

Children's Hospital and Health System, Inc.
Patient Care Evidence Based Guideline
CW Urgent Care

SUBJECT: Wound Management

Purpose: Evaluate and discuss management of wounds in order to promote consistency of care within CW Urgent Care.

General Considerations:

- Goals of repair:
 - Stop bleeding
 - Improve scar/cosmetics
 - Restore function to the affected tissue
 - Reduce risk of infection
- Repair is indicated for most laceration into the dermis which cause:
 - Bleeding
 - Gaping
 - Infection risk
 - Cosmetic concern
- Consider risks/benefits of closure versus not closing
- Patient/family anxiety and expectations around sedation
 - LET and lidocaine offer effective anesthesia
 - Distraction techniques
 - Share the risks and benefits of midazolam as an anxiolytic and allow family to be involved in the decision-making process

Lacerations not requiring repair:

- Superficial wounds/abrasions
- Most puncture wounds
- Most animal/human bites except when cosmetically important to close
- Many intraoral lacerations (exceptions noted in the appendix)
- If wound is contaminated or infected, best not to repair with primary closure

Guideline

Subjective Data/History

- Mechanism of injury
- Time of injury for optimal repair:

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- Extremities: < 12 hours old
- Face and scalp: < 24 hours old
- Other locations: < 18 hours

Objective Data/Physical Exam (Wound Assessment)

- Check for injury to the underlying anatomy
- Assess neurovascular status
 - Two point discrimination
 - Strength
 - Numbness
 - Color
 - Warmth
 - Capillary refill
 - If on face, check for function of facial nerves
- Assess function, including range of motion
- Consider possibility of underlying fracture
- Check for other injuries
- Explore wound for foreign bodies or debris
- Consider possible wound contaminants associated with:
 - Soil/dirt
 - Fresh water, including ponds, lakes, rivers, standing water, untreated wading pools
 - Ocean, seawater, or brackish water
 - Sewage

Treatment and Indications for Referral to ER

General Criteria for ER Referral (also see location-specific criteria below):

- Deep wounds of the hand or foot
- Any wound of the forearm, wrist, hand, or finger that may require deep sutures
- Full-thickness lacerations of the eyelid, lip, nose, or ear
- Closure of large defects that might be more practical to close in the operating room or that might require grafting
- Wounds with too much tension to be closed easily (may consider 1-2 dermal sutures first if appropriate)
- Animal bites:
 - Large or irregular bite wounds that may need closure or those that may need rabies prophylaxis
 - Any animal bite of the forearm, hand, finger, or foot that requires closure
- Lacerations completely through fat layer (underlying tissues visible)
- Lacerations involving nerves, arteries, bones, joints, or tendons
- Actively bleeding lacerations despite proper application of pressure
- Consider for patients with significant bleeding disorder
- Penetrating wounds of unknown depth
- Severe crush injuries
- Severely contaminated wounds requiring drainage or washout
- Wounds leading to a strong concern about cosmetic outcome (especially irregular or large facial lacerations)
- Lacerations which require more than infiltration of lidocaine for anesthesia
- Significant patient apprehension or uncooperative patient despite use of tools or medications available in Urgent Care

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Location-Specific Criteria for ER Referral (also see general criteria above)

