

## Recent Advances in Wound Management.

**Dr. Gyaneshwar Rao\***, **Dr. Alka Rao\*\***, **Dr. Nishant Pujara\*\*\***, **Dr. Piyush Pujara\*\*\*\***, **Dr. Shrikant Patel\*\*\*\***

\*Assistant Professor, Department Of Surgery, \*\* Assistant Professor, Department Of Paediatrics, \*\*\* Assistant Professor, Department Of Medicine, Gujarat Adani Institute Of Medical Science, Bhuj, Gujarat, India. \*\*\*\* Senior Lecturer, Department Of Public Health Dentistry ,Pacific Dental College, Udaipur, Rajasthan, India.

**Abstracts:** New wound care technologies are being developed at an increasingly rapid pace in recent years. These innovations could significantly reduce the overall costs for treating complex and chronic wounds, while offering greater savings in preventing wounds and their recurrence. The ultimate goal of wound management is the prevention of wounds, or the halting of wound deterioration to achieve more rapid healing. This goal can only be accomplished by intervening with appropriate quality care, in a timely manner. Expenses related to wound care may include surgical and diagnostic procedures, pharmaceuticals, and fees for services provided by physicians and other healthcare professionals. Other costs include the use of medical equipment, the use of devices to provide compression or support for surfaces, wound closing, and the cost of skin care protection products, compression bandages, and changing dressings. Patients need access to the best standard of care to heal their wounds, prevent complications and restore quality of life. This is the goal of healthcare providers and is cost-effective for the health care system. [Pujara P NJIRM et al 2015; 6(3):94-97]

**Key Words:** Bandages, Dressings, Medical Wound.

**Author for correspondence:** Dr. Piyush Pujara, Senior Lecturer, Department Of Public Health Dentistry ,Pacific Dental College, Udaipur, Rajasthan, India. Email: shrikantpatelmds@gmail.com.

Medicine arouse out of the primary sympathy of Man with Man, out of his desire to help those in sorrow, disease and suffering. Wound, a breach in the surface of the body, can be caused by accident, assault, warfare & surgical operations. The healing of such wounds has always been central consideration in surgical practice. So, understanding of the various mechanisms of healing and factors affecting it is of Prime importance for successful practice. Healing is the final outcome of inflammation. A surgeon's role in wound management is to create environment in which the healing process can be precede in optimal fashion.

Chronic Wounds: Chronic wounds are generally associated with an aging population, with wounds such as pressure sores, venous leg ulcers and diabetic foot ulcers being typical examples. In a prospective study, Campbell et al determined the incidence of heel pressure ulcers in 150 orthopedic patients. The cohort consisted of patients who were admitted to an acute care hospital either for elective orthopedic surgery or for treatment of a fractured hip. The incidence of heel pressure ulcers in all patients was 13.3%, with the incidence in patients with hip fracture being higher than that in elective surgery patients (16% vs 13%, respectively). However, patients with hip fracture in whom pillows and rolled sheets were used to relieve heel pressure had a significantly lower ulcer

rate than did the other hip fracture patients. When all patients in the study were taken into account, the presence of respiratory disease was the only factor significantly associated with pressure ulcer development. Pressure ulcers occur in approximately 9% of hospitalized patients, usually during the first 2 weeks of hospitalization. The prevalence of pressure ulcers among patients residing in long-term care facilities has been reported as 2.3-28% and has been an increasingly common reason for litigation.<sup>1, 2, 3, 4, 5</sup>

Complications of Diabetic Foot Ulcers: DFUs that persist more than 4 weeks have 5-fold higher risk of infection.<sup>6</sup> Development of an infection in a foot ulcer increases the risk for hospitalization 55.7 times and the risk for amputation 155 times.<sup>7</sup> "Infected neuropathic ulcerations are the leading cause of diabetes-related partial foot amputations at the Phoenix Indian Medical Center."<sup>2</sup> Foot ulceration is a significant risk factor for lower-extremity amputation in Native American Indians.<sup>8</sup>

