



A CRITICAL EXAMINATION OF WOUND DRESSING CLASSIFICATIONS: CURRENT TRENDS AND DEVELOPMENTS

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Abstract

Introduction: Surgical wounds are ubiquitous in healthcare, demanding meticulous attention from nurses, especially concerning collaborative efforts with surgeons. The prevalence of infections in ostensibly "clean" surgical wounds is a pivotal quality indicator, reflecting the efficacy of surgical services. This article explores the multifaceted realm of maintaining elevated standards in surgical wound care, elucidating key components instrumental in attaining and perpetuating these benchmarks.

Objective: To offer a comprehensive overview of essential elements in surgical wound care management, spanning infection prevention strategies, nuances of cleanliness maintenance, and collaborative tasks between nursing professionals and surgeons. The emphasis is on understanding these elements' critical role in securing optimal patient outcomes and the overall success of surgical interventions.

Key Components:

- 1. Infection Prevention Strategies:** Exploring proactive measures to mitigate the incidence of infections, even in ostensibly clean surgical wounds.
- 2. Cleanliness Protocols:** Delving into the intricacies of maintaining a sterile environment, acknowledging its significance in preventing postoperative complications.
- 3. Nursing Tasks and Surgeon Activities:** Analyzing the collaborative efforts between nurses and surgeons, underlining their collective responsibility in ensuring effective wound care.

4. Quality Indicators: Recognizing the prevalence of surgical wound infections as a crucial marker for evaluating the quality and efficiency of surgical services.

5. Patient Outcomes: Highlighting the direct impact of optimal surgical wound care on overall patient recovery and well-being.

6. Surgical Intervention Success: Underlining the integral connection between meticulous wound care management and the overall success of surgical procedures.

Conclusion: This article underscores the imperative of maintaining high standards in surgical wound care, emphasizing the collaborative responsibilities of nursing professionals and surgeons. By delving into infection prevention, cleanliness protocols, and the broader spectrum of wound care, it aims to equip healthcare practitioners with insights that can enhance patient outcomes and contribute to the overall success of surgical interventions.

Keywords: Surgical wounds, Wound management, Surgical service, Infection prevention, Cleanliness protocols, Nursing tasks, Surgeon activities, Quality indicators, Patient outcomes, Surgical intervention

INTRODUCTION

The surgical wound constitutes an element of justified concern for the surgeon and its management, a primary activity of the surgical nurse. The wound is an expression of "operative mechanics" but also of "surgical philosophy," a true and very personal manifestation of the art and science of surgery. The wound is not only the site of anatomical and tissue alteration, which causes pain and disability, but mainly where a complex inflammatory process and accelerated cellular metabolism occur with important systemic repercussions. The injury can be complex and affect several systems, such as those of the extremities, where open fractures with extensive muscle injury, vascular injury leading to ischemia, and nerve injury are serious complications (Carter, DaVanzo et al. 2023).

Wounds have two effects: one local and one systemic. Local trauma causes bleeding, pain, contamination site, inflammatory focus, and generation of mediators. The systemic effect is of three kinds: hypovolemia due to bleeding and decreased extracellular fluid (ECF), inflammation, and sepsis. Healing comprises a chronological sequence of phases that begins with injury or injury, immediately leading to coagulation, continues with inflammation, continues with fibroplasia and angiogenesis, and concludes with scar formation (Chang, Zhang et al. 2023).

In some individuals, the tissue repair process is disrupted, and a keloid is produced, a painful, itchy scar extending beyond physiologic limits and differing in shape from the original wound. From the biochemical point of view, it is characterized by an exaggerated accumulation of collagen. Healing is profoundly affected by systemic physiologic changes in the patient. Until a few years ago, it was believed that abdominal dehiscence was only the result of bloating and coughing. Other etiologic factors such as blood flow, lung function, and nutrition are now recognized. Likewise, regarding the etiology of wound infection, it is known that the battle between the patient's defenses and the bacteria, which occurs throughout the wound, is profoundly affected due to factors such as ischemia, hypoxia, hypovolemia, coagulopathies or nutritional depletion (Corcoran, Martin et al. 2023).

