

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

SUBJECT: Wound Repair

Purpose: To evaluate and initiate treatment of wounds needing repair including establishing criteria for when the patient should be referred to the ER 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:

Supersedes 6/2015, 6/2018, 4/2022

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Next review due 8/2025

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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. These 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 preparation
 - If possible, apply LET gel prior to wound cleansing
 - Clean and irrigate wound
 - Wound cleanser for dirty wounds
 - Sterile saline or water (50-100 ml/cm of area involved) for clean wounds.
 - Wounds with water exposure (lake, river, pond, ocean) should be irrigated copiously with wound cleanser. Less concern if a well-maintained swimming pool.
 - Crushed or devitalized tissues should be debrided and foreign bodies should be

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removed if present.

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
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. 	

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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

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

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Indications for Antibiotic Prophylaxis	Species	Prophylaxis (3 days)
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 rabies prophylaxis if indicated Consider tetanus vaccine
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 section on 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
Wounds exposed to ocean water/brackish water/salt water	<i>Vibrio vulnificus</i>	Levofloxacin 10 mg/kg/day once Daily (max 750), increase to 20 mg/kg/day divided BID if < 5 years old Consider tetanus vaccine
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

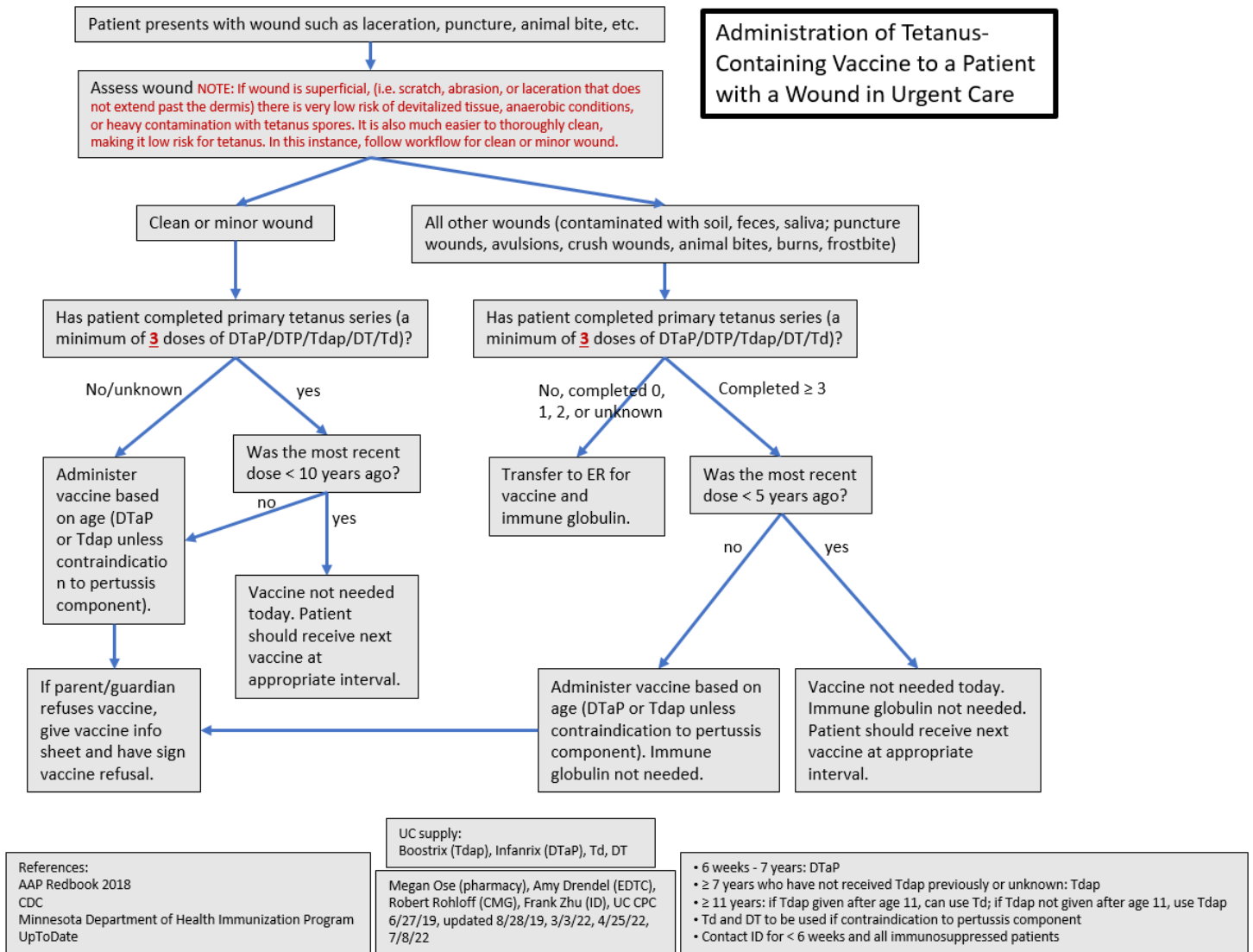
Arrange for close follow-up of any water-exposed wound. Signs of infection should prompt further evaluation.

- 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

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- Reduced risk of contact allergic reaction
- Speeds healing compared to no ointment use

- Verify Immunization status (refer to tetanus vaccine workflow below and on LH)



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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

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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This guideline is designed to serve as a reference for clinical practice and does not represent an exclusive course of treatment nor does it serve as a standard of medical care. Providers should apply their professional judgment to the management of individual patient conditions and circumstances. Children's Hospital and Health System (CHHS) does not make any representation with respect to any sort of industry recognized standard of care for the particular subject matter of this clinical guideline. Additionally, CHHS form documents are subject to change, revision, alteration, and/or revocation without notice.

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