Wound management : Successful treatment of difficult wounds requires assessment of the entire patient and not just the wound. Systemic problems often impair wound healing; conversely, nonhealing wounds may herald systemic pathology. The usual reason for inadequate tissue oxygenation is local vasoconstriction as a result of

sympathetic over activity. This may occur because of blood volume deficit, unrelieved pain, or hypothermia, especially involving the distal extent of the extremities. Adequate nutrition is an often-overlooked requirement for normal wound healing.<sup>9</sup> Inadequate protein-calorie nutrition, even after just a few days of starvation, can impair normal wound-healing mechanisms. For healthy adults, daily nutritional requirements are approximately 1.25-1.5 g of protein per kilogram of body weight and 30-35 calories/kg. Increase these requirements for those with sizable wounds. A positive wound culture does not confirm a wound infection. Opportunistic microorganisms may colonize any wound. Wound exudate, which is naturally bactericidal, inhibits the spread of surface contamination from becoming a deep wound infection. However, when wound ischemia or systemic immune compromise supervenes, pathogenic microorganisms propagate until an excessive concentration of bacteria in the wound precludes healing. This heralds a true wound infection. Multidrug resistant organisms are becoming increasingly common.

Foul-smelling drainage, a spontaneously bleeding wound bed, flimsy friable tissue, increased levels of wound exudate, increasing pain, surrounding cellulitis, crepitus, necrosis, fasciitis, and regional lymphadenopathy characterize the infected wound. Fever, chills, malaise, leukocytosis, and an elevated erythrocyte sedimentation rate are common systemic manifestations of wound infection.<sup>10</sup>

Wound infection requires surgical debridement and appropriate systemic antibiotic therapy. Topical antiseptics are usually avoided because they interfere with wound healing because of cytotoxicity to healing cells.

Gently irrigate the wound with a physiologic saline solution. If cost is a major consideration, the patient can prepare a saline solution at home by using 1 gallon of distilled water and 8 teaspoons of table salt. The solution is boiled and then cooled to room temperature before use.<sup>11</sup>

If surface exudate is present, consider irrigation under pressure. An irrigation pressure of approximately 8 psi can be achieved with saline

forced through a 19-gauge angiocatheter with a 35-mL syringe. Pat the wound surface with soft moist gauze; do not disrupt viable granulation tissue.<sup>12</sup>

After debridement, apply a moist saline dressing, an isotonic sodium chloride gel, or a hydroactive paste. Optimal wound coverage requires wet-to-damp dressings, which support autolytic debridement, absorb exudate, and protect surrounding normal skin. A polyvinyl film dressing, Tegaderm, which is semipermeable to oxygen and moisture and impermeable to bacteria, is a good choice for wounds that are neither dry nor highly exudative.

For dry wounds, hydrocolloid dressings, such as DuoDerm or IntraSite hydrocolloid, are impermeable to oxygen, moisture, and bacteria. They maintain a moist environment, and they support autolytic debridement. They are a good choice for relatively desiccated wounds.

For exudative wounds, absorptive dressings, such as calcium alginates and hydrofiber dressings, are highly absorptive and are appropriate for exudative wounds. Alginates are available in rope form, which is useful for packing deep wounds.<sup>13</sup> For very exudative wounds, impregnated gauze dressings, such as Mesalt (Scott), are useful. Twice-daily dressing changes may be needed.

For infected wounds, use silver sulfadiazine (Silvadene) if the patient is not allergic to sulfa drugs. If the patient is allergic to sulfa, bacitracin-zinc ointment is a good alternative. An ionic-silver hydrofiber dressing (Aquacel-AG) is also a good choice.<sup>14, 15</sup>

Treatment of decubitus ulcers requires prolonged surgical and nursing care.<sup>16,17,18,19</sup> During the extended period of treatment required, the patient remains at risk for the development of new pressure ulcers at other sites.<sup>20, 21, 22</sup> Treatment, particularly indications for support surfaces, is based on appropriate staging of the pressure ulcer. Milne et al reported the outcome of a long-term acute care hospitals program to reduce the incidence of pressure ulcers.

