

## Animal Bite Skin Soft Tissue Infection (SSTI)

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# What is a Clinical Pathway?

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An evidence-based guideline that decreases unnecessary variation and helps promote safe, effective, and consistent patient care.

# Objectives

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- Standardize treatment of animal bites in children
- Outline the management of an animal bite depending on patients' wound characteristics
- Recommend if vaccination and/or immune globulin prophylaxis are indicated
- Recommend if antibiotics are needed and which are optimal, tailored based on patient's wound type

# Why is the Pathway Necessary?

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- Animal bites are a common reason for presentation to the Emergency Department and pediatric and surgical offices
- Dog bites account for approximately 90 percent of animal bites and occur most often in children.
  - Cat bites account for about 10 percent of all animal bites.
- In children, dog bites usually involve the head and neck
  - in adolescents and adults, dog bites usually involve the extremities.
- Dog bites may be associated with a range of injuries, from minor to major wounds.
  - Cat bites usually occur on the extremities and tend to penetrate deeply, with higher risk of deep infection than dog bites
  - The likelihood of wound infection is more likely in cat bites (~50%) vs dog bites (~5-15%).
  - Treatment should be tailored based on physical examination, likelihood of infection and based on guidelines.

# Why is Pathway Necessary?

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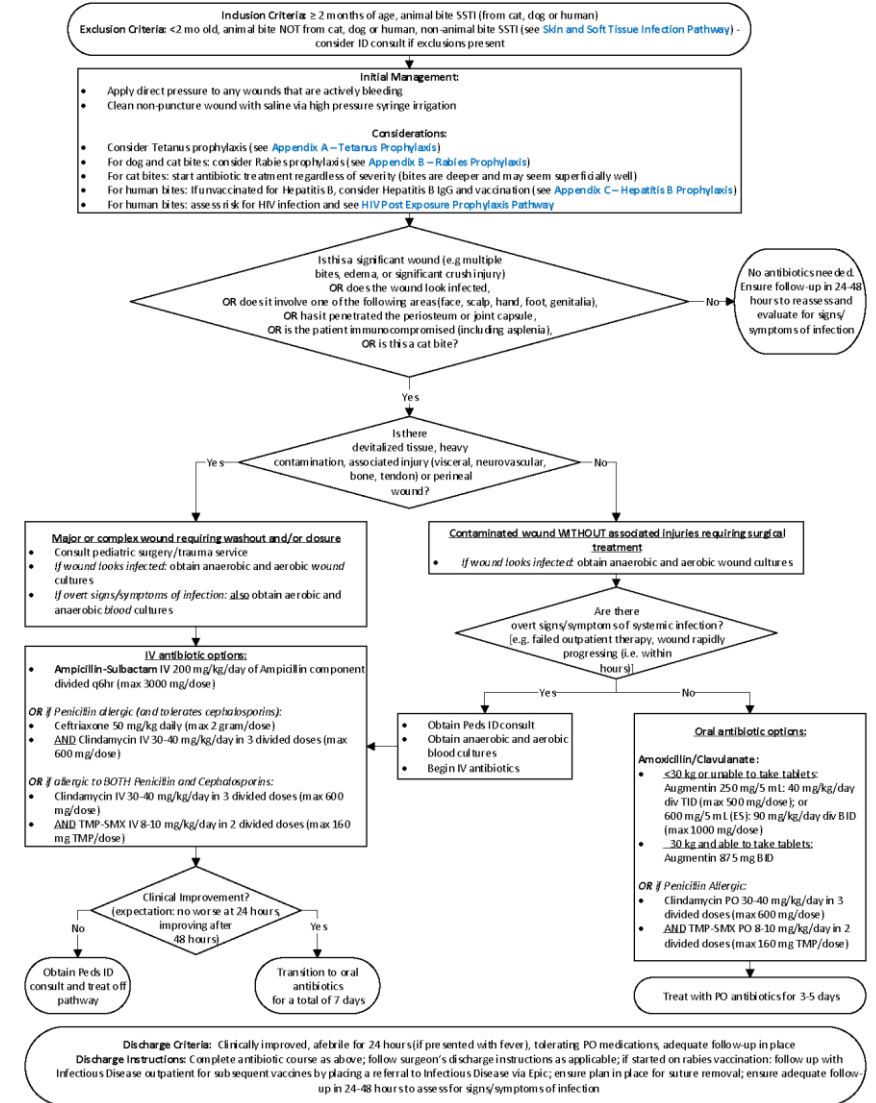
- The Infectious Diseases Society of America updated their Practice Guidelines for the Diagnosis and Management of Skin and Soft Tissue Infections in 2014, and these guidelines include recommendations for animal and human bite wounds prevention and treatment
- The Connecticut Children's Animal Bite clinical pathway was developed to ensure an optimal consistent approach to the surgical and medical management of children who present with animal bites

