneous fistulae.

The fistula adapter ensures the separation of the suction from the fistula and enables an undisturbed granulation of the wound surface as well as a controlled drainage of the fistula secretions.

The technique supports coverage of wound surface with mesh graft.

Please visit us on our exhibition booth 10B11 at the EWMA Congress 14 - 16 May 2014, Madrid.
The Korean Wound Management Society was established in 2002 at its inaugural meeting, with a vision of integrating all realms of wound care to become a leader in wound management. The Society has grown to become the large organisation that it is now, with about 1,500 diverse members ranging from nurses and doctors to engineers, researchers and industrial members. Medical personnel come from diverse backgrounds and include nurses working in acute care hospitals, home care, intensive care units and wound care, as well as orthopaedic surgeons, burn specialists, physicians working in rehabilitation medicine, dermatologists and emergency department doctors.

The Society sponsors a diverse array of academic symposia and forums. In just the past year, the Society held seven seminars and meetings. Doctors Gerit D. Mulder and David G. Armstrong spoke about diabetic foot care and management at the annual spring seminar in March. The Honam regional meeting assembled in April, and the multinational participants by converting to an international program. The Society also sponsors the Korean Wound Academy and annual forums dealing with pressure sores, wound dressing and wound education. Issues and controversies regarding patient care are discussed, and individualised care principles and treatment algorithms are developed at the Society’s gatherings. The Society publishes its conference proceedings and the Journal of the Korean Wound Management Society, a bi-monthly issue that addresses relevant topics.

Along with the aforementioned conferences, inter-disciplinary education is one of the Korean Wound Management Society’s main focuses. Educational programs are based on the simple and realistic notion that no single person can be an expert in all components of wound care, and thus, the Society encourages inter-professional communication. We are also intent on spreading the most practical knowledge to healthcare personnel; therefore, we work on integrating evidence-based knowledge into realistic wound management practice guidelines.

For example, the Korean Wound Academy, which is held twice a year, provides various hands-on lectures. These include the most basic principles, such as methods for wound debridement and application of negative pressure wound therapy (NPWT). Advanced dressing materials are being introduced to medical personnel at a rapid pace, and a large part of our educational program focuses on adequate incorporation of new dressing materials into wound care. These academies are open to all wound care personnel.

Korean Wound Academy met every Saturday from August 31st to September 14th. In October, the Busan regional meeting was convened and was followed by several symposia held with industrial support. Last but not least, the Education Symposium was opened in November.

After its first seminar in 2003, the Society began hosting an annual seminar, usually in the spring. This meeting welcomes all those interested in wound care and is planning to open its doors to Hands-on lectures at the Korean Wound Academy Voluntary activities at facilities for the homeless
Collaboration with nursing groups is also an important aspect of the Society’s mission. The WOCN (Wound, Ostomy, Continence Nurse) group is very active in Korea, their motto being “Place your care in the hands of an expert.” The Society is working to provide continuous educational courses for WOCNs, standardise wound care procedures and issue certificates for these courses.

Although the quality of wound care has greatly improved thanks to the many dedicated medical personnel and continued educational opportunities available to them, there are still many in need. The Society has an outreach program in which members make charity visits to those in need of wound care that are unable to reach adequate medical help. In collaboration with nursing groups, we visit local prisons and facilities for the homeless and supply care for many minor wounds.

We are currently welcoming international communication and collaboration. Approximately 40 members participated in the 4th Congress of the World Union of Wound Healing Societies (WUWHS) in September, 2012, and 13 members participated as stream planners. Most members actively participate in associated conferences and congresses internationally. One of the Society’s many plans is to host the Congress of the WUWHS in the near future.

Through these conferences, educational meetings, and collaborations, the Society aims to provide standardised guidelines for the care of all types of wounds. Universal prevention and treatment guidelines are introduced, but the Society also wishes to provide realistic practice guidelines for different situations. For instance, care of a patient in the intensive care unit cannot be the same as care at the home of a financially compromised, bedridden, paraplegic patient, but each should receive adequate management based on the same universal principles.

Wounds are inevitable and may be found anywhere there are people. However, through its educational and academic programs, the Society hopes to decrease the incidence of wounds and enable medical personnel to effectively manage each wound based on evidence-based treatment algorithms in order to significantly improve the quality of life for human-kind.
The World Alliance for Wound and Lymphoedema Care (WAWLC) continues the hard work on advancing sustainable prevention and care of wounds & lymphoedema in settings with limited resources.

