

Principles of wound care

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WOUNDS

- **It refers to a breach in normal tissue continuum, resulting in a variety of cellular & molecular sequelae.**

Etiology

- **Accident**
- **Planned surgical intervention**
- **Pathological process/disease**
 - **Infective**
 - **Peripheral vascular**
 - **Neoplastic**

Types (Classification)

- **Acute vs. chronic wounds**
- **Tidy vs. untidy wounds**
 - **Tidy wounds are incised clean, with healthy tissues & seldom tissue loss.**
 - **Untidy wounds are crushed or avulsed, contaminated with devitalized tissues & often tissue loss.**

WOUND CLASSIFICATION SYSTEMS FOR ACUTE WOUNDS

Etiological	Morphological	Contamination	Complexity	Special tissues
<ul style="list-style-type: none"> • Surgical • Penetrating trauma <ul style="list-style-type: none"> ▪ Stab ▪ Projectile injury ▪ Bite • Blunt trauma <ul style="list-style-type: none"> ▪ Bruise/contusion ▪ Hematoma ▪ Avulsion/traction ▪ Crush injury • Burns <ul style="list-style-type: none"> ▪ Thermal ▪ Electrical ▪ Irradiation • Frost bite 	<ul style="list-style-type: none"> • Abrasion • Incision <ul style="list-style-type: none"> ▪ Superficial ▪ Deep • Laceration <ul style="list-style-type: none"> ▪ Incised ▪ Penetrating ▪ Bursting • Degloving injury • Ulceration <ul style="list-style-type: none"> ▪ Superficial ▪ Deep 	<ul style="list-style-type: none"> • Clean <ul style="list-style-type: none"> ▪ Implant ▪ Non-implant • Clean-contaminated • Contaminated • Dirty-infected 	<ul style="list-style-type: none"> • Simple • Complex <ul style="list-style-type: none"> ▪ Internal organs ▪ Open fracture ▪ Laparostomy ▪ Tissue loss ▪ War & gunshot wound • Complicated <ul style="list-style-type: none"> ▪ Wound infection ▪ Gas gangrene ▪ Flap necrosis 	<ul style="list-style-type: none"> • Fat • Muscles • Bone • Nerve • Artery • Vein

USA NATIONAL RESEARCH COUNCIL SYSTEM OF WOUND CLASSIFICATION

Wound classification	Criteria	Examples
Clean	<ul style="list-style-type: none"> • An incised wound thru uninflamed tissue created at elective surgery & closed primarily. • Oropharyngeal, tracheobronchial, gastrointestinal, biliopancreatic, genitourinary tracts are not entered • No breach in aseptic technique 	<ul style="list-style-type: none"> • Non-implant <ul style="list-style-type: none"> ▪ Mastectomy ▪ Herniorrhaphy • Implant <ul style="list-style-type: none"> ▪ Hip replacement ▪ Hernioplasty
Clean-contaminated	<ul style="list-style-type: none"> • Wound (that is otherwise clean) created at emergency surgery • Reoperation via clean incision within 7 days • Elective controlled entry into visceral tracts with minimum spillage of contents • Minor break in aseptic technique 	<ul style="list-style-type: none"> • Cholecystectomy • Elective lung resection
Contaminated	<ul style="list-style-type: none"> • Wounds left open; fresh accidental wounds; penetrating trauma < 4 hours old • Operations with gross spillage of gastrointestinal contents • Major breaks in sterile technique 	<ul style="list-style-type: none"> • Stab wound • Non-perforated appendicitis
Dirty	<ul style="list-style-type: none"> • Presence of pus • Preoperative perforation of oropharyngeal, tracheobronchial, gastrointestinal, biliopancreatic, genitourinary tracts • Penetrating trauma > 4 hours old 	<ul style="list-style-type: none"> • Laparotomy wound for sigmoid diverticular perforation

Evaluation of Wounds

- ABC's first → Always!
- Ensure hemostasis
 - Saline gauze dressing
 - Compression
- Remove obstructions
 - Rings, clothing, other jewelry
- History

History

- Symptoms
- Type of Force
- Event
- Contamination
- Potential for foreign body
- Function
- Non-accidental trauma
- Tetanus status
- Allergies
- Medications
- Comorbidities
- Previous scar formation

Wound Examination

- Site
- Size
- Shape
- Margins
- Depth
- Alignment with skin lines
- Neuro function
- Vascular function
- Tendon function
- Underlying structures
- Wound contamination
- Foreign bodies

Goals of Wound Care

- Facilitate hemostasis
- Decrease tissue loss
- Promote wound healing
- Minimize scar formation

Wound Preparation - Anesthesia

- **Topical**
 - Solution or gel
 - EMLA cream (eutectic mixture of lidocaine 2.5% and prilocaine 2.5%)
- **Local**
 - Direct infiltration
 - 1% lidocaine with or without epinephrine
 - Bupivacaine for longer acting anesthesia
- **Regional Block**
 - Local infiltration proximally in order to avoid tissue disruption
 - Smaller amount of anesthesia required

