



DSHS-School Nurse Notes | May 2017

Wound Care

To address the needs of school nurses, the Texas Department of State Health Services (DSHS)–School Health Program has developed this repository of information. With each issue of *DSHS-School Nurse Notes*, professionals receive the latest research, evidence-based practices, and resources in school nursing related to a topic of interest. If you have any questions or comments about this publication, please contact Anita Wheeler, School Nurse Consultant, at (512) 776-2909 or at anita.wheeler@DSHS.texas.gov.

Background

The Skin Healing Process

For most children, wound healing is quick, uncomplicated, and requires minimal specialized attention.⁹ A series of physiological events begins once skin has been broken.⁵ The complex, dynamic process of wound healing unfolds in its four basic phases.⁹

Coagulation & Hemostasis: The body attempts to control bleeding and prevent any bacteria from entering the wound.

Inflammation: Anti-bacterial and anti-inflammatory receptors are released; a clot forms and the process of phagocytosis begins.⁵

Proliferation & Repair: This marks the beginning of dermis restoration and occurs within five days of injury. New blood vessels form, the wound contracts, granular tissue develops, and re-epithelialization begins.⁵

Wound Maturation & Remodeling: Collagen fibers work to repair the scar tissue; however, it will never achieve its original tensile strength. This final phase may continue for years.⁵

Chronically ill children, such as those with poor nutritional status, frequent hospitalization, immune compromise, or neurodevelopmental delays, are predisposed to poor wound healing and iatrogenic skin injury.⁹

Research

The following articles have been compiled from a review of the scientific literature. For assistance in obtaining an article, please contact the DSHS Library at library@DSHS.texas.gov and mention inclusion of the requested article in the *DSHS-School Nurse Notes*. The articles are presented on a continuum, ranging from those that primarily address wound care procedures to those that focus on wound healing products. Following each citation is a portion of the article's abstract.

1. McGrath JA, Uitto J. **Chapter 2: Structure and function of the skin.** In Griffiths CE, Creamer D, Barker J, et al. 9th ed. *Rook's textbook of dermatology*. John Wiley & Sons Ltd; 2016.

A detailed appreciation of the development, structure and function of human skin is fundamental to understanding diseases that originate in or target the skin. Recent advances in molecular science have provided fascinating new insights into stem cell biology and skin homeostasis as well as disease processes such as inflammation, wound healing, ageing and neoplasia, providing novel opportunities to improve the diagnosis and therapy of skin disease.

2. Proksch E, Brandner JM, Jensen JM. **The skin: an indispensable barrier.** *Exp Dermatol*. 2008;17:1063-1072.

The skin forms an effective barrier between the organism and the environment preventing invasion of pathogens and fending off chemical and physical assaults, as well as the unregulated loss of water and solutes. In this review we provide an overview of several components of the physical barrier, explaining how barrier function is regulated and altered in dermatoses. . . . Changes in epidermal differentiation and lipid composition lead to a disturbed skin barrier, which allows the entry of environmental allergens, immunological reaction and inflammation in atopic dermatitis. A disturbed skin barrier is important for the pathogenesis of contact dermatitis, ichthyosis, psoriasis and atopic dermatitis.

3. Gloster AS, Johnson PJ. **How to perform first aid.** *Nurs Stand*. 2016;30(20):36-39.

This article aims to help nurses to perform first aid in a safe, effective and patient-centered manner. First aid comprises a series of simple, potentially life-saving steps that an individual can perform with minimal equipment. . . . First aid is the provision of immediate medical assistance to an ill or injured person until definitive medical treatment can be accessed. . . . it is essential that nurses understand the basic principles.