# CLINICAL PATHWAY: Animal Bite Skin and Soft Tissue Infection

THIS PATHWAY  
SERVES AS A GUIDE  
AND DOES NOT  
REPLACE CLINICAL  
JUDGMENT.

This is the Animal Bite Skin Soft Tissue Infection Clinical Pathway.

We will be reviewing each component in the following slides.



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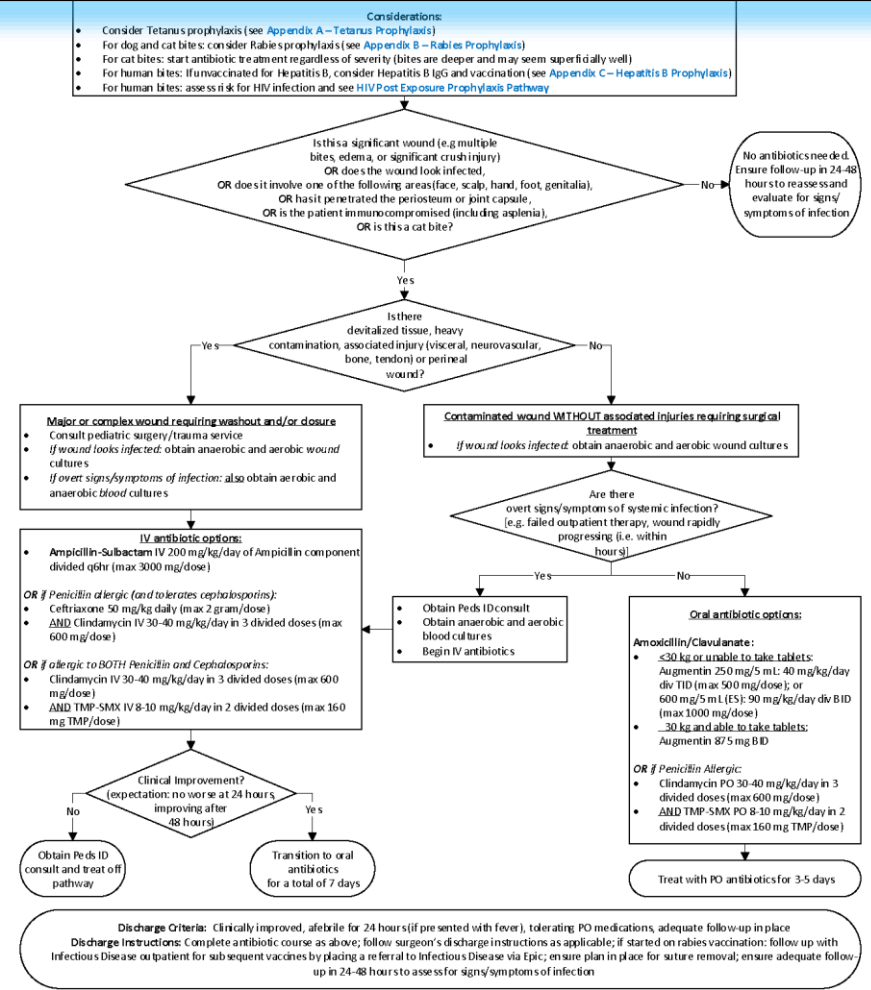
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**Inclusion Criteria:** ≥ 2 months of age, animal bite SSTI (from cat, dog or human)  
**Exclusion Criteria:** <2 mo old, animal bite NOT from cat, dog or human, non-animal bite SSTI (see [Skin and Soft Tissue Infection Pathway](#)) - consider ID consult if exclusions present

- Inclusion criteria are those who are >2 months of age, and have an animal bite SSTI from a cat, dog or human.
- If there are other animal bites NOT from a cat, dog or human, or the child is younger than 2 months of age, consider an ID consult as organisms that cause infection may change.
- Otherwise, all other non-animal bite SSTIs should refer to the SSTI clinical pathway.



