Improved Healthcare Outcomes in Partial-Thickness Wounds
Faculty:

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Baytown, TX

Target Audience:

Physicians and Nurses who treat patients with wounds

Learning Objectives:

Upon completion of this educational activity, participants should be able to:

• Describe perineal dermatitis, its pathophysiology, risk factors and sequelae
• review research pertaining to the management of perineal dermatitis using two formulations containing balsam Peru, castor and trypsin and compare the results to the other topical therapies.

Accreditation:

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Mikel Gray, PhD, CUNP, CCCN, FAAN has disclosed that he is a member of the speakers’ bureau for Healthpoint.

Linda Bohacek, RN, CWS, WOCN has disclosed that she is a member of the speakers’ bureau for Healthpoint.

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In reviewing products for incontinence, wound care, and medicine in general, clinicians are finding that they must examine more than just the active ingredients. The delivery vehicle itself has a profound influence on the active ingredients, the efficacy of the ingredients’ delivery, and clinical outcomes. This article will focus on a specific research study that compared 2 products with equal active ingredients but different base formulations.

The Skin

As the largest organ, the skin weighs 6lbs, and its thickness varies from 0.5mm (tympanic membrane) to 6mm (palms and soles of the feet). The skin has multiple functions, including thermoregulation, metabolic functions (vitamin D metabolism), and immune functions. The skin’s barrier function is an important consideration for the perineum, because it is a segment of the skin that comes into contact with variable amounts of toxins and moisture.

The composition of the barrier is well known. The essential components include the integrity of the corneum stratum (horny layer); the lipid matrix, which has an approximate ratio of 1:1:1 of ceramides, cholesterol, and free fatty acids; water content/saturation; and pH (normal range, 4.0–6.8; average, 0.5–5.9), which acts as an acid mantle.

The skin’s reabsorption ability is lowest on the palms and the soles of the feet (the rough, scaly, horny areas of the skin that essentially bear the brunt of daily wear and tear). The skin of the backside of the body is thicker than that of the front and does not absorb as well. The perineal skin, particularly the scrotal skin in men, is the most absorptive area of the skin. This skin is relatively thin, absorbs with great affinity, and has relatively high moisture content. It is also sensitive to changes in the moisture barrier and the presence of various toxins on the skin. The normal pH range is 4–6.8, but the average is approximately 5–6. The skin’s acid mantle also functions as part of its barrier.

The keratinocytes, the interstitial components of the skin, have a “brick-and-mortar” arrangement. They are composed of approximately 40–70% protein (primarily keratin), 15–40% water, and between 15–20% lipid matrix.

Perineal Dermatitis

The cause of perineal dermatitis is prolonged exposure to urine, stool, and perspiration. Factors that exacerbate perineal dermatitis include containment devices for incontinence, which hold moisture to the skin, and erosion of the skin.
caused by urine and stool. Urine mixed with stool causes a dramatic increase in skin pH. Alkaline pH causes the skin to be prone to secondary bacterial and fungal infections. These bacterial and fungal infections will thrive in the perineal skin, particularly in the patient who is obese.

The prevalence of perineal skin lesions is virtually unknown. Lyder et al. documented a 23–25% prevalence in 2 studies using geropsychiatric units. Keller et al. found a 41% prevalence in approximately 121 ambulatory elder residents in a long-term care facility. In another small pilot study, I observed a 42% prevalence in ambulatory patients who presented for urodynamic evaluation. Of these patients, approximately 80% were mild to moderate, and 20% were moderately severe to severe. The incidence of perineal dermatitis remains unknown.

