1995

Debridement Teaching Aid

Katharine E. Ward
University of North Dakota

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DEBRIDEMENT TEACHING AID

By

Katharine E. Ward
Bachelor of Science in Physical Therapy
University of North Dakota, 1994

An Independent Study
Submitted to the Graduate Faculty of the
Department of Physical Therapy
School of Medicine
University of North Dakota
in partial fulfillment of the requirements
for the degree of
Master of Physical Therapy

Grand Forks, North Dakota
May
1995
This Independent Study, submitted by Katharine E. Ward in partial fulfillment of the requirements for the Degree of Master of Physical Therapy from the University of North Dakota, has been read by the Faculty Preceptor, Advisor, and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.

Renné Maloney
(Faculty Preceptor)

Beverly Johnson
(Graduate School Advisor)

Thomas McCa
(Chairperson, Physical Therapy)
PERMISSION

Title  Debridement Teaching Aid
Department  Physical Therapy
Degree  Master of Physical Therapy

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Signature  Katherine E. Ward
Date  12/7/94
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ABSTRACT

Physical therapists treat patients with wounds. Debridement is one area of wound care which physical therapists frequently perform. Debridement is a particularly difficult skill to learn in the classroom due to the inability to simulate authentic conditions.

This study is intended to be a debridement teaching aid in the physical therapy classroom and/or the professional setting. Written text discusses the classification, healing, assessment, debridement, and dressing of wounds. Photographs of wounds and wound care clarify the written text.

The purpose of this teaching module is to help students and professional staff feel more comfortable with wound care and debridement upon completion of didactic instruction. Techniques to practice wound debridement in the context of reality without risk to the patient are presented.
CHAPTER I

INTRODUCTION

Physical therapists are involved in treating wound care patients. Debridement is one area of wound care which physical therapists are frequently asked to perform. Debridement is a particularly difficult skill to learn in the classroom due to the inability to simulate authentic conditions.

The purpose of this independent study is to develop a debridement teaching aid to be used in the physical therapy classroom and/or the professional setting. Prior to beginning any type of wound care treatment, it is essential that the clinician have a thorough understanding of wounds including their classification, healing, assessment, debridement, and dressing. This paper will cover each of these areas with the main emphasis being on debridement.

Wounds are classified as either acute or chronic. Acute wounds include burns and trauma, and chronic wounds include arterial insufficiency, venous insufficiency, and pressure ulcers. Each wound type demonstrates individual
characteristics depending on the etiology.

Wound healing is broken down into the five stages of inflammation, fibroplasia, contraction, epithelialization, and maturation. It is essential that clinicians dealing with wounds possess, at minimum, a fundamental knowledge of the wound healing process. Chapter III focuses on the five stages of wound healing, noting the key aspects of each phase.

Wound assessment is a crucial part of wound management. Before the clinician can begin to successfully treat a wound, he or she must understand what is causing tissue deterioration and remove that cause. The wound evaluation must include a thorough subjective and objective exam.

Debridement is defined as the removal of foreign material and dead or damaged tissue.¹ The presence of necrotic tissue interferes with the normal healing process. It impairs the wound’s defenses and promotes the development of infection.² Necrotic material also acts as a physical barrier to repair by impeding epithelialization.

Debridement can be broken down into two major categories: non-selective and selective. Non-selective debridement removes both viable and non-viable tissue. Non-selective methods include radical sharp, mechanical, gauze dressing, and whirlpool debridement. Selective debridement removes only non-viable tissue. Selective methods include partial sharp, chemical, vaporization, autolytic, and Water Pik debridement.

Chapter VII presents two simulated practice techniques for debridement.
One method involves the use of a navel orange and the other the use of two candles of different colors. Simulations provide the clinicians with the opportunity to practice skills in the context of reality without harm to the patient.

The final topic covered in this paper is wound dressing. This area of wound care is currently expanding at a rapid rate. The major dressing categories and their functions are discussed in a general, broad sense.

Included in this independent study are slides of various wounds and debridement procedures. Descriptions of each slide can be found in Appendix A. This paper, along with slides and simulated practice, is intended to help students and clinicians feel more comfortable with wound care and debridement upon completion of didactic instruction.
CHAPTER II
WOUND CLASSIFICATION

A wound is defined as a break in the continuity of soft parts of the body structures caused by violence or trauma to tissues.\(^1\) Wounds are classified as either acute or chronic. Acute wounds (those less than three months old) are generally due to burns or trauma.\(^4\) Chronic wounds are generally the result of arterial insufficiency, venous insufficiency, or pressure.

Burn injuries are one of the major health problems of the industrial world.\(^5\) Burns can occur as a result of fire, hot liquids, chemicals, or electricity. Classification is based on the depth and the degree of thickness of the tissues destroyed (Appendix A, slides 1-3). The symptoms associated with a burn vary according to the different classifications. Burns are summarized in Table 1.

Trauma wounds are caused by external force or violence. They are difficult to classify because wound presentation is specific to the mechanism of injury. Examples of trauma wounds include abrasions (Appendix A, slide 4), lacerations (Appendix A, slide 5), and punctures.

A chronic wound is defined as a loss in skin or tissue integrity produced by injury or insult that is of long duration or frequent recurrence.\(^6\) Chronic wounds are summarized in Table 2. Simple medical or surgical interventions
<table>
<thead>
<tr>
<th>Burn Depth</th>
<th>Skin Elements Involved</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Degree</td>
<td>Superficial Epidermis</td>
<td>Erythema</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Edema</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Painful</td>
</tr>
<tr>
<td>Second Degree</td>
<td>Superficial Epidermis</td>
<td>Blistered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Weeping</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Red</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Painful</td>
</tr>
<tr>
<td>Deep</td>
<td>Epidermis and Dermis</td>
<td>Pale or cherry red</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skin pliable</td>
</tr>
<tr>
<td>Third Degree</td>
<td>Total destruction of skin</td>
<td>Tan</td>
</tr>
<tr>
<td></td>
<td>May involve subcutaneous</td>
<td>Leathery</td>
</tr>
<tr>
<td></td>
<td>fat, muscle, tendons, bone</td>
<td>Nonpliable</td>
</tr>
<tr>
<td>Fourth Degree</td>
<td>Total destruction of tissues</td>
<td>Entrance wound-charred and</td>
</tr>
<tr>
<td></td>
<td>including bone</td>
<td>depressed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exit wound-explosive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>wound edges</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bone fractures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>may occur</td>
</tr>
</tbody>
</table>
Table 2. Classification of Ulcers Via Various Characteristics

<table>
<thead>
<tr>
<th>Ulcer Type</th>
<th>Primary Cause</th>
<th>Typical Location</th>
<th>Other Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial</td>
<td>Arterial insufficiency</td>
<td>Toes, feet, lower one-third of leg</td>
<td>Irregular shape, Pale base, Poor granulation, Severe pain</td>
</tr>
<tr>
<td>Venous</td>
<td>Venous insufficiency</td>
<td>Lower one-third of leg, medial aspect</td>
<td>Irregular shape, Pinkish-red base, Surrounding area of pigmentation, Mild pain</td>
</tr>
<tr>
<td>Pressure</td>
<td>Compression of soft tissue</td>
<td>Bony prominences</td>
<td>Circular lesions, Often deep, Indolent</td>
</tr>
</tbody>
</table>
do not produce an easy resolution. Examples of chronic wounds include vascular ulcers, diabetic ulcers, pressure ulcers, and post-operative open wounds. Chronic wounds may be the result of an illness such as diabetes or cancer. Precipitating factors include poor nutrition, obesity, smoking, and immobility.