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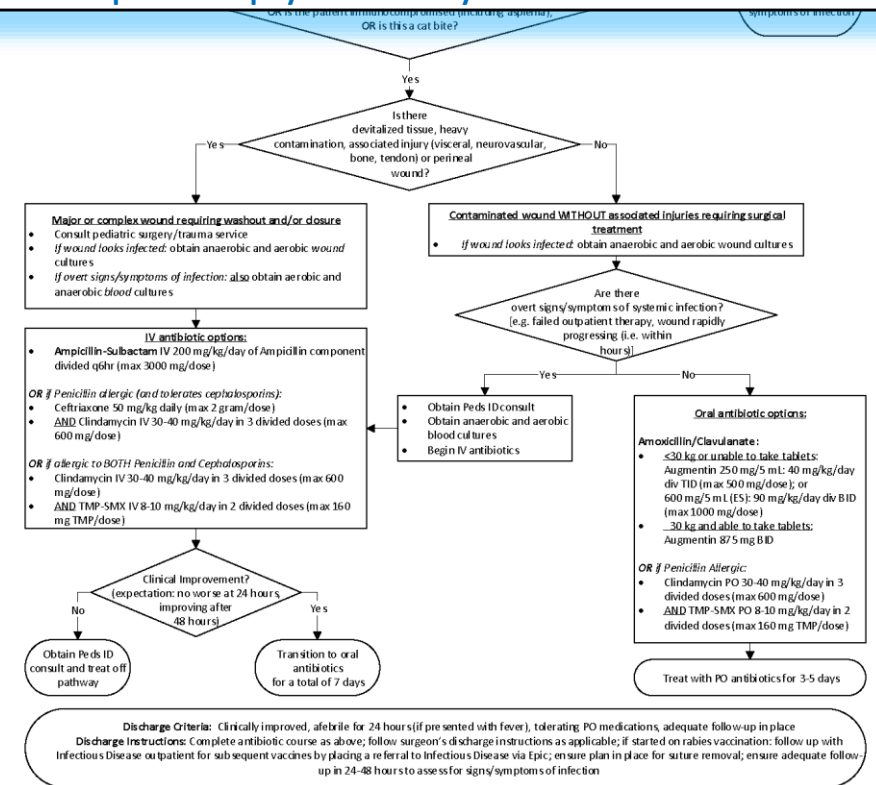
**Initial Management:**

- Apply direct pressure to any wounds that are actively bleeding
- Clean non-puncture wound with saline via high pressure syringe irrigation

**Considerations:**

- Consider Tetanus prophylaxis (see [Appendix A – Tetanus Prophylaxis](#))
- For dog and cat bites: consider Rabies prophylaxis (see [Appendix B – Rabies Prophylaxis](#))
- For cat bites: start antibiotic treatment regardless of severity (bites are deeper and may seem superficially well)
- For human bites: If unvaccinated for Hepatitis B, consider Hepatitis B IgG and vaccination (see [Appendix C – Hepatitis B Prophylaxis](#))
- For human bites: assess risk for HIV infection and see [HIV Post Exposure Prophylaxis Pathway](#)

- Initial management includes stabilization and cleaning
- Cat bites tend to be deeper and may seem superficially well – they require antibiotic treatment regardless



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**Initial Management:**

- Apply direct pressure to any wounds that are actively bleeding
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**Guide to Tetanus Prophylaxis in Routine Wound Management**

History of Absorbed Tetanus Toxoid (Doses)	Animal Bite Wounds (all of which are contaminated with saliva)	
	DTaP, Tdap or Td <sup>1</sup>	TIG <sup>2</sup>
Fewer than 3 or unknown	Yes	Yes
3 or more	No <sup>3</sup> if <5 years since last tetanus-containing vaccine dose	No
	Yes if ≥5 years since last tetanus-containing vaccine dose	No

Tdap indicates booster tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine; DTaP, diphtheria and tetanus toxoids and acellular pertussis vaccine; Td, adult-type diphtheria and tetanus toxoids vaccine; TIG, Tetanus Immune Globulin (human).