| Location | ER Referral Criteria | Urgent Care Considerations |
|--|--|--|
| Scalp | <ul style="list-style-type: none"> • Having difficulty obtaining hemostasis • Galea repair is necessary | <ul style="list-style-type: none"> • Most can be closed with staples or sutures • Skin adhesive may be used in select cases: <ul style="list-style-type: none"> ○ Small, superficial wounds ○ Trim hair around wound ○ Excess adhesive should not run through hair ○ Keep area dry for ≥ 5 days • Place deep sutures if wound is very deep or gaping |
| Face (forehead, chin, cheek, eyebrow) | <ul style="list-style-type: none"> • See general criteria in chart above | <ul style="list-style-type: none"> • N/A |
| Lip | <ul style="list-style-type: none"> • Large or full thickness lacerations • Significant intraoral lacerations • Irregular • Are associated with loss of or devitalized tissue • Involve deep structures such as muscle or nerve • Consider referral for lacerations that cross the vermilion border if unable to approximate the border well due to an uncooperative patient or skill level | <ul style="list-style-type: none"> • Consider UC repair for wound that meets ALL of the following criteria: <ul style="list-style-type: none"> ○ Small, linear, under low tension ○ Is easy to align both sides of the vermilion border ○ Patient is cooperative |
| Eyelid | <ul style="list-style-type: none"> • Concerns for ocular injury or unable to assess • Full-thickness lid lacerations • Lacerations with orbital fat prolapse • Suspected injury to the tear drainage system • Lacerations through the lid margin • Lacerations with poor alignment or avulsion | <ul style="list-style-type: none"> • Consider Steri-strips or allow to heal without closure for superficial, simple lacerations that are: <ul style="list-style-type: none"> ○ Horizontal ○ Follow skin lines ○ Involve $< 25\%$ of the lid |
| Intraoral | <ul style="list-style-type: none"> • Lesions are greater than 2 cm • Gaping widely • The wound interferes with mastication • Significant bleeding continues | <ul style="list-style-type: none"> • Most buccal mucosa and gingival lacerations are not widely separated, heal rapidly without repair and do not warrant primary closure • Consider Biotene application twice daily |
| Tongue | <ul style="list-style-type: none"> • Large lacerations (> 1 cm in length) that extend into the muscular layers or pass completely through the tongue • Deep lacerations on the lateral border of the tongue • Large flaps or gaps in the tongue • Lacerations with significant hemorrhage • Lacerations that may cause dysfunction if improper healing occurs, (i.e. anterior split tongue) | <ul style="list-style-type: none"> • Most lacerations of the tongue do not require repair |
| Hand | <ul style="list-style-type: none"> • Deep, large or irregular lacerations or punctures • Lacerations that may affect function • Wounds that are significantly contaminated • Wounds that have any alteration in neurovascular status • Require digital block for anesthesia | <ul style="list-style-type: none"> • Uncomplicated hand lacerations (< 2 cm) may heal well with cleansing, irrigation and dressing with close follow up • Primary closure best within 8 hours • For most bites (including fist to mouth injury), usually avoid primary closure. Treat with irrigation, cleansing, dressing, and prophylactic antibiotics with close follow up, unless complicated |
| Genital area | <ul style="list-style-type: none"> • Most genital lacerations requiring repair • Significant genital lacerations • Deep or penetrating injuries or for management of lacerations of the ventral surface of the penis and lacerations that extend to the corporal bodies or the urethra • Evaluation for sexual abuse may be warranted | <ul style="list-style-type: none"> • For vulvar lacerations, hemostatic superficial lacerations should be left open and do not need to be referred • Most vulvar and vaginal hematomas do not require surgical intervention; ice packs and pain control usually suffice • Small superficial penile shaft and scrotal lacerations can be repaired with fine absorbable sutures |

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| Location | ER Referral Criteria | Urgent Care Considerations |
|-------------------|--|--|
| Fingers and nails | <ul style="list-style-type: none"> • Significant nail-bed laceration/injury • For larger avulsions, will likely need hand surgeon for possible grafting • For nail bed injuries with an associated fracture, treat as an open fracture and consult CW ED; usually need specialist involvement and prophylactic antibiotics • If an acute injury produces a subungual hematoma > 50% of the nail, the nail bed often needs repair • If a subungual hematoma presents with injury to the margin of the nail, nail removal is often required • For nail removal if the nail is significantly elevated or displaced | <ul style="list-style-type: none"> • Radiographs are indicated before repair of nail bed lacerations or fingertip amputations or if other clinical concern for fracture • For minor avulsions of fingertips (< 1 cm and no bone or tendon exposed) without skin available for closure, may cleanse, dress with gauze, and arrange for close follow-up <ul style="list-style-type: none"> ○ These wounds may bleed significantly as fingertips are highly vascularized, especially in young children. Patient, family member, or staff to hold firm pressure consistently (avoid checking or releasing pressure) for ≥ 5 minutes to achieve hemostasis ○ See clinical pearl below regarding achieving hemostasis for fingertip injuries and minor avulsions * |

- * Clinical Pearl: Achieving hemostasis for fingertip injuries and minor avulsions
 - If holding pressure for 5 minutes is insufficient to achieve hemostasis, or to provide topical anesthesia if the avulsion is so painful that the child does not tolerate firm pressure for 5 minutes and there is nothing to suture, may soak affected digits in lidocaine with epinephrine.
 - Following soaking in lidocaine with epinephrine, if still oozing then can try to hold firm pressure for 5 minutes.
 - This tactic would be second line if pressure alone didn't work or wasn't tolerated.
 - Technique: Place appropriate amount of lidocaine 1% with epinephrine in medicine cup or sterile specimen container.
 - Do not use sodium bicarbonate.
 - Soak affected digit for 5 minutes.
 - Lidocaine 1% with epinephrine: 10 mg lidocaine and 5 mcg epi per 1 mL.
 - Cumulative max dose for all lidocaine: 5 mg/kg up to 300 mg (30 mL).