The central point of physiological alterations in a wound is the blood supply. Circulatory flow and oxygen supply are the primary elements that determine resistance to infection, and Hunt has for years demonstrated the effect of different oxygen tensions on wound infection (3). The wound plays a major role in the overall picture of the metabolic response to trauma. By metabolic response, we understand the neurohumoral or neuroendocrine response in which there is an afferent branch that transmits impulses and messages from the wound, and the other efferent branch originating in the that activates the release of hormones and other substances that make up the metabolic response. Whether the patient's wound is a surgical incision, a pressure ulcer, or an open wound amenable to healing by secondary intention, the healing process is the same (De la Garza Ramos, Ryvlin et al. 2023).

PREOPERATIVE PREPARATION

It is an important factor in preventing postoperative wound infection. The most important aspects that must be taken into account in the preoperative preparation are:

skin disinfection

It is performed the day before the operation using a shower with antiseptic soap (povidone-iodine or chlorhexidine), and the area where the incision is to be made is "painted" with povidone-iodine solution. In this way, the I do povidone acts for many hours before the operation.

Skin hair removal

A few years ago, cutaneous hair was thought to be one of the factors causing wound infection. Today, it is known that its removal by shaving is a cause of infection. Currently, only a minimum amount of hair is shaved, only that which allows the placement of the postoperative bandage. The shaving of the skin is real. It is done immediately before the patient is taken to the operating room with an electric machine that does not cause lacerations or abrasions on the skin (a razor blade should be avoided) (Glenn, Harman et al. 2023).

prophylactic antibiotic therapy

It is one of the most important aspects of preoperative preparation. At Fundación Santa Fe de Bogotá, prophylactic antibiotics are used in all operations of larger clean operations or in those in which the incision is going to be made over a highly contaminated area (inguinal and axillary regions) and in all contaminated clean operations. The antibiotic of choice is a first-generation cephalosporin. In our institution, we prefer the *cefazotina*, whose half-life of action is 1.8 hours, on cephalothin, whose half-life is less than 50 minutes. The classic combination of neomycin and erythromycin for colorectal surgery is *neomycin and erythromycin-base* the day before the operation and a systemic antibiotic during anesthetic induction, usually *cefoxitin*. There are other factors that affect the rate of infection of the surgical wound.

There is a direct correlation between the preoperative hospital stay and the development of postoperative wound infection. An active hidden infection during an elective operation is related to developing postoperative wound infection. There is also a correlation with the surgery time: for every hour of operation, the risk of infection almost doubles. Likewise, the excessive manipulation of the tissues by the surgeon during the operation is directly related to the infection of the wound in the postoperative period (Gupta, Poret et al. 2023).

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In addition, there are factors specific to the patient, such as age and underlying diseases such as diabetes, obesity, and malnutrition, which delay the healing process and increase the risk of infection.

WOUND CLASSIFICATION

In our institution, wounds are classified according to the proposal of the *National Research Council* of the United States, welcomed by the *American College of Surgeons* (4).

clean wound

It is one in which there is no infection, no hollow organs have been opened, and it has been performed with an aseptic technique (herniorrhaphy, thyroidectomy, exploratory laparotomy, etc.).

clean-contaminated wound

It is one in which a hollow organ has been opened with minimal dissemination of its content.

contaminated wound

It is a traumatic wound lasting less than 4 hours or when a hollow organ has been opened with its contents disseminated or passed through acute inflammation but without pus (cholecystectomy with biliary inflammation).

dirty-infected wound

Traumatic wound of more than 4 hours or when pus or a hollow organ perforated during the operation is found (perforation of the cecum).

WOUND COMPLICATIONS

The wound may present alterations in the natural processes of healing and recovery; these are called **complications**, and the main ones are:

- hemorrhage
- Roman
- dehiscence
- infection
- delayed healing
- fistula

Complication rates, especially the wound infection rate, are recognized parameters of the quality of a surgical service.

GENERAL WOUND MANAGEMENT

Wound care by the surgical nurse is a primary activity in clinical practice and their daily work. The wound should be managed with aseptic technique. The use of gloves is mandatory in the care of major wounds. The bandage is usually removed on the second postoperative day, 48 hours after the surgical procedure. If the wound is accompanied by drains or tubes, the dressing is changed when it appears wet or every 12 hours. When wounds have drains, they should be covered with gauze and sealed airtight (Lu and Khachemoune 2023).