Wounds due to arterial insufficiency occur when blood flow to a given area is impaired. The areas becomes ischemic which leads to irreversible cell damage.\(^7\) The initial symptoms of arterial insufficiency are hair loss, nail dystrophy, and cool, pale, atrophic skin. In severe cases, muscle atrophy, intermittent claudication, and gangrene may be present. The typical locations of ulcers due to arterial insufficiency are toes, feet, and lower one-third of leg (Appendix A, slides 6-8).\(^7\) A pale or white ulcer bed without granulation is characteristic of arterial ulcers. Arterial wounds are usually very painful and become more painful with elevation or exposure to cold.\(^8\)

Venous stasis ulcers are the result of prolonged venous hypertension, particularly in the lower half of the calf. Up to 60 percent of venous leg ulcers are due to deep vein thrombosis (DVT).\(^6,8\) Other factors that may contribute to venous insufficiency are prolonged standing, walking on unyielding surfaces, and wearing high-heeled shoes. Patients with venous disease may initially present with an aching or heaviness in the calf or the foot with ankle edema. Varicose veins are often very large and prominent (Appendix A, slide 9). The typical location of venous stasis ulcers is the medial, lower one-third of the leg.
A characteristic of venous insufficiency is a pinkish-red base with brown discoloration that extends beyond the edges of the ulcer (Appendix A, slides 10-11). Pain is mild and tends to increase with leg dependency and decrease with a cool environment or elevation of the leg.

Pressure ulcers form when the body's soft tissue is compressed between a bony prominence and an external surface. The pressure causes capillaries to collapse disrupting the flow of blood and nutrients to the body tissues. This leads to ischemia and eventually cellular necrosis. Typical areas of breakdown include the sacrum, trochanters, ischium, and heels. The characteristics of pressure ulcers are dependent on wound stage (Appendix A, slides 12-14). The four stages are summarized in Table 3. Pressure ulcers are generally the result of diminished sensation; therefore, pain is absent. Table 4 lists other factors that contribute to pressure ulcer formation.

Chronic ulcers are a difficult therapeutic problem. Depending on their etiology, different interventions are indicated. Those due to arterial insufficiency require revascularization if technically possible. Venous ulcers respond to elevation and graded compression. And pressure ulcers respond at least partially to avoidance of trauma and pressure. Common to all acute and chronic wounds is the frequent need for removal of necrotic tissue. Satisfactory debridement may be achieved through a variety of methods which will be discussed in later chapters.
Table 3.—Stages of Pressure Ulcers$^{6,7}$

<table>
<thead>
<tr>
<th>Stage</th>
<th>Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Reddened area that does not disappear when pressure is relieved</td>
</tr>
<tr>
<td>II</td>
<td>Skin blister or superficial break in the epidermis</td>
</tr>
<tr>
<td>III</td>
<td>Skin break with deep tissue involvement exposing dermal tissue</td>
</tr>
<tr>
<td>IV</td>
<td>Skin break with deep tissue involvement exposing muscle and bone</td>
</tr>
<tr>
<td>Factors Contributing to Pressure Ulcer Formation</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>♦ Shear</td>
<td></td>
</tr>
<tr>
<td>♦ Friction</td>
<td></td>
</tr>
<tr>
<td>♦ Moisture</td>
<td></td>
</tr>
<tr>
<td>♦ Immobility</td>
<td></td>
</tr>
<tr>
<td>♦ Altered activity levels</td>
<td></td>
</tr>
<tr>
<td>♦ Altered mental status</td>
<td></td>
</tr>
<tr>
<td>♦ Altered nutritional status</td>
<td></td>
</tr>
<tr>
<td>♦ Chronic conditions</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER III

WOUND HEALING

Wound healing is a complex process by which all wounds, be they of a surgical or accidental nature, heal in the same sequence of events. The number of phases into which the process can be divided varies with the author, as do the terms to identify each phase. For the remainder of this paper, wound healing will be broken down into five stages: inflammation, fibroplasia, contraction, epithelialization, and maturation. The stages and characteristics of wound healing are summarized in Table 5.

Inflammation

The initial phase of healing is referred to as inflammation. It begins at the moment of injury and continues for approximately 72 hours. At the time of injury, blood enters the wound, bringing platelets, granulocytic leukocytes, macrophages, and epithelial cells.

Platelets adhere to exposed collagen, flatten, and release numerous substances, one of which is glycoproteins. These proteins cause platelets to become sticky. The "activated" platelets attract other platelets, ultimately causing the formation of a plug. This process reduces blood loss, isolates the wound, and prevents or reduces bacterial contamination.
<table>
<thead>
<tr>
<th>Stage</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflammation</td>
<td>Occurs during the first 72 hours after wound formation</td>
</tr>
<tr>
<td></td>
<td>Arteriolar and venous dilatation</td>
</tr>
<tr>
<td></td>
<td>Leukocyte, macrophage migration</td>
</tr>
<tr>
<td></td>
<td>Clot formation</td>
</tr>
<tr>
<td>Fibroplasia</td>
<td>Duration: two weeks after stage of inflammation</td>
</tr>
<tr>
<td></td>
<td>Formation of collagen fibrils and ground substance</td>
</tr>
<tr>
<td></td>
<td>producing matrix for the new connective tissue</td>
</tr>
<tr>
<td></td>
<td>Vitamin C, A, and protein required for collagen formation</td>
</tr>
<tr>
<td>Contraction</td>
<td>Edges of wound drawn together</td>
</tr>
<tr>
<td></td>
<td>Degree of contraction directly related to elasticity of the underlying tissue</td>
</tr>
<tr>
<td></td>
<td>80% of all acute wounds will heal by contraction alone</td>
</tr>
<tr>
<td>Epithelialization</td>
<td>Epithelial cell migration across surface of the wound</td>
</tr>
<tr>
<td></td>
<td>Requirements for migration include tissue oxygenation,</td>
</tr>
<tr>
<td></td>
<td>moisture, nutrition, temperature, and lack of infection</td>
</tr>
<tr>
<td></td>
<td>Known as &quot;healing by secondary intention&quot;</td>
</tr>
<tr>
<td>Maturation</td>
<td>Continuous remodeling and organizations of collagen</td>
</tr>
<tr>
<td></td>
<td>Nutritional deficiencies may produce degeneration and weakening of the collagen network</td>
</tr>
</tbody>
</table>
Granulocytic leukocytes appear within six to twelve hours of injury. Their primary purpose is to combat bacterial contamination. Leukocytes act by either lysing bacterial cell walls or by coating the antigen with antibody making it more appealing and recognizable to phagocytic cells.⁶

Macrophages serve a number of functions in the healing wound. Their primary function is phagocytic debridement of necrotic tissue, foreign material, and dead cells. This is essential to wound healing. Without phagocytosis, tissue debridement is incomplete and fibroblast influx is markedly reduced. In addition to debridement, the macrophage is known to secrete biologically active substances, several of which are key to the subsequent initiation and propagation of granulation tissue necessary for healing.⁶

The last cell of significance in the inflammation phase is the epithelial cell. Within 24 hours epithelial cells begin migrating toward the injured area. As they migrate toward one another from severed edges of the wound, re-epithelialization occurs.

Fibroplasia

Towards the end of the inflammatory phase of wound healing, fibroblasts begin to appear in wounds.¹⁰ Fibroblasts produce several types of extracellular materials essential in the formation of collagen and ground substance. Collagen production is the most important function of the fibroblast. The ultimate strength of any healed wound depends on the synthesis and cross
linking of collagen. Fibroblasts require vitamins B and C, oxygen, amino acids, and trace metals in order to perform their tasks.