| Weight | Cumulative Max Dose by Weight |
|----------|--|
| 5-10 kg | 25 mg (2.5 mL) |
| 10-20 kg | 50 mg (5 mL) |
| 20-30 kg | 100 mg (10 mL) |
| ≥ 30 kg | 150 mg-300 mg depending on size (15-30 mL) but likely will not need more than 10mL to soak digit |

- Wound Cleansing and Irrigating
 - Clinical staff will apply LET gel after provider assessment and prior to wound cleansing and irrigation
 - Wounds requiring closure should be cleansed with wound cleanser prior to irrigating with normal saline
 - See Wound Cleaning Resource on Learning Home for further details

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Closure Techniques

| Type | Indications | Benefits | Contraindications |
|--|---|---|---|
| Steri-strips, usually with mastisol | <ul style="list-style-type: none"> • Lacerations with delayed presentation or other contraindications to sutures • Superficial flap wounds • Superficial eyelid lacerations • Other superficial or small wounds | | <ul style="list-style-type: none"> • Do not use for lacerations that are deep, under tension (across a joint), or if child is unlikely to leave steri-strips in place without removal |
| Tissue adhesives | <ul style="list-style-type: none"> • Small, superficial lacerations with minimal tension • Deeper lacerations after placement of subcutaneous sutures • Flap lacerations or skin damage over very thin skin | <ul style="list-style-type: none"> • Fast repair time and quick bonding • Minimal discomfort and reduced anxiety of patient • Equivalent strength to healed tissue at 7 days post repair • Antimicrobial properties • Water resistant covering • No suture removal required | <ul style="list-style-type: none"> • Jagged or stellate (star-like) lacerations • Bites, puncture, or crush wounds • Contaminated wounds • Mucosal surfaces • Axillae and perineum (high moisture areas) • Hands, feet, and joints (unless kept dry and immobilized) • Uncertainty about the ability to approximate the wound or under high tension • Use caution in eyebrows and vermillion border due to need for careful alignment |
| Staples | <ul style="list-style-type: none"> • Most scalp lacerations | <ul style="list-style-type: none"> • Rapid, simple closure with less expense • No risk of cross hatching • Non-circumferential so less risk of tissue damage or necrosis • Similar cosmetics without increased complications • Easy to remove | <ul style="list-style-type: none"> • Generally avoid staples for non-scalp locations |
| Non-absorbable sutures (Prolene or monofilament nylon/Ethilon) | <ul style="list-style-type: none"> • Primary closure of most lacerations | | <ul style="list-style-type: none"> • Do not use for deep suturing |

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| | | | |
|---|--|---|--|
| Absorbable sutures (Chromic or Vicryl) | <ul style="list-style-type: none"> • Primary closure: <ul style="list-style-type: none"> • Scalp, rarely on face • Intra-oral/mucosal repairs • Primary closure in patients who may not tolerate suture removal, especially for wounds on the fingers or hands in young children • Buried/deep closure: <ul style="list-style-type: none"> • Close dead space to prevent hematoma formation and reduce infection risk • Decreases tension on surface of skin and increases wound strength | <ul style="list-style-type: none"> • Acceptable alternative to non-absorbable sutures with little to no difference in cosmesis, dehiscence, keloid formation, or infection • No need to return for removal, consider if family unable to return for removal | |
|---|--|---|--|

| Body Region | Monofilament (non-absorbable) | Absorbable |
|---------------|-------------------------------|------------|
| Scalp | 5-0 or 4-0 | 4-0 |
| Face | 6-0 | 5-0 |
| Eyelid | 7-0 or 6-0 | - |
| Eyebrow | 6-0 or 5-0 | 5-0 |
| Trunk | 5-0 or 4-0 | 3-0 |
| Extremities | 5-0 or 4-0 | 4-0 |
| Joint surface | 4-0 | - |
| Hand | 5-0 | 5-0 |
| Foot sole | 4-0 or 3-0 | 4-0 |