Clinical Study

Proper product selection for the management of pressure ulcers or perineal dermatitis is typically based on consideration of active ingredients, but evidence suggests that the delivery vehicle may also influence both safety and efficacy. The question also arises as to whether the difference in formulation base could affect the performance of products. Thus, a study was undertaken to research the safety and efficacy of 2 prescription products—balsam Peru, castor oil, and trypsin ointment (BCT-O; XENADERM® Ointment, Healthpoint, Ltd., Fort Worth, Tex) and balsam Peru, castor oil, and trypsin spray (BCT-S; Granulex® Spray, Bertek Pharmaceuticals, Durham, NC)—used for the treatment of pressure ulcers or perineal dermatitis.

Both products contain equivalent active ingredients (balsam Peru, castor oil, and trypsin) but different base formulations. Though the 2 products have equivalent active ingredients, they differ in their mode of delivery: BCT-S is an aerosol designed to be sprayed onto the lesion, and BCT-O is applied to the lesion and rubbed in like a typical ointment.

This study was conducted on 60 healthy elder volunteers aged 65 years and older. Two equivalent skin wounds (approximately 6mm in diameter) were intentionally created on the inner aspect of the thighs using an Erbium-YAG laser. Wounds were randomized to treatment with BCT-O, BCT-S, or saline (control). Wound characteristics including complete reepithelization were clinically graded using a rank score of 1 to 10.

Three study comparisons were made over a 10-day period. Group 1 (30 volunteers) comprised a head-to-head comparison of BCT-O versus BCT-S. Group 2 (15 volunteers) compared BCT-O versus a saline placebo. Group 3 (15 volunteers) compared BCT-S versus saline. In the group randomized to be treated with BCT-O, subjects were instructed to apply a small amount of BCT-O or saline to the center of an adhesive bandage each morning and evening and then apply the bandage to the wound. In the group randomized to BCT-S, subjects were instructed to spray the BCT-S directly onto the wounds as per manufacturer’s directions each morning and evening and then cover the wounds with 4” x 4” gauze pads and tape the edges. Participants returned to the clinic for wound measurements on Days 1, 3, 5, 7, and 9.

The clinicians who evaluated the wounds were blinded to the treatment group. The subjects removed bandages prior to evaluation of the wound site so the examining dermatologist would not be biased. At each visit, the wound site was clinically graded for either irritation (0=none, 10=severe) or healing (0=no healing, 10=complete healing). The effectiveness of BCT-O (n=29) or BCT-S (n=29) was compared on the basis of erythema, edema, scabbing, and reepithelization (Tables 1 and 2).

Erythema. In the head-to-head comparison of BCT-O versus BCT-S, on Day 1, clinical grading for erythema showed no statistically significant difference. At Day 3, erythema was significantly lower in BCT-O-treated wounds and continued to be significantly lower throughout the study (p<0.05) (Figure 1).

Edema. Edema was significantly lower (p<0.05) at wound sites treated with BCT-O as compared to wounds treated with BCT-S at Days 1 through 7 of the study. By Day 9, the degree of edema was similar in the 2 treatment groups (Figure 2).

Scabbing. Scabbing was significantly reduced (p<0.05) at Day 1 in wounds treated with BCT-O and continued to be so throughout the course of the study.
In sharp contrast to the findings in wounds treated with BCT-S, the degree of scabbing increased in wounds treated with BCT-S from Day 1 (mean score 1.02) to Day 3 (mean score 3.31) to Day 5 (mean score 5.10) and continued at that level to the end of the study. The degree of scabbing in wounds treated with BCT-O increased very slightly from Day 1 (mean score 0.10) to Day 9 (mean score 0.45) (Figure 3).

**Reepithelization.** Reepithelization of the wound was greater in wounds treated with BCT-O than with BCT-S. At Day 1, the degree of reepithelization was equivalent in the 2 treatment groups. By Day 3, however, the difference in favor of treatment with BCT-O was significant (mean 2.97 versus 1.29, p<0.05). At successive observation days, the differences continued to favor BCT-O by a widening margin (Day 5, 4.07 versus 1.97, p<0.05; Day 7, 6.03 versus 2.91, p<0.05; and Day 9, 8.14 versus 4.34, p<0.05) (Figure 4).