4. Greener, M. **Wound care: Treating small wounds in the school setting.** *British Journal of School Nursing.* 2016;11(8):376-378.
School nurses can manage most minor cuts, scrapes and puncture wounds. However, the amount of bleeding is a poor guide to severity. Because an everyday injury occasionally hides serious damage, such as internal bleeding, nurses should take even seemingly minor cuts and scrapes seriously. In addition to acute wound care, knowing when to refer to accident and emergency services and GP practices, as well as advising parents and older children are essential elements of management.
5. Chau EA. **Managing minor wounds.** *NASN Sch Nurse.* 2012;27(5):238-239.
This brief article describes the importance of skin as our largest organ and addresses the topics of wound assessment and wound categories. The school nurse is advised of what kinds of questions to ask students presenting with an open wound and how to document care. The article also describes the physiological events that comprise wound healing, how to cleanse a wound, the effective dressings, and when to consider using each type.
6. Calianno C. **How to choose the right treatment and dressing for the wound.** *Med/Surg Insider.* 2003;6-15.
Identifying the cause of your patient's wound, initiating the right interventions, and achieving your wound care goals can be very rewarding—and challenging. You're faced with more than 1,000 wound care products and interventions, with new ones becoming available daily (see *Commonly Used Wound Dressings*). . . . In this article, I'll review basic wound types and how to manage them with the latest treatment options.
7. Forrest RD. **Early history of wound treatment.** *J R Soc Med.* 1982;75:198-205.
Wounds cause pain, bleeding, disability and death. . . . The history of surgery has been the history of wound therapy during the last four or five millennia and, despite the causes of the injury generally being obvious and the wound easily observed, it is only in the last two to three decades that the process occurring in the wound and the factors influencing them have been understood. The aim of wound treatment has always been to reduce the risks caused by the wound itself and to minimize potential complications. Pain, hemorrhage, loss of skin continuity and tissue substance in a wound have tested man's ingenuity throughout the ages.
8. Chang PH, Swan-Mahony A. **The ABCs of burn care for school-age children.** *NASN Sch Nurse.* 2016;31(6):364-367.
Burn injuries are among the most painful injuries any child can endure. This article explains common sources of burn injuries in student populations, diagnosis and classification of burn injuries, initial burn management, and how to determine when a child needs to be evaluated by a physician.

9. King A, Stellar JJ, Blevins A, Shah KN. **Dressings and products in pediatric wound care.** *Adv Wound Care.* 2014;3(4):324-334.
Advances in the understanding of the pathophysiology of wound healing have contributed to an ever-increasing number of specialized wound care products, most of which are predominantly marketed to adult patients and that have not been evaluated for safety and efficacy in the neonatal and pediatric populations. This review aims to discuss the available data on the use of both more traditional wound care products and newer wound care technologies in these populations, including medical-grade honey, nanocrystalline silver, and soft silicone-based adhesive technology. (Explanatory graphics are included.)
10. Murphy PS, Evans GR. **Advances in wound healing: A review of current wound healing products.** *Plast Surg Int.* 2012;2012:190436.
Successful wound care involves optimizing patient local and systemic conditions in conjunction with an ideal wound healing environment. Many different products have been developed to influence this wound environment to provide a pathogen-free, protected, and moist area for healing to occur. Newer products are currently being used to replace or augment various substrates in the wound healing cascade. This review of the current state of the art in wound-healing products looks at the latest applications of silver in microbial prophylaxis and treatment, including issues involving resistance and side effects, the latest uses of negative pressure wound devices, advanced dressings and skin substitutes, biologic wound products including growth factor applications, and hyperbaric oxygen as an adjunct in wound healing.
11. Rippon MG, Ousey K, Cutting KF. **Wound healing and hyper-hydration: a counterintuitive model.** *J Wound Care.* 2016;25(2):68-75.
Winter's seminal work in the 1960s relating to providing an optimal level of moisture to aid wound healing (granulation and re-epithelialization) has been the single most effective advance in wound care over many decades. As such the development of advanced wound dressings that manage the fluidic wound environment have provided significant benefits in terms of healing to both patient and clinician. Although moist wound healing provides the guiding management principle, confusion may arise between what is deemed to be an adequate level of tissue hydration and the risk of developing maceration. . . . This paper discusses tissue hydration, the cause and effect of maceration and distinguishes these from hyper-hydration of tissue.

12. Eberlein T, Gerke P, Lorenz H, Ammer R. **Advantages in wound healing by a topical easy to use wound healing lipo-gel for abrasive wounds—Evidence from a randomized, controlled experimental clinical study.** *Wound Medicine*. 2016;15:11-19.

Objective: Study's purpose was to compare wound healing properties of topical healing agent (Medigel®) (moist environment) versus standard plaster (dry environment) versus well-established standard Bepanthen® Wund- und Heilsalbe. Methods: Healthy volunteers were enrolled into an observer-blind, randomized, controlled, intra-individual experimental comparison study. Three standardized abrasions were induced on each subject's forearms. . . . Results: Evaluation showed significantly faster wound healing results (**relative differences to baseline) for investigational product vs. standard plaster (all time points) and with significant AUC difference and slightly faster results vs. reference product (day 5 to 10). . . . Conclusion: Clinically relevant accelerated wound healing and reduced wound contraction were measured for investigational product compared to traditional treatment indicating a superiority of moist wound environment.