Wound Preparation - Anesthesia

<u>Drug</u>	<u>Max Dose</u>	<u>Onset</u>	<u>Duration</u>
Lidocaine	5 mg/kg	5-30 min	2 hours
(with Epi)	7 mg/kg	5-30 min	2-3 hours
Bupivacaine	2 mg/kg	7-30 min	> 6 hours

Minimize the Pain of Injection

- Use sodium bicarbonate mixed with the anesthetic (1 ml/10 ml solution)
- Use smallest needle possible
- Inject slowly
- Insert needle through open wound edge and skin that has already been anesthetized

Wound Preparation - Hemostasis

- Direct pressure
- Epinephrine
- Cautery
- Use a tourniquet

Wound Preparation – Foreign Body Removal

- Visual inspection
- Imaging
 - Glass, metal, gravel fragments **>1mm** should be visible on plain radiographs
 - Organic substances and plastics are usually radiolucent
- Always discuss and document possibility of retained foreign body

Wound Preparation – Irrigation

- Local anesthesia prior to irrigation
- Do not soak the wound
- Use normal saline
- Large syringe (60mL) with Zerowet attachment
- Do not use iodine, chlorhexidine, peroxide or detergents



Wound Preparation – Debridement

- Removes foreign matter & devitalized tissue
- Creates sharp wound edge
- Excision with elliptical shape
- Respect skin lines

Wound Preparation – Debridement

Methods

- **Surgical debridement**
 - Necrotic tissue is removed by scalpel or scissors
 - Quick ; only necrotic tissue is removed
 - Wound may bleed for several hours after debridement
- **Mechanical debridement**
 - Wet to dry dressings are used to pull dead tissue from wound base
 - Slow and non selective; healthy tissue is sometimes removed with necrotic tissue
 - May be painful and can cause maceration of surrounding skin
- **Chemical debridement**
 - Application of an enzymatic debriding agent to necrotic areas
 - Selective but slow
 - Can irritate surrounding skin and/or cause pain or allergic reactions
- **Autolytic debridement**
 - Natural debridement process that occurs in a moist wound environment and uses the body's enzymes
 - Slow and selective
 - Not indicated when risk of infection is high

Wound Preparation – Antibiotics

- Infections occur in ~3-5% of traumatic wounds seen in the ED
- Factors that increase risk
 - Heavily contaminated wound, especially with soil
 - Immunocompromised patients
 - Diabetics
 - Human bites > animal bites
- Most important prevention → adequate irrigation & debridement

Wound Preparation – Tetanus Prophylaxis

- **Clean wounds**
 - Incomplete immunization → toxoid
 - >10 years, then give toxoid
- **Tetanus prone wound**
 - Incomplete immunization
Toxoid & immune globulin
 - > 5 years, give toxoid
- **Remember to think about rabies!**

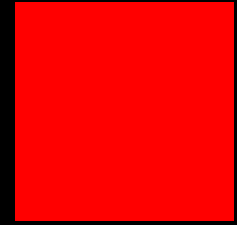
Wound Closure

- **Primary closure**
 - Suture, staple, adhesive, or tape
 - Performed on recently sustained lacerations: <12 hours generally and <24 hours on face
- **Secondary closure**
 - Secondary intent
 - Allowed to granulate
- **Tertiary closure**
 - Delayed primary (observed for 4-5 days)

Wound Care

- **Dressing**
 - Maintain dry for 24-48 hours
 - Use topical antibiotic to maintain moist environment
 - If overlying a joint, splint in a position of function
 - Sun protection to prevent scar hyperpigmentation
 - Suture removal instructions!

Wound Care -selecting a dressing



- **Ability to absorb exudates**
 - Absorption varies greatly among wound products and is important for wounds with moderate to high amounts of exudate.
 - For example, transparent films do not absorb any exudates, whereas foams are most absorbent.
- **Ability to add moisture**
 - Adding or retaining moisture in the wound is critical to the healing process; different wounds have different needs.
 - A wound that requires only minimal hydration might benefit from a foam or collagen dressing, but a wound that requires significant hydration should be treated with an amorphous gel.
- **Adhesiveness and conformability**
 - Wounds are often in locations that are difficult to dress and have the dressing stay in place.
 - Conformable dressings are flexible and can be shaped to the wound or anatomical surface eg heel cups.
 - Some dressings adhere to the wound bed and perimeter, and others have no adhesiveness and require a secondary dressing.

Video demonstrations

Wound debridement – animal tissue



**WOUND
DEBRIDEMENT**

Dressing change - simulator

Dressing change - patient

Practice Time!

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'He's had so many operations I'm
putting in a zip.'