**BCT-O versus saline.** Based on the outcome variables of erythema, scabbing, and reepithelization, wounds treated with BCT-O demonstrated greater rate and degree of healing than those treated with saline. This

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**TABLE 1**

WOUND EVALUATION SCORES: BALSAM OF PERU, CASTOR OIL, AND TRYPsin OINTMENT (BCT-O; n=29) VERSUS BALSAM OF PERU, CASTOR OIL, AND TRYPsin SPRAY (BCT-S; n=29)

| Observation/ | Day 1 | Day 3 | Day 5 | Day 7 | Day 9 |
| Treatment    | Erythema† | Edema† | Scabbing† | Reepithelization‡ |
| BCT-O        | 4.36   | 4.09*  | 4.26*  | 4.00*  | 3.41* |
| BCT-S        | 4.71   | 6.59   | 6.88   | 6.78   | 5.98  |
| BCT-O        | 0.07*  | 0.24*  | 0.12*  | 0.14*  | 0.14  |
| BCT-S        | 1.24   | 1.00   | 0.74   | 0.62   | 0.24  |
| BCT-O        | 0.10*  | 0.26*  | 0.64*  | 0.38*  | 0.45* |
| BCT-S        | 1.02   | 3.31   | 5.10   | 5.60   | 5.43  |
| BCT-O        | 0.93   | 2.97*  | 4.07*  | 6.03*  | 8.14* |
| BCT-S        | 0.60   | 1.29   | 1.97   | 2.91   | 4.34  |

* Statistically significant (p<0.05)
† Erythema, edema, scabbing, 10-point analog scale with 0=none, 10=severe (a lower score indicates less irritation)
‡ Reepithelization, 10-point analog scale with 0=no healing, 10=complete healing

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**TABLE 2A**

WOUND EVALUATION SCORES: BALSAM OF PERU, CASTOR OIL, AND TRYPsin OINTMENT (BCT-O; n=14) VERSUS SALINE (n=14)

| Observation/ | Day 1 | Day 3 | Day 5 | Day 7 | Day 9 |
| Treatment    | Erythema† | Edema† | Scabbing† | Reepithelization‡ |
| BCT-O        | 3.96   | 3.64*  | 3.86*  | 3.46*  | 3.00* |
| Saline       | 4.61   | 5.25   | 5.46   | 4.93   | 3.79  |
| BCT-O        | 0.00   | 0.00*  | 0.00   | 0.00   | 0.00  |
| Saline       | 0.43   | 0.43   | 0.14   | 0.11   | 0.00  |
| BCT-O        | 0.07   | 0.18*  | 0.21*  | 0.21*  | 0.29* |
| Saline       | 0.21   | 1.50   | 2.04   | 1.93   | 2.25  |
| BCT-O        | 1.14   | 3.14*  | 4.36*  | 7.25*  | 8.68* |
| Saline       | 0.79   | 1.61   | 3.14   | 5.61   | 7.86  |

* Statistically significant (p<0.05)
† Erythema, edema, scabbing, 10-point analog scale with 0=none, 10=severe
‡ Reepithelization, 10-point analog scale with 0=no healing, 10=complete healing

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**TABLE 2B**

WOUND EVALUATION SCORES: BALSAM OF PERU, CASTOR OIL, AND TRYPsin SPRAY (BCT-S; n=14) VERSUS SALINE (n=14)

| Observation/ | Day 1 | Day 3 | Day 5 | Day 7 | Day 9 |
| Treatment    | Erythema† | Edema† | Scabbing† | Reepithelization‡ |
| BCT-S        | 4.07   | 5.71   | 6.68   | 6.93   | 5.89  |
| Saline       | 5.50   | 5.21   | 5.50   | 4.50*  | 3.89* |
| BCT-S        | 1.11   | 1.14   | 0.79   | 0.93   | 0.21  |
| Saline       | 0.29   | 0.43*  | 0.21*  | 0.07*  | 0.00  |
| BCT-S        | 0.75   | 2.29   | 3.07   | 4.21   | 5.00  |
| Saline       | 0.29   | 1.14*  | 1.89   | 2.14*  | 1.75* |
| BCT-S        | 1.07   | 1.79   | 2.18   | 3.25   | 4.89  |
| Saline       | 0.86   | 2.21   | 3.00*  | 5.61*  | 7.75* |