**Contraction**

Wound contraction is the process by which the area of an open wound is diminished by gross centripetal movement.\(^1\) The degree of contraction is directly related to the granulation tissue that fills the wound. Within this tissue, modified fibroblasts (myofibroblasts) containing contractile proteins are found. Myofibroblasts appear to combine features of both fibroblasts and smooth muscle cells in that they exhibit both collagen synthesis and contractility.\(^10\) Most acute wounds will close entirely via contraction.\(^6\)

**Epithelialization**

Epithelialization involves the simultaneous resurfacing of the wound by epithelial cells in conjunction with dermal thickening by fibroblasts.\(^10\) The cells adjacent to the wound become flattened, lose many of their junctional complexes, and develop pseudopod-like extensions of their cytoplasms. Once these physical changes occur, the epidermal cells begin to migrate into the wound in sheets. Masses of cells continue to advance until they come into contact with other sheets of epidermal cells migrating across the wound from other directions. This process continues until the wound is completely covered by epidermal cells. The rate at which epithelialization occurs is dependent upon an appropriate environment for cell growth. A wound that is warm, moist, and supplied with oxygen will heal faster than one that is infected, ischemic, or dry.\(^6\)
Maturation

Maturation of the granulation tissue into a richly cross-linked scar may continue for months to years depending on the size of the original wound.\textsuperscript{12} During this phase, fibroblasts continue to produce collagen where needed and proteolytic enzymes work to eliminate fibers that do not provide strength. The fibers that remain in a scar are those that are oriented parallel to lines of tension and, thus, impart mechanical strength to the tissue. In the healthy wound, there is a fine balance between synthesis and lysis of collagen with the goal that neither should outdo the other.\textsuperscript{6}

In the previous paragraphs, wound healing was broken down into five separate phases. However, in reality, these phases overlap and occur simultaneously. Krasner best sums up wound healing with his statement, "The wound healing process is as interwoven as a tangled ball of yarn or as overlapping as a waterfall."\textsuperscript{6}
CHAPTER IV

WOUND ASSESSMENT

Evaluation of the patient with a wound begins with a thorough history and physical examination. The history should include the patient's personal and family medical history; the patient's primary diagnoses; the events leading to the wound onset; the patient's occupation; any secondary diagnoses that may affect wound healing; any symptoms, discomfort, or difficulties which the patient is experiencing; and the patient's use of cigarettes, medication, and alcohol. The physical examination should include a description of the wound including location, size, tissue characteristics, drainage, skin factors, and stage of wound. Also included in the initial assessment is a thorough neurological and vascular examination. As the wound changes, follow-up evaluations should be performed and any new or unusual changes reported to the physician.

The location of the wound should be described in detail and documented on a body diagram. Wound location is an important consideration because some areas require special needs. For example, wounds over bony prominences require relief from the pressure beneath the skin. The clinician may also wish to include photographs of the wounds.
The wound description should include the length, width, and depth measured and recorded in centimeters. Wound length and width are measured using acetate sheets. The examiner can either trace the wound directly or trace a photograph of the wound. The edges of the wound are measured and documented. The depth is measured using a sterile, flexible, cotton tip applicator. The applicator is inserted into the deepest part of the wound. The evaluator grasps the applicator at the point corresponding to the skin surface. The applicator is withdrawn while maintaining the grasp. The distance is measured from the tip of the applicator to the point of the grasp. Wound measurements can be used to determine the rate of wound healing by calculating the rate at which the wound area grows smaller. The equation is:

\[
\text{percent wound contraction} = 100 \times \frac{\text{original area} - \text{later area}}{\text{original area}}
\]

Photographs taken daily provide a visual progress report of wound healing.

Tissue characteristics include color, texture, and type of necrotic tissue. Wound color is most easily described using the *Three Color Concept* by Marion laboratories, Inc. This system classifies a wound by simply describing its appearance. The "Red Wound" is a new or clean wound that is healing (Appendix A, slide 150, the "Yellow Wound" contains some exudate and possible infection (Appendix A, slides 16-17), and the "Black Wound" identifies dead tissue (Appendix A, slide 18). Necrotic tissue is defined as dead tissue or bone surrounded by healthy parts. Necrotic tissue can be black, brown, yellow, beige, or white depending on the causative factors. An area with
venous obstruction will result in a black, thick eschar several times thicker than normal skin. Arterial insufficiency without accompanying venous obstruction produces a yellow-brown eschar with a shrunken brittle look. Dehydration may add a leathery look to either type of eschar. When cell death alone occurs, the resulting eschar is thin, wet with serum transudate, and a waxy color as a result of a lack of circulating red cells.\textsuperscript{14}

The amount, color, consistency, and odor of drainage should also be documented. Wound drainage is referred to as exudate. Exudate can be broken down into three categories: serous, serosanguinous, and purulent. Serous exudate contains only serum and is thin and watery. Serosanguinous exudate contains serum and blood. Purulent exudate contains pus and is cloudy and more viscous. Purulent exudate is most commonly associated with a foul or musty odor and infection.

Skin factors that are documented include color, lesions, turgor, and temperature. A cyanotic (blue) skin color indicates ischemia due to decreased circulation. Redness indicates an increase in temperature and possible infection. Any skin temperature greater than 98\textdegree{} Fahrenheit or less than 95\textdegree{} Fahrenheit should be investigated. A thorough assessment of pulses and sensation should also be included. The most common pulses assessed are the common iliac, femoral, popliteal, posterior tibial, and dorsalis pedis. The pulse should be compared to the uninvolved extremity and documented as normal, diminished, or absent.
Documentation of a wound evaluation may be written in S.O.A.P.\textsuperscript{15} format or on a wound evaluation form. An example of a physical therapy wound evaluation form is included in Appendix B.
CHAPEL V
DEBRIDEMENT: GENERAL INFORMATION

The key to wound management is early intervention, with timely assessment, appropriate therapy, and continual reassessment to break the chain of tissue deterioration and necrosis.\textsuperscript{14} Appropriate therapy may include debridement, which is defined as the removal of foreign material and dead or damaged tissue, especially in a wound.\textsuperscript{1} The purposes of debridement are to remove tissues heavily contaminated by dirt and bacteria, thus protecting the patient from invasive infection; to remove devitalized tissues that impair the wounds' ability to resist infection; and to remove necrotic tissue which impedes the formation of granulation tissue and prevents epithelial cells from migrating across the wound.\textsuperscript{2,3} Debridement can be accomplished in a number of ways. It can be broken down into two major categories: non-selective and selective. Examples of non-selective include radical sharp, mechanical, gauze dressing, and whirlpool debridement. Examples of selective include partial sharp, chemical, vaporization, autolytic, and Water Pik debridement.

Non-Selective Debridement

Non-selective debridement is usually chosen for extensive necrotic debris and eschar and for debris supporting an infected process in the wound.\textsuperscript{18} Viable
tissue is sacrificed for rapid cleaning and improvement. Non-selective debridement methods are briefly described in the following paragraphs.

Radical sharp debridement is defined as excision of devitalized tissue by sharp dissection. This type of debridement is generally performed in the operating room under a general anesthetic. The primary indication for radical sharp debridement is preparation for coverage with a graft or flap.

Mechanical debridement requires the use of a sponge, soft brush, or gauze. The procedure involves rubbing the wound to remove all loose necrotic tissue. It is destructive to the surrounding tissues and painful to the patient.