Wound cleaning

An adequate solution to clean the wound promotes the healing process. The ideal solution must have the following characteristics: it must not be toxic to avoid cell damage; it must not delay the healing process; it must have a high cleaning power to remove bacteria and foreign bodies; it must not potentiate infection (the solution must necessarily be sterile), and it must not cause pain, since at the level of the wound the nerve endings have been exposed, which greatly increases sensitivity. The *antiseptic chemical solutions* are effective because they kill bacteria but can also injure or kill living cells, interfering with local defense mechanisms and the healing process. The water is hypotonic compared to the patient's serum and damages the cells by lysis. *Hydrogen peroxide and alcohol* are highly irritating; alcohol causes pain and slow healing. *Therefore, the appropriate wound-cleansing solution is an isotonic agent that can remove foreign material without causing further damage to traumatized tissue. Such are normal saline and povidone-iodine and chlorhexidine solutions (Melling, Ali et al.).*

wound irrigation

The mechanical action of irrigating a traumatic or severely infected wound removes contaminating agents that promote infection in the wound. Vigorous irrigation with water and saline is the best method to clean the wound, especially an open wound. Its effective pressure reduces the incidence of infection due to the efficient elimination of contaminating agents. Ants that may be present in the wound. **Debridement** Removing devitalized tissue reduces the risk of infection; devitalized tissue provides a favorable environment for the growth of bacteria (Rios, Almeida et al. 2023).

bandages

The dressing is used to cover the wound and fulfills different functions: pressure in the presence of bleeding; elimination of dead space resulting from loss of tissue; helps control edema; immobilization (wound healing can be interfered with by body movement); protection and support; absorption of blood, pus and cell debris; prevention of infection with touch, medication application, and better appearance of the wound area (Seidelman, Mantyh et al. 2023).

Classification of bandages

Transparent. They are used in wounds with minimal exudate. They can be used in combination with other materials. It is not recommended on heavily exuding wounds, cavities, or tracts unless used as a secondary dressing, on infected wounds, third-degree burns, or on wounds where the surrounding skin is crispy. *Hydrocolloids.* Semi-permeable bandages are composed of gelatin,

pectin, and carboxymethylcellulose particles in combination with other polymers and adhesives. They are used in wounds with minimal or moderate exudate, necrotic tissue, open wounds, and pressure ulcers or lower limbs. They are not recommended for third-degree burns in wounds with abundant exudate, cavities, or infected wounds (Carter, DaVanzo et al. 2023).

Polyurethane. Hydrophilic polyurethane semi-permeable bandage; its composition varies depending on the manufacturer. They are used in wounds with minimal or abundant exudate and necrotic wounds with exudate. They can be used in combination with other materials. They are not recommended for dry wounds without exudate. *Hydrogel.* They are semi-permeable or waterproof bandages, which depends on their composition. Most are composed of water or glycerin. They are indicated in wounds with minimal or moderate exudates, wounds with necrotic or infected tissue, pressure ulcers, and first and second-degree burns or donor areas. They can also be used in combination with other bandages. They are not recommended in wounds with abundant exudates or in macerated wounds (Chang, Zhang et al. 2023).

Foams, pastes, powders. They are indicated for wounds that require absorption, open wounds, and those with necrotic or infected tissue. Powders are not recommended for dry wounds.

Alginates They are bandages composed of gauze impregnated with gel sodium alginate and calcium chloride. They are used in wounds with moderate or abundant exudate, in those requiring "packaging" due to increased dead space, or in those infected. Its use is not recommended in wounds with minimal exudate, drainage, or necrotic tissue (Corcoran, Martin et al. 2023).

impregnated bandages

- a) *Hydrophilic bandage.* It is used as a primary bandage; it absorbs exudate from the wound and creates an acidic environment that stimulates granulation tissue formation.
- b) *Bandage with hydrolyzed protein.* This bandage is composed of a hydrolyzed protein, indicated in wounds with abundant or moderate exudates. Accelerates the healing process.
- c) *Zinc bandage and saline solution.* This bandage is indicated for managing wounds with venous stasis, such as skin ulcerations, surgical incisions, and first-degree burns. It stimulates or accelerates granulation.
- d) *Collagenase bandage.* It is a collagen-based compound used to debride chronic ulcers and severe burns.