* Statistically significant (p<0.05)
† Erythema, edema, scabbing, 10-point analog scale with 0=none, 10=severe
‡ Reepithelization, 10-point analog scale with 0=no healing, 10=complete healing

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In sharp contrast to the findings in wounds treated with BCT-S, the degree of scabbing increased in wounds treated with BCT-S from Day 1 (mean score 1.02) to Day 3 (mean score 3.31) to Day 5 (mean score 5.10) and continued at that level to the end of the study. The degree of scabbing in wounds treated with BCT-O increased very slightly from Day 1 (mean score 0.10) to Day 9 (mean score 0.45) (Figure 3).
difference was significant on Days 3, 5, 7, and 9. Edema at the wound site was ranked as minimal for both treatment groups.

**BCT-S versus saline.** Wounds treated with BCT-S showed reduced erythema compared with those treated with saline at Day 1. Edema was significantly greater around the wounds that were treated with BCT-S than those managed with saline on Days 3, 5, and 7. Wounds treated with saline showed significantly decreased scabbing on Days 3, 7, and 9 compared to those managed with the BCT-S. Wounds treated with saline also showed significantly increased reepithelization compared to the BCT-S on Days 5, 7, and 9.

**Safety.** Adverse events reported in 6 subjects included insufficient wound healing by Day 3, 7, or 9 with little reepithelization, bleeding when the bandage was removed, and erythema around the wound site (Table 3). Five involved wound sites treated with BCT-S, and 1 adverse event was recorded in a patient who was treated with saline. Four of the 5 adverse events were reported for the BCT-S treated wounds in subjects treated with BCT-S and BCT-O. One adverse event was reported for the BCT-S treated wound in a subject treated with BCT-S and saline. One adverse event was reported for a saline-treated wound in a subject treated with BCT-O and saline.
Conclusion

The effectiveness of BCT-O in promoting cutaneous wound healing is attributed to 2 properties of the ointment. First, the topical circulatory stimulant in the BCT-O formulation effectively increases epidermal microcirculation at the site of application. BCT-O has been demonstrated to increase local blood flow by 45%. Although BCT-O and BCT-S contain the same active ingredients, these data show that BCT-O did not result in increased inflammation as measured by its lower scores of erythema and edema. Second, the patented base provides a water-barrier function protecting the wound site from fecal or urinary incontinence. The present study has demonstrated, in addition, that the formulation of the vehicle base also plays a vital role in the total performance of the formulation.

References

Clinical Safety, Efficacy, and Cost Effectiveness of Balsam of Peru, Castor Oil, and Trypsin: A Case Series

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The demands of managed care have presented clinical challenges within the specialized field of wound care. Limited reimbursement and treatment timeliness delineated by managed care have demanded clinicians search for alternative wound healing therapies.

Pharmacoeconomics is the branch of economics that applies cost-benefit, cost-effectiveness, cost-minimization, and cost-utility analyses to compare the economics of different pharmaceutical products or to compare drug therapy to other treatments.1

The various choices in wound therapy present economic issues in decision making. In order to assess a patient’s health status and resource consumption in association with therapeutic strategies, economic assessments are performed utilizing cost analyses. The European Tissue Repair Society2 published a cost-effectiveness document that posed 2 questions clinicians must answer when evaluating wound care products for clinical use. First, is the therapy effective in improving clinically meaningful outcomes; and second, are those improved outcomes or benefits worth the additional costs they entail?