13. Sibbald RG, Elliott JA. **The role of Inadine in wound care: a consensus document.** *Int Wound J*. 2017;14:316-321.

Iodine-based products are anti-bacterial. The small iodine molecular size is ideally suited to treat surface critical colonization. Inadine is a 10 percent povidone iodine dressing with the equivalent of 1 percent available iodine that is easily extracted from the viscose backing by serum or exudate. . . . In this study, we developed a short online survey completed by 23 wound-care key opinion leaders from the nursing, medical and podiatry professions. A computerized modified Delphi technique was used to achieve 80 percent consensus on 11 statements related to the utility and everyday topical wound-care use of this product.

14. Dissemond J, Assadian O, Gerber V, et al. **Classification of wounds at risk and their antimicrobial treatment with polihexanide: A practice-oriented expert recommendation.** *Skin Pharmacol Physiol*. 2011;24:245-255.

Currently there are no generally accepted definitions for wounds at risk of infection. In clinical practice, too many chronic wounds are regarded as being at risk of infection, and therefore many antimicrobials – in terms of frequency and duration of use – are applied to wounds. Based on expert discussion and current knowledge, a clinical assessment score was developed. The objective of this wounds at risk (W.A.R.) score is to allow decision-making on the indication for the use of antiseptics on the basis of polihexanide. . . . The indication for the use of antiseptics results from the addition of differently weighted risk causes, for which points are assigned. Antimicrobial treatment is justified in the case of three or more points.

15. Dissemond J, Gerber V, Kramer A, et al. **A practice-oriented recommendation for treatment of critically colonized and locally infected wounds using polihexanide.** *J Tissue Viability.* 2010;19:106-115.

The problem of wound infection presents a special challenge in the treatment of acute as well as chronic wounds. Typical complications not only jeopardize the successful outcome of treatment modalities as a whole; they may result in amputation or even become life-threatening. Polihexanide is an antimicrobial substance, which is highly appropriate for use in critically colonized or infected acute and chronic wounds. This finding is based primarily on the broad antimicrobial spectrum and good cell and tissue compatibility of polihexanide, its capability of binding to organic matrix, the low risk of contact sensitization, and the fact that it promotes wound healing. Up to now there are no microbial resistances observed.

16. Rollins H, Nathwani N, Morrison D. **Optimizing wound care in a child with an infected gastrostomy exit site.** *Br J Nurs.* 2013;22(22):1272-1279.

The percutaneous endoscopic gastrostomy (PEG) tube has become a widely used feeding tube for long-term delivery of fluids, liquid feed and medicines. . . . In pediatric practice, children experience care shared across several healthcare settings, meeting clinical teams with varying levels of knowledge and experience of PEG care. This can lead to conflicting advice, which can have a negative effect on patient safety and experience. The case history in this article demonstrates how PEG tube insertion is never a minor procedure for a child and family It highlights areas of potential conflict in clinical management of PEG exit sites, and it shows how application of wound care principles, along with a range of modern products can have a positive outcome.

Resources

Materials

- ✓ [American Red Cross - Participant Materials](#): Digital class materials may be downloaded free of charge.
 - [Pediatric First Aid/CPR/AED Ready Reference](#)
 - [Wilderness and Remote First Aid Pocket Guide](#)
 - [Babysitter's Training Emergency Reference Guide](#)
 - [Bloodborne Pathogens Training Fact and Skill Sheets](#)

Organizations that Provide Training for a Fee

- ✓ [American Red Cross](#): Courses available in classrooms and online.
 - First Aid/CPR/AED

- First Aid, Health and Safety for Coaches
- Anaphylaxis and Epinephrine
- ✓ [National Safety Council](#): Courses available onsite and online.
 - Bloodborne Pathogens Training
 - Advanced Pediatric First Aid, CPR & AED
- ✓ [American Heart Association](#):
 - Pediatric Advanced Life Support (PALS) course
 - Pediatric Advanced Emergency Assessment, Recognition and Stabilization (PEARS)[®] course
- ✓ [International Society for Pediatric Wound Care](#) (ISPeW):
Membership fee is required to access medical articles.
- ✓ Pharmaceutical Society of Australia: [ACTION kit – Wound care](#).
Membership as a pharmacist is required to view these supplementary materials.

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