<sup>1</sup> DTaP is used for children younger than 7 years. Tdap is preferred over Td for underimmunized children 7 years and older who have not received Tdap previously.

<sup>2</sup> Immune Globulin Intravenous should be used when TIG is not available.

<sup>3</sup> More frequent boosters are not needed and can accentuate adverse effects.

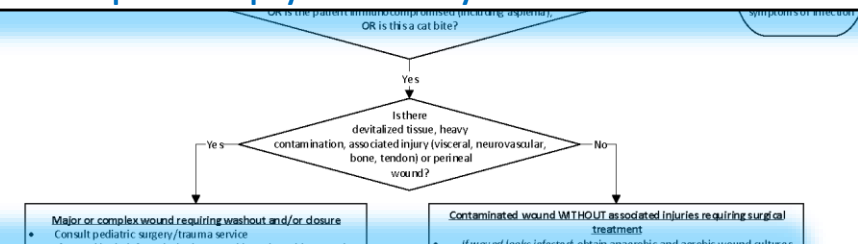
Tetanus prophylaxis recommendations are listed in Appendix A , per AAP guidelines.

**Initial Management:**

- Apply direct pressure to any wounds that are actively bleeding
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**Considerations:**

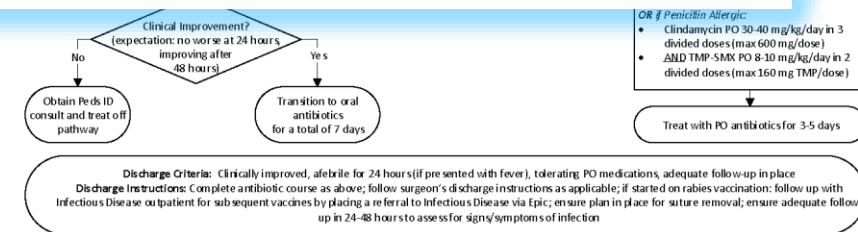
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- For human bites: assess risk for HIV infection and see [HIV Post Exposure Prophylaxis Pathway](#)



**TETANUS IMMUNE GLOBULIN (TIG)<sup>2</sup>**

- When TIG is required for wound prophylaxis, it is administered intramuscularly in a dose of 250 U (regardless of age or weight).
- If tetanus toxoid vaccine and TIG are administered concurrently, separate syringes and sites should be used.

If tetanus immune globulin is indicated, information is also available in Appendix A.



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- For human bites: assess risk for HIV infection and see [HIV Post Exposure Prophylaxis Pathway](#)

Rabies prophylaxis is listed in Appendix B, per AAP recommendations.

Animal Type	Evaluation and Disposition of Animal	Postexposure Prophylaxis Recommendations
<b>Dogs, cats, and ferrets</b>	Healthy and available for 10 days of observation	Prophylaxis only if animal develops signs of rabies <sup>1</sup>
	Rabid or suspected of being rabid <sup>2</sup>	Immediate immunization and RIG <sup>3</sup>
	Unknown (escaped)	Consult public health officials for advice
<b>Bats, skunks, raccoons, coyotes, foxes, mongooses, and most other carnivores; woodchucks</b>	Regarded a rabid unless geographic area is known to be free of rabies or until animal proven negative by laboratory tests <sup>2</sup>	Immediate immunization and RIG <sup>3</sup>
<b>Livestock, rodents, and lagomorphs (rabbits, hares, and pikas)</b>	Consider individually	Consult public health officials; bites of squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, mice and other rodents, rabbits, hares, and pikas almost never require rabies postexposure prophylaxis

RIG indicates Rabies Immune Globulin.

<sup>1</sup>During the 10-day observation period, at the first sign of rabies in the biting dog, cat, or ferret, prophylaxis of the exposed person with RIG (human) and vaccine should be initiated. The animal should be euthanized immediately and tested.