Gauze dressing debridement can be broken down into the wet-to-dry method and the wet-to-wet method. Wet-to-dry is an excellent source of debridement. It removes only dead tissue, making it safe around vital structures such as nerves and vessels. This method of debridement is traumatic to granulation tissue and newly formed epithelium; it should be discontinued when the ulcer is clean, otherwise it will interfere with the healing process. In the wet-to-wet method, the gauze is not permitted to become completely dry before removal. This technique is less effective in debriding, but more comfortable for the patient.

The whirlpool removes loosened necrotic debris relatively painlessly when set at low agitation levels. By washing away some of the bacteria on the wound surface, the whirlpool aids in decreasing infection. It is especially useful in the treatment of patients with multiple wounds. On the negative side, the
whirlpool requires extra personnel for transporting the patient to and from the physical therapy department.

Selective Debridement

Selective debridement removes only necrotic tissue. As the amount of necrotic material decreases in a wound, the method of debridement must be changed from a non-selective to a more selective form.\textsuperscript{18} This is necessary to prevent removal of regenerating tissue, a process that would retard wound healing. The following paragraphs contain brief descriptions of selective debridement techniques.

Partial sharp debridement implies excision of devitalized tissue only.\textsuperscript{2} Only necrotic tissue is removed, thus minimizing both pain and bleeding. This type of debridement is generally carried out either at bedside or in the physical therapy department. The procedure is often repeated in a piecemeal fashion on several consecutive days to remove all necrotic material.\textsuperscript{2} Partial sharp debridement is indicated in the promotion of healing by secondary intention and for the preparation of the wound for autologous punch grafting.

Chemical debridement is effective in removing hard, black eschar tightly adherent to the surrounding skin. Chemical debriding agents such as fibrinolysis (Elase), collagenase (Santyl), and sutilens (Travase) are applied to the eschar and allowed to penetrate.\textsuperscript{19} After several days, a clean separation usually occurs between the viable and non-viable tissue and the necrotic tissue can be excised.
Vaporization is considered a form of surgical debridement. The carbon dioxide laser is most often used for this procedure. Necrotic tissue can be removed with minimal blood loss.\textsuperscript{2} The end result is a relatively aseptic, bloodless field.

Autolytic debridement incorporates the use of occlusive dressings such as transparent films, hydrocolloids, and hydrogels.\textsuperscript{18} Occlusive dressings soften and separate necrotic tissue from healthy tissue. This is a slow form of debridement with little pain to the patient.

The Water Pik provides yet another alternative for wound debridement. The Water Pik delivers a pulsating fluid stream that compresses and decompresses tissue, loosening necrotic debris from the wound. This action frees the wound of debris, increases tissue perfusion, and assures a clean granulation bed, thereby enhancing wound healing.\textsuperscript{20}

Regardless of the type of debridement performed, there are similar objectives for which the clinician strives. These objectives, which are listed in Table 6, include removing eschar and non-viable tissue, sequential debridement of eschar (80\% to 90\% at each session), protecting viable tissue, limiting bleeding, removing foreign particles, lowering bacteria count, and promoting grafting potential.\textsuperscript{14}
Table 6.—Objectives of Debridement

- Remove eschar and non-viable tissue
- Implement sequential debridement of eschar
- Avoid damage to viable tissue
- Produce little or no bleeding
- Remove foreign particulate matter
- Produce lower bacteria count
- Promote grafting potential
CHAPTER VI
DEBRIDEMENT - PROCEDURES

Prior to beginning debridement, the clinician must thoroughly understand the patient's medical history or condition. This will be major factor in determining if debridement is indicated and which type of debridement is most appropriate. For example, a patient exhibiting an impaired clotting mechanism may not be a candidate for debridement due to the increased risk of bleeding. The ideal situation is for the clinician to be present with the physician at the initial evaluation. At this visit, the management of the wound, the frequency of client visits, the criteria for debridement, and the expected outcome will be determined. In this chapter, the various debridement techniques commonly performed by physical therapists will be discussed.

Mechanical Debridement

Mechanical debridement is a non-selective form of debridement in which both viable and non-viable tissue is removed from the wound bed. In performing mechanical debridement, a soft brush, a sponge, or a dry piece of gauze is used to rub off any loose necrotic tissue (Appendix A, slide 19). Mechanical debridement is indicated in areas with moderate amounts of necrotic tissue and wound exudate. This method of debridement is painful to
the patient and destructive to surrounding tissue; therefore, once granulation tissue begins to form, mechanical debridement should be discontinued.\textsuperscript{6}

\textbf{Gauze Dressing}

Gauze dressing debridement can be broken down into the wet-to-dry method and the wet-to-wet method. The wet-to-dry method is one of the most common and conservative forms of debridement. Fine mesh gauze is moistened with normal saline (Appendix A, slide 20), povidone iodine, or acetic acid; opened to full size; crumpled; and packed into the wound bed (Appendix A, slide 21).\textsuperscript{18} It is important that the gauze not be so wet that it causes maceration of surrounding wound margins or fungal infection, and that the wound be lightly packed to prevent unnecessary pressure on the wound bed.\textsuperscript{2}

The gauze should be allowed to dry in the wound bed for approximately six hours before it is removed.\textsuperscript{2} As the gauze dries, the exudate and necrotic tissue interface with the gauze and are removed along with the dried gauze (Appendix A, slides 22-23). This method of debridement removes granulation tissue, may cause bleeding, and is often times painful for the patient.

Wet-to-wet gauze dressing debridement is a milder source of debridement which may be used on wounds with small amounts of exudate and necrotic tissue. Wet-to-wet debridement follows the same procedure as wet-to-dry debridement with the exception of allowing the gauze to dry in the wound bed. This method is less painful for the patient.\textsuperscript{6}
Whirlpool

The whirlpool is probably the most universally used modality associated with physical therapy and the treatment of wounds. Soaking is one physical effect of the whirlpool. It aids in the removal of dressings, softens tissues, and removes exudate from the wounds. Other physical effects are produced by agitation. The vigorous whirling of the water aids in loosening and debriding necrotic tissue. Agitation stimulates the development of new granulation tissue. The mechanical effects also produce a massaging effect on tissues, which is attributed to reducing edema and inflammatory responses.

Wounds healing by secondary intention will initially benefit from the whirlpool for cleansing, debridement, antibacterial action, and circulation enhancement (Appendix A, slides 24-25). Whirlpool is generally administered daily or twice a day in conjunction with other forms of debridement. Prior to whirlpool treatment, the clinician must consider what affects water temperature, agitation, and duration will have on the wound and surrounding tissues. The temperature of the water should be selected according to the medical condition of the patient and the treatment objective. Water temperature can be classified as non-thermal, neutral, and thermal.

Non-thermal temperatures range from 27.0°C to 33.5°C. This temperature is effective for softening, loosening, and cleansing the tissue of exudate and infection. Mild responses to the circulatory, nervous, and
cardiopulmonary systems also occur in this temperature range. Neutral
temperatures are indicated when treating a compromised patient.

The thermal temperature range is between 35.5°C to 40.0°C. The heat
produces significant changes in the circulatory, nervous, and cardiopulmonary
systems. Thermal temperatures are generally used unless heat is
contraindicated.

The agitation of the whirlpool is controlled by adjusting the amount of air
injected into the water. Agitation intensity and direction are adjusted according
to patient tolerance and the presence of tissue that may be damaged. A
whirlpool with even moderate agitation may mechanically damage new
granulation tissue; therefore, once a wound reaches this stage of healing,
whirlpool treatments are discontinued.