The clinical safety and efficacy findings of balsam of Peru, castor oil, and trypsin ointment (BCT-O; XENDERM® Ointment, Healthpoint, Ltd., Fort Worth, Tex) and results of the case studies presented here demonstrate clinically meaningful outcomes. Combined with the benefits of cost effectiveness and enhanced patient quality of life, clinical use of BCT-O in patients with partial-thickness wounds is a justifiable option.

Case Studies

Case Study 1. A 70-year-old female with the diagnoses of insulin-dependent diabetes mellitus, hypertension, and chronic diarrhea presented with a stage 2 pressure ulcer. The wound extended to the rectal area, and a rectal bag was placed to contain the diarrhea. Prior wound treatment consisted of a hydrogel, ordered on March 18, 2002; however, this therapy did not remain intact on the wound. BCT-O was initiated on April 1 and applied daily and as needed (Figure 1).

On April 8, the wound was 75% reepithelized and by April 15 had a thin layer of skin over all previously open areas. By April 22, those areas were completely covered. The patient’s prealbumin levels were 16.2mg/dL on March 14; 26.7mg/dL on April 1; 32.3mg/dL on April 8; and 30.5mg/ dL on April 22.

Case Study 2. A 78-year-old woman was admitted to the hospital on February 2, 2002 with diagnoses of uncontrolled diabetes, peripheral vascular disease, gastritis, dysphagia, peptic ulcer disease, and multiple stage...
2 pressure ulcers. Her wounds extended to the perineal area and down the inner thigh. Prior wound treatment consisted of collagen and alginate dressings and hydrocolloid dressings, which were initiated on March 19. BCT-O was initiated on April 8 and applied daily and as needed (Figure 2).

By April 22, the wound was 100% reepithelialized. The patient’s prealbumin levels were 10.2mg/dL on March 27; 8.7mg/dL on April 1; 17.9mg/dL on April 8; and 14.8mg/dL on April 22. While there were great fluctuations in the patient’s prealbumin levels, the wound continued to heal.

**Case Study 3.** A 39-year-old quadriplegic man with the diagnoses of bacteremia and cirrhosis presented with a stage 2 sacral decubitus ulcer that measured 4.2cm x 4.8cm x 0.2cm. Prior wound treatment consisted of balsam of Peru, castor oil, and trypsin spray (Granulex® Spray, Bertek Pharmaceuticals, Durham, NC). BCT-O was initiated on April 18, 2002 with no secondary dressing and applied daily and as needed (Figure 3).

By April 30, his wound was 50% reepithelialized and measured 2.3cm x 3.0cm x 0.2cm. By May 9, the wound measured 1.5cm x 1.0cm x 0.1cm. On May 22, the wound measured 1.0cm x 0.5cm x 0.1cm, and on May 29, it measured 0.8cm x 0.4cm x 0.1cm. On June 6, the wound was 100% reepithelialized. The patient’s prealbumin levels were 8.0mg/dL on April 17; 16.0mg/dL on April 30; 8.2mg/dL on May 9; and 9.0mg/dL on May 29.

**Case Study 4.** A 71-year-old woman presented with the diagnoses of insulin-dependent diabetes mellitus, a gangrenous right heel, and a stage 2 pressure ulcer on her right buttck of 2 years duration. She was admitted to the hospital for antibiotic therapy for the gangrenous heel. Prior wound treatment consisted of a skin barrier, hydrocolloid dressings, and collagen and alginate dressings. BCT-O was initiated on April 8, 2002 and applied daily with as-needed collagen and alginate dressings (Figure 4).

The wound measured 3.0cm x 4.5cm x 0.1cm on March 25. On April 8, the wound was 50% reepithelialized and measured 1.2cm x 3.2cm x 0.1cm. On April 15, the wound was 100% reepithelialized. The patient’s prealbumin levels were
17.5mg/dL on March 25; 11.4mg/dL on April 8; and 13.4mg/dL on April 15.