Recent advances in wound management: The ALLEVYN hydrocellular dressings range has been considerably enhanced by new versions introduced in recent years. These provide efficient fluid management and an optimal moist wound environment that promotes faster healing of the wound<sup>1</sup>, reduced risk of maceration and protection from infection<sup>2</sup>. ALLEVYN includes ALLEVYN Ag, a set of dressings combining the infection management capabilities of silver with ALLEVYN.<sup>23, 24</sup>

Negative Pressure Wound Therapy : PICO Negative Pressure Wound Therapy (NPWT) is one of the oldest forms of medicinal therapy used to heal the human body. Over the past decade there has been a significant increase in the use of this therapy and today NPWT provides clinicians with an important option for the advanced management of a variety of chronic and acute wounds.

The PICO System, our latest innovation provides single use Negative Pressure Wound Therapy, while RENASYS $\diamond$  offers you flexibility through a choice of easy to use, intuitive devices and a range of foam and gauze dressing kits.

Mist Therapy: The MIST Therapy System produces a low-frequency, ultrasound-generated mist used to promote wound healing through wound cleansing and maintenance debridement by the removal of yellow slough, fibrin, tissue exudates, and bacteria. MIST Therapy is a healing device for wounds and uses acoustic pressure to stimulate new cell growth. The cell walls of healthy human tissue cells, when put under stress will proliferate at a much faster rate. Studies show that when the acoustic pressure from MIST

Therapy hits healthy cells, they become elongated and deform, causing a greater mitotic response of new healthy cells. Mist Therapy also uses acoustic pressure to remove bacteria. Unlike healthy tissue cells, the cell walls of bacteria are hard, like egg shells, and studies have shown that bacteria cells break apart and are destroyed when the acoustic pressure from a MIST Therapy treatment comes in contact with them.

Although not a primary debridement tool, MIST Therapy helps to remove yellow slough, fibrin,

necrotic tissue, and bacteria. This is especially helpful and beneficial in the removal of biofilm that often “stalls” the healing process in wounds.

Bioactives: Bioactives represent the fastest growing category of chronic wound therapeutics. Our diversified biotherapeutics portfolio offers novel, cost-effective solutions for tissue repair and healing, addressing the full spectrum of hard-to-heal wounds.

Currently our leading product is Collagenase SANTYL ointment, the only FDA-approved biologic enzymatic debriding agents for chronic dermal ulcers and severe burns. Other products including REGRANEX<sup>®</sup> Gel, a FDA-approved platelet-derived growth factor; and the OASIS<sup>®</sup> family of naturally-derived, extracellular matrix replacement products indicated for the management of both chronic and traumatic wounds.

Recent innovations include ALLEVYN Life, a new range of dressings designed for people with wounds and providing them with security, confidence and protection to go about their everyday life. The Human Shaped Wound Care $\diamond$  range of ALLEVYN dressings are a unique range of ALLEVYN Gentle Border dressings designed especially for the contours of the human body.

ACTICOAT Flex offers a highly conformable interface between the site of injury and secondary dressing. Protection is also provided through its sustained antimicrobial performance, killing pathogenic organisms common to wounds in order to reduce the risk of infection.<sup>25,26</sup>

#### References:

1. Horn SD, Bender SA, Ferguson ML, Smout RJ, Bergstrom N, Taler G, et al. The National Pressure Ulcer Long-Term Care Study: pressure ulcer development in long-term care residents. *J Am Geriatr Soc.* Mar 2004;52(3):359-67.
2. Bergstrom N, Horn SD, Smout RJ, Bender SA, Ferguson ML, Taler G, et al. The National Pressure Ulcer Long-Term Care Study: outcomes of pressure ulcer treatments in long-term care. *J Am Geriatr Soc.* Oct 2005;53(10):1721-9.