WOUNDS IN MINIMALLY INVASIVE SURGERY

In this era of mini-traumatic surgery, there is a phenomenon of open revision and substitution of orthodox traditional surgical techniques and procedures, which naturally translates into a new perspective on surgical wounds. But while mini-trauma surgery is practiced, every major surgical service continues to perform large operative procedures involving wide incisions. In any type of surgery, permanent monitoring of the surgical wound makes it possible to determine the impact of the incision or surgical wound on the patient's response, establish the degree of pain and disability, and record the rates of complications, which are all indicators or quality parameters. It is precisely minimally invasive surgery, whose paradigm is the cholecyst laparoscopic tomy, in which good control and monitoring of the patient makes it possible to recognize the development of complications (De la Garza Ramos, Ryvlin et al. 2023).

SURGICAL WOUND SURVEILLANCE AND CONTROL PROGRAM

This program was developed under the direct responsibility of the Surgical Nursing Clinical Coordinator (6) at the Santa Fe de Bogotá Foundation and fulfills the following functions:

- 1) Observation of the surgical wound on the day of the operation and the first postoperative day; classification of the operation (sometimes it is necessary to reclassify the wound); measurement of the length of the wound; record of the presence of drains; registration of prophylactic antibiotic therapy; and the immediate postoperative behavior (bleeding, secretion, infection, etc.).

- 2) Daily wound healing following the corresponding protocol, using the appropriate healing materials for each case, and incorporating new technologies. THE SURGICAL WOUND
- 3) Review of the literature on the biology of the surgical wound.
- 4) Instruction to nursing staff and doctors in training.
- 5) Definition of norms, guides, and protocols for managing the surgical wound.
- 6) Detection and registration of complications in the evolution of the surgical wound.
- 7) Detection, recording, and control of wound infection; crop monitoring.
- 8) Instruct the patient on reporting a wound abnormality once discharged (it is about detecting all postoperative infections).
- 9) Study of the control of postoperative pain and its correlation with the characteristics of the wound.
- 10) Periodic presentation of results.

General objective

Carry out objective and systematic follow-up of the surgical wound to keep a continuous and permanent record of the evolution, establish management standards, and define protocols and guidelines for wound treatment.

Specific objectives

- Unify the treatment of the surgical wound.
- Define standards, guidelines, and protocols for the management of surgical wounds.
- Detect complications of surgical wound
- Detect, record, and control surgical wound infection
- Instruct the patient and his family on the management of the wound
- Study and monitor the main systemic and metabolic effects of the wound.

Control program and surgical wound monitoring

This program also monitors enterostomy, colostomy, tracheostomy, gastrostomy, etc.) With enterostomies, especially colostomies, the nurse performs a preoperative visit together with the surgeon, in which the site where the colostomy will be located is defined: the patient is placed in a supine position, sitting and standing to make sure that the stoma is in a comfortable position and is not interfered by skin folds or clothing (belt, etc.). The nurse instructs the patient on what an ostomy is and its care in the postoperative period, in the medium and long term (Glenn, Harman et al. 2023).

Immediately afterward, this teaching is re-emphasized so that, when the patient is discharged, he and his immediate family are well trained to manage the colostomy, both about aspects of mechanical care and diet and skin care. The acceptance of the colostomy by the patient, in our experience, is due in large part to the teaching. That should be taught; such acceptance is more difficult for patients being considered for a permanent colostomy. In the same way that follow-up is done to detect infection and complications of the surgical wound in the extra-hospital environment, ostomies are followed up. When an emergency colostomy has been performed, this teaching is given in the immediate postoperative period (Gupta, Poret et al. 2023).

Surgical wound surveillance and control program

This is, first of all, a **quality assurance program**(8). The systematization of the continuous and permanent observation of the wound, the attention to technical and humanitarian detail in its care, and the identification of the factors that affect the recovery and rehabilitation of the patient and the healing process constitute a set that manifests the quality of care. Quality refers not only to clinical and biological factors but also to factors of an educational and training order, administrative order (provisions), and economic order (costs). It is also an audit program and greatly contributes to creating an environment of care, humanitarian solidarity with the patient, safety, and efficiency (Lu and Khachemoune 2023).

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