Case Study 5. A 77-year-old woman with multiple comorbidities was admitted to the hospital on August 26, 2002 with the diagnoses of diabetes, a gangrenous right foot with cellulitis, end-stage renal disease, and pneumonia. She was status post right above-knee amputation on September 6. Complications included a myocardial infarction, urinary tract infection, sepsis, fecal incontinence, and stage 1 and 2 pressure ulcers on the sacrum and upper buttocks measuring 4.0cm x 4.0cm x 0.1cm. There was no prior wound treatment. BCT-O was initiated on September 25 and applied daily and as needed (Figure 5).

On October 14, the wound was 50% reepithelialized and measured 5.0cm x 10.0cm x 0.1cm. On October 30, the wound was 75% reepithelialized and measured 2.2cm x 1.5cm x 0.1cm. The wound was 100% reepithelialized on November 19. The patient’s prealbumin levels were 24.5mg/dL on October 11; 14.6mg/dL on October 29; 17mg/dL on November 11; and 10.0mg/dL on December 2.

Conclusion

The use of BCT-O in these patients resulted in increased healthcare outcomes. Wound healing rates increased 24%, and the average wound healing rate was 15–21 days. The use of BCT-O as a topical application in the aforementioned case studies revealed numerous benefits: 1) no secondary dressing was required with BCT-O application; 2) BCT-O applica-
tion was uncomplicated; 3) a soothing effect and a low incidence of pain upon application was reported by patients treated with BCT-O; 4) decreased nursing time was required with BCT-O application; 5) BCT-O treatment was demonstrated to be cost effective when compared to a product used within the same treatment category; and 6) partial-thickness wound healing was expedited, providing patients with an enhanced quality of life.

In addition to the increased healthcare outcomes generated by BCT-O application, use of the product is also cost effective. In these case studies, 1 tube lasted from 3 to 6 weeks. If the tube lasted 3 weeks, the cost to treat the patient was a $1.90 per day. The other leading item used in the facility was the hydrocolloid dressing. The cost of a sheet of hydrocolloid in the author’s facility was $3.00 a sheet. Although hydrocolloids
can be left in place up to 72 hours, they were being replaced multiple times per day in the majority of cases. This was due to the hydrocolloid failing to stay in place. When the hydrocolloid was changed once a day, cost rose to $3.00 per day.

While decreased nursing time was not evaluated during these case studies, the average wound care team at the author’s facility could accommodate 20 patients with wound care, which is how the acuity level of 20 patients to 1 team was determined. While the patient census began to rise in the facility, there was no need for another team to accommodate the patients because of BCT-O’s ease of use.

With managed care as the dominant structure for health-care delivery, clinicians are increasingly focused on improving healthcare outcomes. As wound care technology advances and companies develop new products, clinicians must make informed decisions while integrating technology and cost effective strategies to provide patients with the most appropriate treatment options.

Based on the clinical findings in this report, BCT-O is indicated as a treatment option in treating partial-thickness wounds. The demonstrated effects of increased peripheral blood flow, enhanced reepithelization, and decreased transepidermal water loss provide an efficacious topical treatment for patients with partial-thickness wounds while enhancing healing rates and improving patient quality of life.

References
PARTICIPANT EVALUATION-TEST FORM

The North American Center for Continuing Medical Education respects and appreciates your opinions. To assist us in evaluating the effectiveness of this activity and to better meet your educational needs in future educational offerings, please take a few minutes to complete this evaluation form.

Please note: A certificate of completion is issued only upon receipt of this form (see request for credit on reverse).