3. Bergstrom N. Litigation or redesign: improving pressure ulcer prevention. *J Am Geriatr Soc.* Sep 2005;53(9):1627-9.
4. Howard DL, Taylor YJ. Racial and gender differences in pressure ulcer development among nursing home residents in the Southeastern United States. *J Women Aging.* Oct 2009;21(4):266-78.
5. Horn SD, Sharkey SS, Hudak S, et al. Pressure ulcer prevention in long-term-care facilities: a pilot study implementing standardized nurse aide documentation and feedback reports. *Adv Skin Wound Care.* Mar 2010;23(3):120-31.
6. Lavery et al. Risk Factors for Foot Infections in Individuals With Diabetes. *Diabetes Care.* 2006;29:1288-93.
7. Dannels E. Neuropathic foot ulcer prevention in diabetic American Indians with hallux limitus. *J Am Podiatr Med Assoc.* 1989;79:447-50.
8. Mayfield et al. A foot risk classification system to predict diabetic amputation in Pima Indians. *Diabetes Care.* 1996;19:704-9.
9. Mechanick JI. Practical aspects of nutritional support for wound-healing patients. *Am J Surg.* Jul 2004;188(1A Suppl):52-6.
10. Bowler PG, Jones SA, Davies BJ, Coyle E. Infection control properties of some wound dressings. *J Wound Care.* Nov 1999;8(10):499-502.
11. Driver VR. Silver dressings in clinical practice. *Ostomy Wound Manage.* Sep 2004;50(9A Suppl):11S-15S.
12. Rayman G, Rayman A, Baker NR, Jurgevicene N, Dargis V, Sulcaite R, et al. Sustained silver-releasing dressing in the treatment of diabetic foot ulcers. *Br J Nurs.* Jan 27-Feb 9 2005;14(2):109-14.
13. Leaper DJ. Silver dressings: their role in wound management. *Int Wound J.* Dec 2006;3(4):282-94.
14. Beam JW. Topical silver for infected wounds. *J Athl Train.* Sep-Oct 2009;44(5):531-3.
15. Walker M, Parsons D. The biological fate of silver ions following the use of silver-containing wound care products - a review. *Int Wound J.* Nov 22 2012;
16. Bergstrom N, Bennett MA, Carlson CE. Treatment of pressure ulcers. In: *Clinical Practice Guideline, No. 15.* Rockville, Md: US Department of Health and Human Services; 1994.
17. Pompeo M, Baxter C. Sacral and ischial pressure ulcers: evaluation, treatment, and differentiation. *Ostomy Wound Manage.* Jan 2000;46(1):18-23.
18. Zeller JL, Lynm C, Glass RM. JAMA patient page. Pressure ulcers. *JAMA.* Aug 23 2006;296(8):1020.
19. Whitney J, Phillips L, Aslam R, Barbul A, Gottrup F, Gould L. Guidelines for the treatment of pressure ulcers. *Wound Repair Regen.* Nov-Dec 2006;14(6):663-79.
20. [Best Evidence] Reddy M, Gill SS, Rochon PA. Preventing pressure ulcers: a systematic review. *JAMA.* Aug 23 2006;296(8):974-84.
21. Wilborn D, Halfens R, Dassen T. Pressure ulcer: Prevention protocols and prevalence. *J Eval Clin Pract.* Dec 2006;12(6):630-8.
22. Halfens RJ. Risk assessment scales for pressure ulcers: a theoretical, methodological, and clinical perspective. *Ostomy Wound Manage.* Aug 2000;46(8):36-40, 42-4.
23. Smith & Nephew Data on File 0711080, Absorption Properties of ALLEVYN Gentle Border, Tompkins L, November 2007
24. Smith & Nephew Data on File 1010016, Bacterial barrier testing (wet-wet) on samples of ALLEVYN Gentle, ALLEVYN Gentle Border dressings with a 7 day duration against *S. Marcescens*, Vaughan J., October 2010
25. Sundberg J and Meller R. A retrospective review of the use of cadexomer iodine in the treatment of chronic wounds. *Wounds* (1997), 9(3): 68-86.
26. Smith & Nephew Data on File ref 0809009, Demand absorbency.

Conflict of interest: None
----------------------------

Funding: None
---------------

Cite this Article as: Rao G, Rao A, Pujara N, Pujara P, Patel S, Recent Advances in Wound Management. <i>Natl J Integr Res Med</i> 2015; 6(3):94-97
---