The annual executive board meeting of the WAWLC took place in Geneva in November 2013. The coordination and organisation of future initiatives and activities of the WALWC were discussed at the meeting.

Development of a dressing kit
Since 2012 the World Alliance for Wound and Lymphoedema Care (WAWLC) has been in the process of developing a dressing kit for use in limited resource settings. This kit will be a dynamic tool and help in providing the basic equipment for standardised wound treatment of patients in emergency situations.

The first step in elaborating this kit was a Delphi like consultation launched at the end of 2012. As a second step, the material from this consultation was discussed by field and scientific experts during a WAWLC Workshop at the EWMA Conference in May 2013 in Copenhagen. Here it was discussed what minimum material is needed to constitute a standard wound kit.

WAWLC Workshop at EWMA-GNEAUPP 2014
During the EWMA-GNEAUPP Conference in Madrid, the third step will be elaborated at a WAWLC workshop where a revised standard kit will be presented for debate and input.
This workshop will bring together experts in wound care and actors of humanitarian contexts. Bringing together these different experiences should help to define the rest of the essential wound care material that is needed to finalise the standard wound kit.
A list of the material decided on during the two first steps will be circulated before the workshop.

The workshop will take place on
Wednesday 14 May 2014 at 16:45-19:10.

Annual WAWLC Symposium at CAWC, Toronto October 2014
A final consolidation of the dressing kit will be presented at the annual WAWLC Symposium which will take place at the Canadian Association of Wound Care (CAWC) Conference from October 30 - November 2, 2014 in Toronto, Canada. The final version of the dressing kit will be circulated to wound care companies in order to have their proposal on concrete products to be included in the kit.

Wound Course in West Africa
In 2014, a course on Chronic Wounds will be held in Cameroon in cooperation between the Faculty of Medicine and Biomedical Sciences at Yaoundé University, Cameroon and the Geneva University Hospital (HUG), Switzerland. The course includes both theory and practice and is intended for doctors and nurses as post-graduate training.

Since 2002, Médecins Sans Frontières (MSF), Switzerland, has supported the BU programme of the district hospital, Akonolinga in Cameroon. This project falls within the now more than 30 years old fruitful exchanges between Yaoundé’s University and the HUG.

Clinic in Leogane, Haiti
On 25th of January – 1st of February 2014, Heather Hettrick from Nova South eastern University (NSU) in Fort Lauderdale and Robyn Bjork from the International Lymphedema & Wound Care Training Institute were in Leogane, Haiti, where they provided training and logistical support for clinical staff, under the direction of WAWLC Secretariat Dr. John Macdonald. The treatment results were impressive. Dr. John Macdonald has actively pursued the reopening of the lymphedema treatment branch of the Lymphatic Filariasis (LF) Clinic at the St. Croix Hospital in Leogane, Haiti. This vision is one step away from full realization. The next steps include procuring funding for the clinic, which will serve as an epicenter for training and treatment of lymphedema secondary to LF.
British Journal of Nursing (BJN) contains the latest clinical developments, original research and evidence-based practice.

Highly regarded by practitioners in the field, BJN has been called ‘the most up-to-date clinically focused journal available’ and an ‘essential companion to my studies’ by our readers.

Articles are written by nurses and subject to peer review by leading authorities in the profession, ensuring that only the best clinical papers and original research appear in the journal, making essential reading for all nurses whether students or specialists.

With an annual subscription to BJN, you will receive 22 issues with the latest on:

- Patient safety and care
- Healthcare policy
- Clinical practice
- Education and training

BJN also features supplements with a dedicated focus on areas such as, tissue viability, stoma care and oncology, offering support and assistance with your professional development.

SAVE 10% – SUBSCRIBE TODAY
Let BJN bring you closer to the forefront of nursing practice
EWMA members quote EWMA14 to receive your discount*