Partial Sharp Debridement

Partial sharp debridement performed by the physical therapist is
understandably less aggressive than surgical excision but requires sound
judgment and an understanding of the practical considerations and principles of
debridement. Sharp debridement should be performed in sequential thin layers,
and damage to viable tissue must be avoided (Appendix A, slides 26-33).14

Instruments used for sharp debridement include gloves, adson forceps,
scalpel, gauze sponges, curved iris scissors, normal saline solution, and sterile
towels (Appendix A, slide 34). The beginner may prefer to use iris scissors and
adson forceps. Iris scissors are tiny tissue scissors that are easy to
Small adson forceps, which have small teeth, allow the tissue being removed to be gripped tightly and then cut with the scissors. Skilled clinicians achieve more rapid results using a scalpel.

The center of the wound is generally the deepest area of the wound and the area of the most non-viable tissue. When debriding the deepest section of the wound, the clinician must be careful to stay in the same tissue plane. As long as the instrument used for debridement is held horizontal to the wound bed, the tissue plane is easy to maintain.

Debridement should be limited to the superficial subcutaneous tissue. These tissue depths vary depending on the body area. Pinching the skin lightly helps determine the depth of subcutaneous tissue. Tendons, bones, nerves, and vascular structures should be avoided (Appendix A, slide 35). To become familiar with tissue planes, pathways of vessels, tendons, and nerves, the clinician should spend ample time in the anatomy department.

If the interface between necrotic tissue and viable tissue is not readily apparent or if there is a question about whether tissue is viable, debridement should be stopped. Wound evaluation a few days later will determine the viability of the tissue in question. It is not essential to remove all non-viable tissue at one time. Eighty to ninety percent of the non-viable tissue is removed each time the patient is seen.

When debriding, pain and bleeding are undesirable and should be avoided. Generally the periphery of the wound is the most sensitive to pain.
While there may be some pain when the tissue is removed, it should subside after the debridement is finished. It is best to remove small amounts of necrotic tissue and then allow the patient to recover. No bleeding will occur when only non-viable tissue is removed. If bleeding does occur, debridement should be stopped and pressure applied until the bleeding subsides.

There are three important rules to remember when performing sharp debridement. "If you uncover a fistula track that goes into another tissue plane - stop. If you suddenly become nervous and unsure of what you are cutting - stop. If the patient complains of pain even after pain medication - stop."18

Enzymatic Debridement

Chemical (or enzymatic) debridement offers a safe, conservative, selective approach to the removal of gross necrotic tissue. Enzymes are complex proteins that are capable of inducing chemical changes in other substances without being changed themselves.19 Enzymes are specific, meaning they act only upon particular substances. There are a wide variety of enzymes classified according to the substances from which they are derived and the substances upon which they act.

Enzymes are delivered into the necrotic tissue of a wound using a number of vehicles, usually a sterile ointment. Some enzymatic preparations are combined with other ingredients that promote granulation, control local inflammation, and control wound odors.
Proper application of enzymatic debriding agents is important to maximize treatment and prevent injury to the surrounding healthy tissue. If the wound is covered with thick eschar (Appendix A, slide 36), the wound is soaked in warm water and scored with a sharp instrument to permit deeper penetration of the enzyme. After application of the appropriate enzyme, a wet gauze dressing is applied. This activates the enzyme and eases the removal of the liquified debris. Enzymatic debridement should be discontinued if there is no significant removal of wound debris after two weeks. To prevent injury to healthy tissues, enzymatic debridings is avoided in wounds communicating with major body cavities and wounds containing exposed nerves, tendons, ligaments, or bone.

Enzymatic debriding offers a positive alternative to sharp debridement. The action-specific nature of enzymes ensures that selective debridement will take place, thus protecting new granulation tissue. The ointment form is easy to use and often even includes extra agents which aid in the healing process.

**Autolytic Debridement**

Autolysis is a method of selective debridement that has become widely accepted over the last several years as a result of health care professionals adopting theories of moist wound healing. Autolysis is the breakdown and separation of necrotic tissue by white blood cells and lysomatic enzymes. Autolysis and autolytic debridement are accomplished through the application of an occlusive moisture retentive dressing. These dressings, which will be
discussed in detail in Chapter VIII, include transparent films, hydrocolloids, hydrogels, exudate absorbers, and foams.

The procedure for autolytic debridement is to apply the appropriate dressing to the wound for approximately 72 to 96 hours. During this time, wound fluid that is yellow in color and possesses an offensive odor is likely to accumulate. This wound fluid is known to contain growth factors and enzymes that further stimulate autolysis and healing. After 72 to 96 hours, the dressing is removed, the wound bed irrigated with normal saline, and non-viable tissue removed with very little pain for the patient. This method of debridement is contraindicated in infected wounds and for immunocompromised patients.

**Water Pik Debridement**

The versatility of the Water Pik makes it an appropriate choice of debridement for a variety of open wounds. A Water Pik may be used easily on surface wounds regardless of their location and it can be used in treating unstable patients who must remain in their rooms due to isolation or equipment.

The Water Pik has a pressure setting so that the amount of flow can be adjusted for patient comfort. There are two Water Pik tips: a straight jet tip, used to deliver a direct stream to loosen and debride necrotic tissue and a shower head tip, used for gentle cleansing of the wound. The wound is usually irrigated with 50 to 100 cc of solution (solution type is chosen by the physician). It may be necessary to suction the irrigant if it becomes trapped in a cavernous pocket. Water Pik therapy is contraindicated in areas of the neck,
eyes, dura, and exposed vessels. The pulsating stream may injure these structures.

One precaution to the use of the Water Pik is the risk of contamination to the caregiver by the spray. Fluid in the wound may not always be suctioned as fast as it is sprayed. The caregiver and patient may be sprayed with wound drainage and debris. Therefore, protective devices must always be used.
CHAPTER VII

DEBRIDEMENT - SIMULATED PRACTICE

Debridement of wounds requires manual dexterity skills that are achieved and improved with practice. Simulations are useful particularly for enhancing psychomotor skills that require practice under conditions of considerable feedback. The use of simulations as an adjunct to didactic instruction has become increasingly popular in health education. Two simulated practice techniques will be presented in this chapter. The first involves the use of a navel orange and the second the use of two candles of different colors.

The simulation on a navel orange requires a pair of disposable gloves, adson forceps, iris scissors, a 4 x 4 inch gauze pad, and a partially peeled navel orange.\(^3^{,14}\) The navel orange has a thick white inner layer, and when soaked in water, this layer simulates the texture of wound slough (Appendix A, slide 38). The task closely simulates actual wound debridement. The white, spongy inner tissue of the orange resembles the less adherent type of non-viable wound tissue both in color and in its ability to be removed from the deeper structures with minimal effort.\(^3\) If the student proceeds too hastily or probes too deeply, the membrane of the orange may become punctured and begin to weep; this immediate feedback requires the student to either slow
down or to proceed with less vigor.\textsuperscript{3} Readiness for the clinic is determined when the thicker layer can be completely removed without piercing the inner membrane (Appendix A, slide 39).

The second method of simulated practice involves the use of two candles of different colors. One candle is burned and allowed to drip onto the other candle. The student then takes a scalpel and debrides the candle. Proficiency is determined by the student’s ability to completely separate the two colors of wax. Practical skills developed include a comfortable holding position for the scalpel as well as the ability to manipulate the scalpel at different levels of penetration.\textsuperscript{18}

Simulation allows the student to gain confidence and to develop manual dexterity in a non-threatening environment. Because simulation does not involve a patient, students are free to practice independently in a variety of safe, non-threatening situations without the apprehension that inevitably occurs when first presented with an actual patient. Later, when presented with an actual wound debridement situation, the student will be prepared to perform in a more efficient and productive manner.
CHAPTER VIII

WOUND DRESSING

In the 1990s, there has been an explosion of options for the treatment of wounds. Most health care professionals can hardly keep pace with the new brands, the new categories, and the new techniques for wound care. The dressing shelf, which once contained cotton wool, lints, plasters, tongs, and oakum, is now cluttered with a new array of technological wonders, such as transparent films, hydrocolloids, hydrogels, exudate absorbers, and foams. Seven commonly used dressing categories will be considered briefly in the following paragraphs.