BACKGROUND

Degree:  
- MD
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- BSN
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I would consider my level of expertise in the subject matter prior to the program as:

- Advanced
- Beginner

Considering my experience & background, the material presented was:

EXTENT TO WHICH PROGRAM ACTIVITIES MET THE IDENTIFIED OBJECTIVES

Please answer the following questions by circling the appropriate rating:

5 = Strongly Agree
4 = Agree
3 = Neutral
2 = Disagree
1 = Strongly Disagree

Upon completion of this activity, I am able to:

- Describe perineal dermatitis, its pathophysiology, risk factors and sequelae

- Review research pertaining to the management of perineal dermatitis using two formulations containing balsam Peru, castor and trypsin and compare the results to the other topical therapies.

OVERALL EFFECTIVENESS OF THE ACTIVITY

The content presented during this activity:

- Was objective
- Was balanced
- Was scientifically rigorous
- Avoided commercial bias or influence
- Was timely and related to my practice
- Will assist me in enhancing patient care
- Faculty disclosure information was presented to the audience by the moderator and/or in the syllabus/handout materials prior to the activity

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- Handout materials were useful

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5 = Excellent
3 = Satisfactory
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<th>Effectiveness of Delivery</th>
<th>Responsiveness to Questions</th>
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IMPACT OF THE ACTIVITY

Information presented:   ___Reinforced my current practice/treatment habits   ___Will improve my practice/patient outcomes
(check all that apply)   ___Enhanced my current knowledge   ___Provided new ideas that I expect to use

Will information gained from this activity result in your making any changes in your practice?   ___Yes   ___No
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5.   A B C D E   10.  A B C D E

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Questions for CME Program: Improved Healthcare Outcomes in Partial-Thickness Wounds

1. Which of the following factors is not associated with an increased risk for partial thickness wounds of the perineal skin?
   a. Urinary incontinence.
   b. Indwelling urethral catheter.
   c. High volume diarrhea with fecal soiling.
   d. Use of an absorptive containment device.

2. Which of the following active ingredients of both BCT-ointment (Xenaderm) and BCT-spray (Granulex) increases local blood flow bringing oxygen and nutrients to the wound bed?
   a. Balsam Peru.
   b. Zinc oxide.
   c. Castor oil.
   d. Trypsin.

3. Which measure is used in the research setting to measure the efficiency of the skin's ability to act as a moisture barrier?
   a. pH of the skin surface.
   b. Transepidermal water loss.
   c. Tissue interface pressure.
   d. Electromagnetic conductance.

4. In a study of intentionally created partial thickness wounds in the inner thigh of healthy elder subjects, which group achieved the highest rate of re-epithelialization within the 9 days of wounding?
   a. Control group.
   b. Combined group.
   c. BCT-spray group.
   d. BCT-ointment group.

5. In a study of intentionally created partial thickness wounds in the inner thigh of healthy elder subjects, which group experience no adverse side effects?
   a. Control group.
   b. BCT-spray group.
   c. BCT-ointment group.
   d. Combined group.

6. What 2 questions must be answered when evaluating wound care products for clinical use.
   a  Is the product effective in improving outcomes
   b  Is the product on formulary
   c  Are the outcomes worth any extra cost
   d  All of the above

7. What is the common objective driving clinical decisions?
   a   reimbursment
   b  improved  outcomes
   c   Clinician preference
   d    all of the above

8. The 2010 Pressure Ulcer Objective is:
   a. eliminate pressure ulcers in the acute care settings
   b. develop treatment protocols for pressure ulcers
   c. reduce the proportion of nursing home residents currently diagnosed with pressure ulcers.
   d. None of the above

9. What group was organized to in 1987 to address the prevention and treatment of pressure ulcers
   a. National Pressure Ulcer Advisory Panel
   b. Wound Ostomy and Continence Nursing
   c. Joint Commission on Accreditation of Healthcare Organizations
   d. None of the above

10. Which of the following measures are recommended by the NPUAP as measure for reducing pressure ulcer occurance.
    a  reposition and turning q2 hrs,  padding bony prominances,
    b. adequate caloric intake
    c. Head of bed elevated at 30 degrees.
    d. All of the above