Visit: www.magsubscriptions.com/bjn
or call us on: +44 (0)1722 716 997

Follow us on Twitter @BJNursing
### Cooperating Organisations

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEEVH</td>
<td><a href="http://www.aeevh.es">www.aeevh.es</a></td>
</tr>
<tr>
<td>AFIScep.be</td>
<td><a href="http://www.afiscep.be">www.afiscep.be</a></td>
</tr>
<tr>
<td>AISLeC</td>
<td><a href="http://www.aislec.it">www.aislec.it</a></td>
</tr>
<tr>
<td>AIUC</td>
<td><a href="http://www.aiuc.it">www.aiuc.it</a></td>
</tr>
<tr>
<td>AMP Romania</td>
<td><a href="http://www.ampromania.ro">www.ampromania.ro</a></td>
</tr>
<tr>
<td>APTFeridas</td>
<td><a href="http://www.aptf">www.aptf</a> eradicas.com</td>
</tr>
<tr>
<td>AWA</td>
<td><a href="http://www.a-w-a.at">www.a-w-a.at</a></td>
</tr>
<tr>
<td>BEFowo</td>
<td><a href="http://www.befowo.org">www.befowo.org</a></td>
</tr>
<tr>
<td>BWA</td>
<td><a href="http://www.woundbulgaria.org">www.woundbulgaria.org</a></td>
</tr>
<tr>
<td>CNC</td>
<td><a href="http://www.wondzorg.be">www.wondzorg.be</a></td>
</tr>
<tr>
<td>CSLR</td>
<td><a href="http://www.cslr.cz">www.cslr.cz</a></td>
</tr>
<tr>
<td>CWA</td>
<td><a href="http://www.huzr.hr">www.huzr.hr</a></td>
</tr>
<tr>
<td>DGGW</td>
<td><a href="http://www.dgww.de">www.dgww.de</a></td>
</tr>
<tr>
<td>DFSC</td>
<td><a href="http://www.saar.dk">www.saar.dk</a></td>
</tr>
<tr>
<td>FWCS</td>
<td><a href="http://www.suomenhaavanhoitoyhdistys.fi">www.suomenhaavanhoitoyhdistys.fi</a></td>
</tr>
<tr>
<td>GAIF</td>
<td><a href="http://www.gaif.net">www.gaif.net</a></td>
</tr>
<tr>
<td>GNEAUUPP</td>
<td><a href="http://www.gneaupp.org">www.gneaupp.org</a></td>
</tr>
<tr>
<td>HSWH</td>
<td><a href="http://www.hswh.gr">www.hswh.gr</a></td>
</tr>
<tr>
<td>ICW</td>
<td><a href="http://www.ic-wunden.de">www.ic-wunden.de</a></td>
</tr>
<tr>
<td>LBAA</td>
<td><a href="http://www.luf.org">www.luf.org</a></td>
</tr>
<tr>
<td>LWMA</td>
<td><a href="http://www.lwma.org">www.lwma.org</a></td>
</tr>
<tr>
<td>MASC</td>
<td><a href="http://www.mwcf.madv.org.mt/">www.mwcf.madv.org.mt/</a></td>
</tr>
</tbody>
</table>

### International Partner Organisations

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWMA</td>
<td><a href="http://www.awma.com.au">www.awma.com.au</a></td>
</tr>
<tr>
<td>AAWC</td>
<td><a href="http://www.aawc.org">www.aawc.org</a></td>
</tr>
<tr>
<td>CAWC</td>
<td><a href="http://www.cawc.net">www.cawc.net</a></td>
</tr>
<tr>
<td>Debra International</td>
<td><a href="http://www.debra.org.uk">www.debra.org.uk</a></td>
</tr>
<tr>
<td>EFORT</td>
<td><a href="http://www.efort.org">www.efort.org</a></td>
</tr>
<tr>
<td>ILF</td>
<td><a href="http://www.lympho.org">www.lympho.org</a></td>
</tr>
<tr>
<td>KWMS</td>
<td><a href="http://www.woundcare.or.kr/eng">www.woundcare.or.kr/eng</a></td>
</tr>
<tr>
<td>NZWCS</td>
<td><a href="http://www.nzwcs.org.nz">www.nzwcs.org.nz</a></td>
</tr>
<tr>
<td>SILAUHE</td>
<td><a href="http://www.silauhe.org">www.silauhe.org</a></td>
</tr>
<tr>
<td>SOBENFeE</td>
<td><a href="http://www.sobenfee.org.br">www.sobenfee.org.br</a></td>
</tr>
<tr>
<td>WAWLC</td>
<td><a href="http://www.wawlc.org">www.wawlc.org</a></td>
</tr>
</tbody>
</table>

### Associated Organisations

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leg Club</td>
<td><a href="http://www.legclub.org">www.legclub.org</a></td>
</tr>
<tr>
<td>LSN</td>
<td><a href="http://www.lymphoedema.org/lsn">www.lymphoedema.org/lsn</a></td>
</tr>
</tbody>
</table>

---

110
For more information about EWMA’s Cooperating Organisations please visit www.ewma.org
### Science, Practice and Education