Gauze

Gauze is one of the most common, cost-effective dressing options of the 1990s. It may be used alone or in conjunction with other dressings. Gauze may be used dry to cover surgical wounds closed by primary intention or moist as packing in wounds left to heal by secondary intention. As mentioned in Chapter VI, wet-to-dry gauze or wet-to-wet gauze may be used as a form of non-selective debridement. For heavily exudating wounds, absorbent "toppers" and "ABDs" can be used to control the exudate.
Non-Adherent Dressings

Non-adherent dressings are useful for skin tears, donor sites, and skin grafts. They are particularly useful when there is body hair near the wound or when the wound margins are easily broken. Non-adhesive dressings are minimally absorptive; therefore, a secondary dressing such as gauze is required.

Transparent Film

Transparent films are used for dressing superficial wounds, donor sites, abrasions, and burns. Transparent films are a moisture retentive dressing and can be used for autolytic debridement of necrotic tissue.\(^2\) Their advantages include conformability, transparency, and cost effectiveness. Precautions include fluid build-up which can lead to maceration, and the lack of ability to hold well in high friction areas.

Hydrocolloids

Hydrocolloids are used on a variety of acute and chronic wounds. They are moisture retentive dressings effective in autolytic debridement. They are available in a variety of sizes, thicknesses, absorbency, and translucency. They come in wafer, powder, and paste form. Hydrocolloids are the ideal dressings for many hard-to-cover and high friction areas.

Gels/Hydrogels

Gels/hydrogels are used for the treatment of a variety of acute and chronic wounds. They can be used for autolysis of necrotic tissue in both clean
and infected wounds. Advantages include their transparency and their frequency of change (usually just once a day or every other day). Hydrogels lower wound temperatures, reducing inflammation and providing marked pain relief for most patients.\textsuperscript{21} A transparent film dressing and a gauze dressing should be used over the gel forms to contain them.

Exudate Absorbers

This category includes starches, pastes, beads, and hypertonic saline gauze. These materials absorb several times their weight in exudate; therefore, their use is restricted to wounds with heavy exudation. They can also be used for autolytic debridement.

Foams

Foams are an excellent dressing choice when there is body hair near the wound or when the wound margins are easily broken. They insulate the wound and are moderately absorptive. Foams are extremely conformable and can be easily customized to fit a particular wound.

There are a variety of functions that dressings need to fulfill. Clinically, dressings need to be conformable, particularly on uneven body surfaces. They need to control pain in order to improve mobility and reduce the use of pain medication. Dressings need to control odor, thus promoting social acceptance. Convenience, cost effectiveness, and environmentally acceptable means of disposal also need to be considered. These factors will increase patient compliance.
Beyond these clinical needs, dressings should address each wound's unique physiological and biochemical status.\textsuperscript{12} Dressings can help in exudate management by providing an environment that is neither too moist nor too dry. If debridement is an issue, a dressing which removes dead tissue or fibrin should be chosen. Antimicrobial dressings reduce and control bacterial growth. And finally, dressings can provide compression which aids in venous return and reduces scarring.
CHAPTER IX

CONCLUSION

Physical therapists are often required to perform wound care. Since every wound is unique and every person heals differently, wound care cannot be completely standardized, and one cannot rely on a routine application of standard recipes.\(^{21}\) Therefore, clinicians must be familiar with the basics of wound care.

While the main emphasis of this independent study is debridement, other topics such as wound classification, healing, assessment, and dressing are also discussed. Optimal wound healing is dependent on identifying the cause of tissue destruction, removing the cause, removing the necrotic tissue, and providing an environment for healing.\(^{12}\)

Wounds are classified as either acute or chronic. Acute wounds are those lasting less than three months and include burns and trauma. Chronic wounds are of longer duration and include arterial insufficiency, venous insufficiency, and pressure ulcers. Common to all acute and chronic wounds is the need for frequent debridement.

Both acute and chronic wounds heal in the same sequence of events. For the purposes of this independent study, wound healing is broken down into
five stages: inflammation, fibroplasia, contraction, epithelialization, and maturation. The healing process begins immediately with injury and may continue for months to years. The debridement technique utilized is related to the stage of wound healing.

A thorough evaluation of the wound will assist the clinician in determining the stage of healing and the intervention indicated. The assessment includes the patient’s personal and family history, events leading to wound onset, and any factors which may complicate wound healing. Also included in the assessment is a physical examination. Wound location, description, and drainage are documented in detail. The presence and type of any necrotic tissue is noted.

Necrotic tissue interferes with the normal healing process; therefore, removal is an essential component of wound therapy. This can be accomplished by a variety of methods. Debridement can be classified as either selective or non-selective. The type of debridement utilized is determined by the presence of infection, the amount of necrotic debris, the presence of exudate, the condition of the surrounding skin, and the goal of therapy. Generally, as the amount of necrotic material decreases in a wound, the method of debridement changes from a non-selective form to a more selective form. All forms of debridement are discontinued when the wound is filled with healthy granulation tissue.
Debridement is a skill which requires manual dexterity that can only be achieved and improved with practice. Simulations provide the student or clinician with the opportunity to practice debridement skills in the context of reality without risk to the patient.

The final step in proper wound care is providing the optimal environment for wound repair. This is accomplished with wound dressings. Careful assessment and reassessment of the wound and a thoughtful choice of dressing materials based on those assessments is critical for effective wound care.

This independent study is designed to be a teaching aid. Included with the text are slides which are designed to assist the reader in visualizing various wounds and wound care techniques. The purpose of this teaching module is to help students and clinicians feel more comfortable with wound care and debridement.
APPENDIX A
<table>
<thead>
<tr>
<th>Slide</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Patient received second degree burns to thorax.</td>
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<td>2</td>
<td>An electrical burn exhibiting 1 degree, 2 degree, and 3 degree burns.</td>
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<td>3</td>
<td>Third degree burns to dorsum of foot.</td>
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<td>4</td>
<td>Traumatic abrasion wound to left lateral thigh as a result of contact with pavement in a MVA.</td>
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<td>5</td>
<td>Traumatic laceration wound to right thumb inflicted by kitchen paring knife.</td>
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<td>6</td>
<td>Arterial ulcer - note the well defined wound borders.</td>
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<tr>
<td>7</td>
<td>Arterial insufficiency leading to gangrene of the entire foot.</td>
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<tr>
<td>8</td>
<td>Arterial ulcer - note the well defined borders.</td>
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<tr>
<td>9</td>
<td>Venous stasis ulcer - note location (lower one third of leg, medial aspect), and varicose veins.</td>
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<tr>
<td>10</td>
<td>Venous stasis ulcer with bacterial contamination - note irregular shape and ill defined borders.</td>
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<tr>
<td>11</td>
<td>Venous stasis ulcer with contact dermatitis - note ill defined borders.</td>
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<tr>
<td>12</td>
<td>Pressure ulcer stage 2 - skin blister and superficial break in epidermis.</td>
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<tr>
<td>13</td>
<td>Pressure ulcer stage 3 - skin break with deep tissue involvement.</td>
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<tr>
<td>14</td>
<td>Pressure ulcer stage 4 - skin break with deep tissue involvement exposing muscle and bone.</td>
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<tr>
<td>15</td>
<td>&quot;Red Wound&quot; - clean wound that is healing. Wound should be protected and allowed to heal.</td>
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16  "Yellow Wound" - wound is covered with yellow eschar and possibly infected.