- Anesthesia
 - LET (lidocaine, epinephrine, tetracaine), topical
 - Injectable lidocaine (consider lidocaine with epinephrine; may add sodium bicarbonate as buffer)
 - IN midazolam as an anxiolytic
- Antibiotic use for wound care
 - 3 day course sufficient for prophylaxis
 - Most common organisms that cause wound infections: Staph aureus, streptococcus species, sometimes MRSA

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| Indications for Antibiotic Prophylaxis | Species | Prophylaxis (3 days) |
|--|--|---|
| Wounds contaminated by soil (not water) | Gram negative organisms Clostridium species | Augmentin 25 mg/kg/dose (amoxicillin component) BID (max 875 mg/dose) Suspension: Augmentin 400 mg/5 ml Capsules: Augmentin 875 mg PCN allergic: Levofloxacin 10 mg/kg/day once Daily (max 750), increase to 20 mg/kg/day divided BID if < 5 years old AND Metronidazole 10 mg/kg/dose TID (max 500 mg/dose) Consider tetanus vaccine, see algorithm below Indications for Rabies Prophylaxis (immune globulin): WI DHS Rabies Algorithm |
| Animal bites if <ul style="list-style-type: none"> • Closed/repaired • Most bites on face, hands, or genitals • Any cat or human bite even if not closed | | Augmentin 25 mg/kg/dose (amoxicillin component) BID (max 875 mg/dose) Suspension: Augmentin 400 mg/5 ml Capsules: Augmentin 875 mg PCN allergic: Clindamycin 10 mg/kg/dose TID (max 450 mg/dose) AND TMP/SMX 4-6 mg/kg/dose (trimethoprim component) BID (max 160mg/dose) Consider tetanus vaccine, see algorithm below Indications for Rabies Prophylaxis (immune globulin): WI DHS Rabies Algorithm |
| Significant wounds occurring in lakes, ponds, rivers, standing water (excludes well maintained swimming pools): <ul style="list-style-type: none"> • Lacerations • Punctures • Embedded fish hooks • Bites from aquatic animals • Requiring closure • Crush injuries • Hands, feet, face, genitals, joint • Immunocompromised • Area of vascular or lymphatic compromise If also contaminated by soil or sewage, see wounds exposed to water containing soil or sewage below. | | Levofloxacin 10 mg/kg/day once Daily (max 750), increase to 20 mg/kg/day divided BID if < 5 years old Consider tetanus vaccine, see algorithm below |
| Wounds exposed to ocean water/brackish water/salt water | Vibrio vulnificus | Levofloxacin 10 mg/kg/day once Daily (max 750), increase to 20 mg/kg/day divided BID if < 5 years old Consider tetanus vaccine, see algorithm below |

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| Indications for Antibiotic Prophylaxis | Species | Prophylaxis (3 days) |
|---|-----------|--|
| Wounds exposed to water containing soil or sewage | Anaerobes | Levofloxacin 10 mg/kg/day once Daily (max 750), increase to 20 mg/kg/day divided BID if < 5 years old AND Metronidazole 10 mg/kg/dose TID (max 500 mg/dose) Consider tetanus vaccine, see algorithm below |

Arrange for close follow-up of any water-exposed wound. Signs of infection should prompt further evaluation.

- Wound care
 - Topical antibiotics not usually required, but if needed:
 - Some topical antibiotic ointments contain neomycin, such as Neosporin, which can cause an allergic reaction in some patients
 - Other ointments such as Polysporin or Bacitracin should be used instead
 - Vaseline or Aquaphor good options
 - No increase in infection
 - Reduced risk of contact allergic reaction
 - Speeds healing compared to no ointment use

Indications for Rabies Prophylaxis:

<https://www.dhs.wisconsin.gov/rabies/algorithm/index.htm>

Or

Click [WI DHS Rabies Algorithm](https://www.dhs.wisconsin.gov/rabies/algorithm/index.htm) (same website address above)

Indications for Tetanus Vaccine: (next page)