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Prevalence of Pressure Ulcers in Hospitalized Patients in Germany</td>
<td>Heidi Heinhold, Andreas Westerfellhaus, Knut Kröger</td>
</tr>
<tr>
<td>17</td>
<td>Excess use of antibiotics in patients with non-healing ulcers</td>
<td>Marcus Gürge</td>
</tr>
<tr>
<td>25</td>
<td>Regenerative medicine in burn wound healing: Aiming for the perfect skin</td>
<td>Magda MW Ulrich</td>
</tr>
<tr>
<td>31</td>
<td>Promising effects of arginine-enriched oral nutritional supplements on wound healing</td>
<td>Jos M.G.A. Schols</td>
</tr>
<tr>
<td>37</td>
<td>Efficacy of platelet-rich plasma for the treatment of chronic wounds</td>
<td>Vladimir N. Obolenskiy, Darya A. Ermolova, Leonid A. Laberkova, Tatiana V. Semenova</td>
</tr>
</tbody>
</table>

### Scientific Communication

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>Results from the world’s largest telemmedicine project</td>
<td>Knistian Kiolholm, Anne-Kirstine Dynig, Knud B. Yderstraede, Birthe Dinesen, Benjamin Schnack Rasmussen</td>
</tr>
<tr>
<td>51</td>
<td>Nutrition and chronic wounds</td>
<td>José Verdú Sancho, Estrella Pando Pérez</td>
</tr>
<tr>
<td>54</td>
<td>The biofilm challenge</td>
<td>Maria Alhede, Morten Alhede</td>
</tr>
</tbody>
</table>

### Innovation, know how and technology

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>National wound care innovation centre launched in the UK</td>
<td>Peter Vowden</td>
</tr>
<tr>
<td>63</td>
<td>Development of tools for home monitoring in wound care</td>
<td>Marco Romanelli, Marie Muller</td>
</tr>
<tr>
<td>66</td>
<td>2014 Education Activities</td>
<td>Ana Maria d’Auchamp</td>
</tr>
</tbody>
</table>

### Cochrane Reviews

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>Abstracts of recent Cochrane reviews</td>
<td>Sally Bell-Syer</td>
</tr>
</tbody>
</table>

### EWMA

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>78</td>
<td>EWMA Journal previous issues and other journals</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>EWMA GNEAUPP 2014 in Madrid</td>
<td>Javier Soldevilla Agreda, Gerrit Jukema</td>
</tr>
<tr>
<td>84</td>
<td>Advocacy Activities update</td>
<td>Salla Seppänen</td>
</tr>
<tr>
<td>86</td>
<td>Christina Lindholm – Honorary Speaker at EWMA-GNEAUPP 2014</td>
<td>Salla Seppänen</td>
</tr>
<tr>
<td>88</td>
<td>EWMA’s commitment to fighting antimicrobial resistance</td>
<td>Salla Seppänen</td>
</tr>
<tr>
<td>90</td>
<td>Home Care-Wound Care</td>
<td>Sebastian Probst</td>
</tr>
<tr>
<td>92</td>
<td>Nordic Diabetic Foot Task Force: Status and Future Activities</td>
<td>Magnus Landahl, Klaus Koketorp Møller</td>
</tr>
<tr>
<td>94</td>
<td>Developing a Diabetic Foot Treatment Programme in Austria</td>
<td>Gerald Zöch, Peter Kurz, Stefan Krasnik</td>
</tr>
<tr>
<td>96</td>
<td>EWMA Participation in the first UEMS meeting for European Scientific Societies</td>
<td>Rytis Rimdeika</td>
</tr>
<tr>
<td>99</td>
<td>Managing Wounds as a Team</td>
<td>Zena Moore</td>
</tr>
</tbody>
</table>

### Organisations

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>EWMA Corporate Sponsors</td>
<td></td>
</tr>
<tr>
<td>101</td>
<td>Conference Calendar</td>
<td></td>
</tr>
<tr>
<td>102</td>
<td>AAWC News</td>
<td>Robert J. Snyder</td>
</tr>
<tr>
<td>104</td>
<td>EB-CLINET – Clinical Network of EB Centres and Experts</td>
<td>Gabriela Pohla-Gubo</td>
</tr>
<tr>
<td>106</td>
<td>The Korean Wound Management Society</td>
<td>Jong Won Rhie</td>
</tr>
<tr>
<td>108</td>
<td>WAWLC update</td>
<td>David Keast</td>
</tr>
<tr>
<td>110</td>
<td>EWMA Cooperating Organisations</td>
<td></td>
</tr>
</tbody>
</table>