17  Wound depicts red and yellow areas. Read areas show healthy granulation tissue, yellow areas are covered with eschar.

18  "Black Wound" - dead necrotic tissue which must be removed for optimal wound healing.

19  Mechanical debridement - therapist is using a sterile 4 x 4 to rub off any dead necrotic tissue.

20  Wet-to-dry debridement - therapist is soaking a sterile 4 x 4 with saline solution in preparation for packing a wound.

21  Wet-to-dry debridement - wound is loosely packed with wet 4 x 4 and allowed to dry in wound bed.

22  Arteriosclerotic sclerosis obliterans status post 4th metatarsal head, 5th toe amputation prior to wet-to-dry debridement.

23  Same patient as slide #22 after wet-to-dry debridement. Dry dressing was soaked off in whirlpool.

24  Status post 4th and 5th toe amputation secondary to diabetic neuropathy prior to whirlpool. Note yellow and gray necrotic tissue.

25  Same patient as slide #24 after whirlpool treatment. Note the decrease in necrotic tissue.

26  Black wound requiring extensive debridement. Prior to partial sharp debridement.

27, 28, 29  Same patient as #26 - during partial sharp debridement. Therapist is removing necrotic tissue in a piecemeal fashion using forceps and scissors.

30  Same patient as #26 - after partial sharp debridement. Note the decrease in black necrotic tissue. Wound will require several more debridement sessions.

31  Abrasion wound to left lateral thigh covered with yellow and black eschar prior to partial sharp debridement.
32 Same patient as #31 - during partial sharp debridement. Note the definite interface between necrotic and viable tissue.

33 Same patient as #31 - after several sessions of partial sharp debridement. Note the reduction of yellow and black eschar and the increase in healthy granulation tissue.

34 Tools used for partial sharp debridement from left to right: curet, adson forceps, and small tissue scissors.

35 When performing partial sharp debridement, one must be careful to avoid tendons, bones, nerves, and vascular structures. Note the exposed bone and tendons.

36 Wound covered with thick, black eschar. An appropriate wound for enzymatic debridement.

37 Partially peeled naval orange with thick, white inner layer which simulates wound slough.

38 Physical therapy student attempting to remove the inner white layer without puncturing or rupturing the membrane of the orange.

39 Naval orange with thick, white inner layer removed leaving the delicate inner membrane intact.
APPENDIX B
# PHYSICAL THERAPY WOUND EVALUATION

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## IVE EXAM:

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<table>
<thead>
<tr>
<th>DEPENDENT</th>
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<tbody>
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</table>

## PAIN

<table>
<thead>
<tr>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>(0</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>10</td>
</tr>
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<table>
<thead>
<tr>
<th>(moderate)</th>
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<tbody>
<tr>
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<table>
<thead>
<tr>
<th>(severe)</th>
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<tbody>
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</tbody>
</table>

## STAGE

### STAGE KEY:

1. REDNESS WITH NO BREAKDOWN
2. LOSS OF EPIDERMIS & PARTIAL LOSS OF DERMIS NOT EXTENDING INTO SUBCUTANEOUS TISSUE
3. LOSS OF EPIDERMIS & DERMIS EXTENDING INTO SUBCUTANEOUS TISSUE
4. LOSS OF EPIDERMIS, DERMIS, SUBCUTANEOUS AND EXTENDING TO MUSCLE, BONE AT TENDON

## MUSCLE

## JOINT ROM (Limitations?):

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</table>

## STAGE:

### FILL (seconds):

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
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<tbody>
<tr>
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<table>
<thead>
<tr>
<th>FAIR : POOR</th>
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</table>

### GOOD :

<table>
<thead>
<tr>
<th>PAIN</th>
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</tbody>
</table>

### STAGE:

### PAIN:

### JOINT ROM (Limitations?):

### STAGE:

### FILL (seconds):

### GOOD : FAIR : POOR
Physical therapists are involved in treating wound care patients between visits to their primary care physician. Debridement is one area of wound care which physical therapists are frequently asked to perform. Debridement is a particularly difficult skill to learn in the classroom due to the inability to simulate authentic conditions.

The purpose of this study is to develop a debridement teaching aid to be used in physical therapy classroom and/or the professional setting. Subjects chosen for the study will be either inpatients or outpatients at United Hospital referred to physical therapy for wound care. The initial photograph of the patient's wound(s) will be taken at the beginning of the treatment, once dressings have been removed. The patient will then undergo his/her regular treatment as ordered and performed by United Hospital professional staff. Photographs will be taken during the treatment while debridement is being performed and again upon completion of debridement.

These photographs will be used in conjunction with a paper explaining the basics of wound care with an emphasis on debridement. With these photographs a more thorough explanation and a better understanding of the debridement procedure will be possible. The purpose of this teaching module is to help students and professional staff more comfortable with wound care and debridement upon completion of didactic instruction. Techniques to practice wound debridement in the context of reality without the patient will also be presented.
Target population will be all patients referred to physical therapy for wound care.
Sample will include all patients who agree to participate in study.
Patients who are unable to make such decisions will be excluded.
Patients under the age of 18 will be excluded.
Patient will undergo his/her regular treatment as ordered and performed by United Hospital professional staff.
Photographs will be taken by United Hospital personnel before, during, and after patient's scheduled treatment.
Slides and/or prints of patient's wounds will be incorporated into a teaching module to be used in the physical therapy classroom and professional setting.
The benefit of this project is to enhance education in the physical therapy classroom and professional setting. Wound care and debridement are difficult concepts to teach without the use of visual aids. The photographs obtained through this study will serve to better educate physical therapy students and professional staff leading to increased confidence in the clinic setting. This project will be of benefit to future wound care patients by producing more competent physical therapists.

Excess movement of personal in the vicinity of a sterile treatment increases the risk of infection. This risk will be minimized by following all sterile techniques deemed necessary by the patient's primary caregiver.

There is a risk of loss of confidentiality. Precautions that will be taken to reduce this risk include photographing the wound area only, collecting data which cannot be directly linked to the patient, and the professional code of ethics.
SENT FORM: A copy of the CONSENT FORM to be signed by the subject (if applicable) and/or any statement to be read to the subject should be attached to this form. If no CONSENT FORM is to be used, document the procedures to be used to assure that infringement upon the subject's rights will not occur. Describe where signed consent forms will be kept and for what period of time.

Signed consent forms will be kept in the University of North Dakota physical therapy department for seven years.

FULL IRB REVIEW forward a signed original and thirteen (13) copies of this completed form, and where applicable, thirteen (13) copies of the proposed consent form, questionnaires, etc. and any supporting documentation to:

Office of Research & Program Development
University of North Dakota
Box 8138, University Station
Grand Forks, North Dakota 58202

ampus, mail to: Office of Research & Program Development, Box 134, or drop it off at Room 101 Twamley Hall.

EXEMPT or EXPEDITED REVIEW forward a signed original and a copy of the consent form, questionnaires, etc. and any supporting documentation to one of the addresses above.

es and procedures on Use of Human Subjects of the University of North Dakota apply to all activities involving use of subjects performed by personnel conducting such activities under the auspices of the University. No activities are slated without prior review and approval as prescribed by the University's policies and procedures governing the use of subjects.