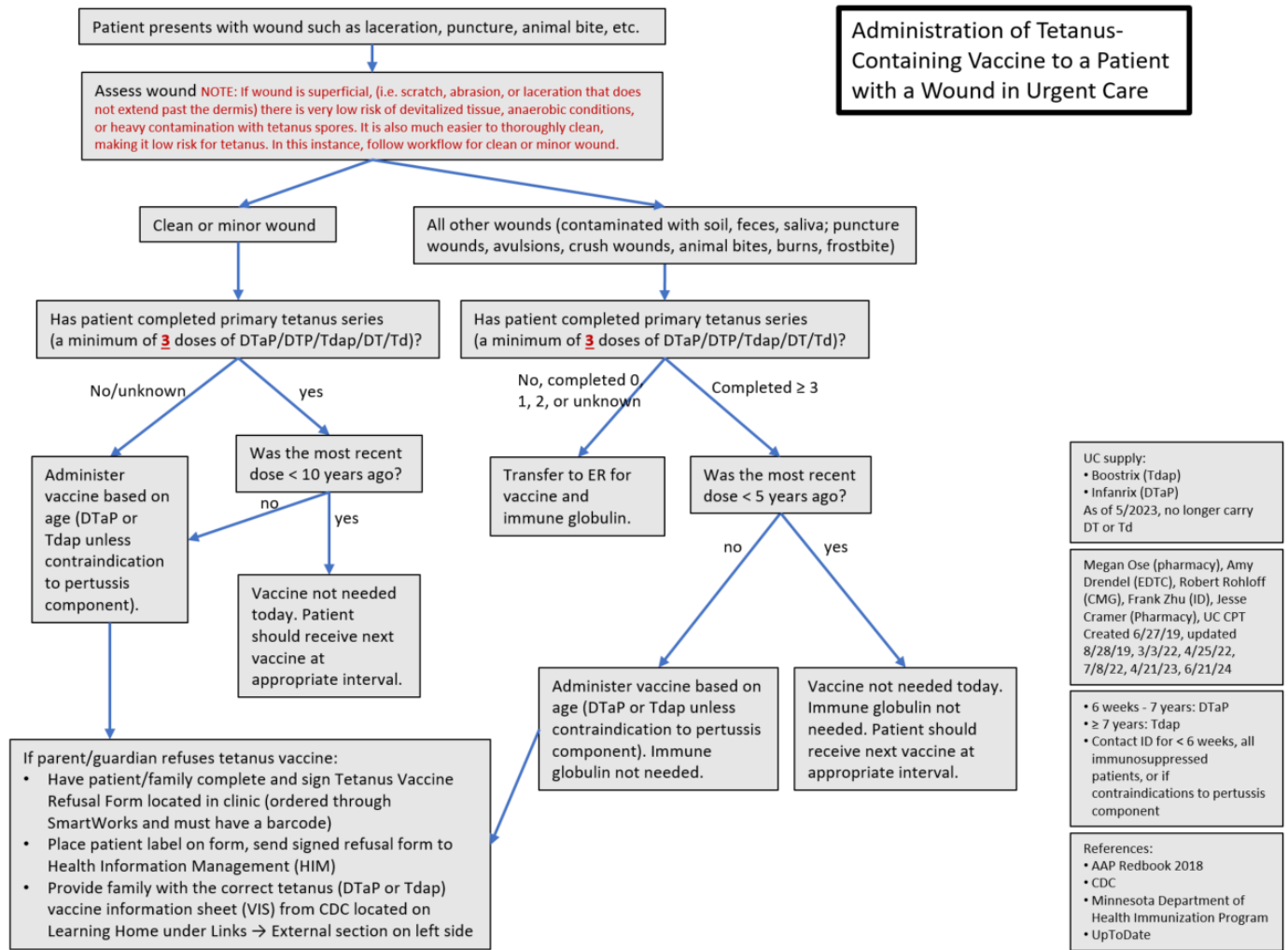
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Education of Patient/Family

- Include discharge instructions applicable to type of wound repair performed.
- Keep the wound clean and dry, preventing scab build-up
- Monitor for signs of infection
- Return as instructed for suture removal
- Use waterproof sunscreen daily for 1 year
- Scar massage
- Scar will be darkest during the first few months after the injury and gradually fade over time

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Follow-up

Patient may return to CW UC or PMD for suture or staple removal in this timeframe:

| Location | Duration (days) |
|-------------------------|---|
| Extremity | 7-10 days |
| Face | 3-5 days (closer to 5) |
| Hands and soles of feet | 7-14 days (depending on location/tension) |
| Joint surface | 10-14 days |
| Scalp | 7-10 days |
| Trunk | 5-7 days (closer to 7) |

Note: Document wound with photographic evidence

- Pre-wound closure
- Post-wound closure
- Post-suture/staple removal if applicable

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