Investigator

DATE: __________________________

nee Malley

DATE: 5-6-94

ector or Student Advisor

DATE: __________________________

Center Grant Director

DATE: __________________________

(Revised 8/1992)
Consent Form

You are invited to participate in developing a teaching aid to be used in the physical therapy classroom and professional setting. The goal of this project is to enhance education in the area of wound care and debridement.

You will have photographs taken of your wounds during your scheduled treatment. Photographs will be taken before, during, and after debridement. We do not anticipate any discomfort or inconvenience to you.

To insure confidentiality, photographs will be taken of the wound area only thus preventing identification. In the case of facial wounds proper draping with sterile towels will be utilized. In addition, there will be no information obtained in this study which could connect you to the photographs. Please see attached copy of photograph journal outlining information which will be collected.

If you have any question or concerns regarding this study, please feel free to contact ______________________ at ____________.

I have read all of the above and hereby agree to participate in this study explained to me by _____________________________.

________________________________________________________________________

Patient's Signature                      Date
I, ____________________________, a patient in United Hospital, Grand Forks, North Dakota, consent to have photographs taken of me or parts of my body for medical or legal purposes as requested by ____________________________________________ and that the same may be released to ____________________________________________.

My signature also means that I have read this form and/or had it read to me and explained in a language that I can understand.

Date ________________ Time ________________

Signed ____________________________
(Patient, closest relative or legal guardian) relationship)

Witness ____________________________

Witness ____________________________
Photograph Journal

Photograph Journal

Patient DOB

DX related to wound

2° DX affecting wound healing

Dedications related to wound care

Does patient smoke?

Dressings removed (description)

Dressings applied (description)

Type of debridement

Any additional RX performed between before and after photographs

******************************************************************************

Photograph Journal

Photograph Journal

Patient DOB

DX related to wound

2° DX affecting wound healing

Dedications related to wound care

Does patient smoke?

Dressings removed (description)

Dressings applied (description)

Type of debridement

Any additional RX performed between before and after photographs

******************************************************************************
May 9, 1994

To whom it may concern:

Please accept this letter as proof of my permission and support of the research project entitled "Debridement Teaching Aid" to be performed by Katie Ward from 6/94 to 4/95.

This permission and support is given under the condition that all policies for research are followed as required by both United Hospital and the University of North Dakota.

This department will cooperate and assist with this project however possible. In return I would request a copy of the finalized project for the department's reference and review.

Sincerely:

Peggi Aymond, MPT
Supervisor
Dept. of Physical Therapy, United Hospital, Grand Forks, ND
UNIVERSITY OF NORTH DAKOTA'S
INSTITUTIONAL REVIEW BOARD

DATE: May 10, 1994

ME: Katie Ward  
DEPARTMENT/COLLEGE: Physical Therapy

OBJECT TITLE: Debridement Teaching Aid

The above referenced project was reviewed by a designated member for the University's Institutional Review Board on May 11, 1994 and the following action was taken:

Project approved.

EXPEDITED REVIEW NO. _____.

Next scheduled review is on ____________________________ .

Project approved.

EXEMPT CATEGORY NO. _____. No periodic review scheduled unless so stated in REMARKS SECTION.

Project approved PENDING receipt of corrections/additions in ORPD and approval by the IRB. This study may NOT be started UNTIL IRB approval has been received. (See REMARKS SECTION for further information.)

Project approval deferred. This study may not be started until IRB approval has been received. (See REMARKS SECTION for further information.)

Project denied. (See REMARKS SECTION for further information.)

MARKS: Any changes in protocol or adverse occurrences in the course of the research project must be reported immediately to the IRB Chairman or ORPD.

Need to attach approval from United Hospital Research Review Board (this is hinted at in letter from Aymond). That is, has the IRB at United approved this project?

On your consent form you leave out name & phone # of contact person.

Can you specify approximate # of photos taken so as to give patient some idea of time constraint & inconvenience.

Mabey, Adviser

Signature of Chairperson or designated IRB Member  5-11-94

UND's Institutional Review Board

The proposed project (clinical medical) is to be part of a research activity funded by Federal Agency, a special assurance statement or a completed 596 Form may be required. Contact ORPD to obtain the required documents. (7/93)
May 20, 1994

Institutional Review Board
fr. F. Richard Ferraro
University of North Dakota
Grand Forks, ND 58202

Dear Mr. Ferraro:

I am enclosing a copy of my revised consent form which includes approximate number of photographs and names and phone numbers of contact people. Also enclosed is a copy of United Hospital Research Review Board approval for my Debridement Teaching Aid project. If you need any additional information please feel free to contact me at 3532 11 ve. N #23, Grand Forks, ND 58203.

Sincerely,

atie Ward
Consent Form

You are invited to participate in developing a teaching aid to be used in the physical therapy classroom and professional setting. The goal of this project is to enhance education in the area of wound care and debridement.

You will have approximately 5-10 photographs taken of your wounds during your scheduled treatment. Photographs will be taken before, during, and after debridement. These photographs will not be posed, therefore, we do not anticipate any discomfort or inconvenience to you.

To insure confidentiality, photographs will be taken of the wound area only thus preventing identification. In the case of facial wounds proper draping with sterile towels will be utilized. In addition, there will be no information obtained in this study which could connect you to the photographs. Please see attached copy of photograph journal outlining information which will be collected.

If you have any question or concerns regarding this study, please feel free to contact Peggi Aymond at 780-5360 or Renee Mabey at 777-2831 or Katie Ward at 795-1067.

I have read all of the above and hereby agree to participate in this study explained to me by ____________________________.

_________________________  ______________________
Patient's Signature        Date
above referenced project was reviewed by the Medical Park Institutional Review Committee on and the following action was taken:

☐ Project approved. Next scheduled review is on .

☐ If no date is given, then review will be required in 12 months.

(See REMARKS SECTION for any special condition.)

☐ Project approved. EXPEDITED REVIEW NO. _________

☐ Next scheduled review is on _________.

☐ Project approved. EXEMPT CATEGORY NO. _______.

☐ No periodic review scheduled unless so stated in REMARKS SECTION.

☐ Project approval deferred. (See REMARKS SECTION for further information.)

☐ Project denied. (See REMARKS SECTION for further information.)

KS:

Any changes in protocol or adverse occurrences in the course of the research project must be reported immediately to the IRC chairperson or IRC office (730-6161).
PROJECT TITLE: Debridement Teaching Aid

The above referenced project was reviewed by a designated member for the University's Institutional Review Board on May 26, 1994, and the following action was taken:

- Project approved. EXPEDITED REVIEW NO. 3.
- Next scheduled review is on May 1995.
- Project approved. EXEMPT CATEGORY NO. _____.
- No periodic review scheduled unless so stated in REMARKS SECTION.

- Project approved pending receipt of corrections/additions in ORPD and approval by the IRB. This study may NOT be started until IRB approval has been received. (See REMARKS SECTION for further information.)
- Project approval deferred. This study may not be started until IRB approval has been received. (See REMARKS SECTION for further information.)
- Project denied. (See REMARKS SECTION for further information.)

ARKS: Any changes in protocol or adverse occurrences in the course of the research project must be reported immediately to the IRB Chairman or ORPD.

Mabey, Adviser in, Medical School

Signature of Chairperson or designated IRB Member Date

Mabey, Adviser in, Medical School

the proposed project (clinical medical) is to be part of a research activity funded by Federal Agency, a special assurance statement or a completed 596 Form may be required. Contact ORPD to obtain the required documents. (7/93)
REFERENCES