<sup>2</sup>The animal should be euthanized and tested as soon as possible. Holding for observation is not recommended. Immunization is discontinued if immunofluorescent test result for the animal is negative.

<sup>3</sup>See below and text in reference: American Academy of Pediatrics. Rabies. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, eds. *Red Book: 2018 Report of the Committee on Infectious Diseases*. American Academy of Pediatrics; 2018; 673-680.

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- For human bites: assess risk for HIV infection and see [HIV Post Exposure Prophylaxis Pathway](#)

OR is the patient immunocompromised (including diabetes),  
OR is this a cat bite?

Yes

If rabies vaccine series is started, subsequent doses can be given in the ID clinic +/- 1 day of the administration schedule.

ED staff may place a referral in Epic to the ID office for these doses.

**RABIES VACCINE ADMINISTRATION**

- Two vaccines are available on the market: Rabavert (preferred) and Imovax (reserved for those with severe egg allergy).
- Administration site: typically deltoid, or for young patient may use outer aspect of thigh.
  - Do NOT administer in the gluteal muscle.
- Dose: 1 ml/dose
- Administration Schedule:
  - Immunocompetent patients: give on days 0, 3, 7, and 14.
  - Immunocompromised patients: give on days 0, 3, 7, 14 and 28.
  - Patients who have had rabies vaccine in the past: give on days 0 and 3.

**RABIES IMMUNOGLOBULIN ADMINISTRATION**

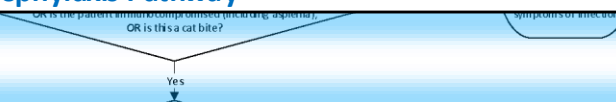
- Dose: 20 IU/kg given in a single dose
- Administration:
  - Give as soon as possible after exposure.
  - If possible, give the full dose around/into the wound(s).
  - Any remaining volume (or if unable to give the dose around the wound) should be administered IM at a site distant from the *vaccine* administration site.

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**Hepatitis B: Post-exposure Immunoprophylaxis**

*Immunoprophylaxis should be administered as soon as possible (preferably within 24 hours) or within 7 days of percutaneous exposure.*

Exposure	Hepatitis B Prophylaxis Management	
	Unvaccinated Person	Previously Vaccinated Person
HBsAg-positive source	Hep B vaccine series <sup>1</sup> and HBIG	Hep B vaccine dose <sup>1</sup>
HBsAg status unknown for source	Hep B vaccine series <sup>1</sup>	No management

Abbreviations: Hep B = hepatitis B; HBsAg = hepatitis B surface antigen; HBIG = hepatitis B immune globulin.

<sup>1</sup>Hepatitis B lifetime vaccination maximum is 6 doses.

Appendix C has hepatitis B prophylaxis, which is based on human bites, the hepatitis B status of the source, and the vaccination status of the patient.



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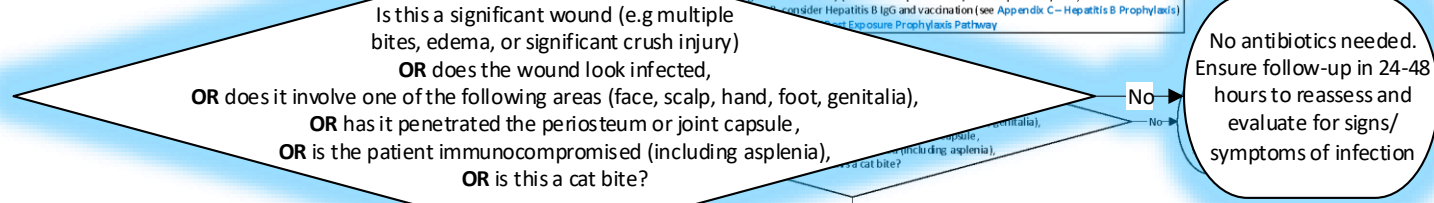
**Inclusion Criteria:** ≥ 2 months of age, animal bite SSTI (from cat, dog or human)  
**Exclusion Criteria:** <2 mo old, animal bite NOT from cat, dog or human, non-animal bite SSTI (see Skin and Soft Tissue Infection Pathway) - consider ID consult if exclusions present

**Initial Management:**

- Apply direct pressure to any wounds that are actively bleeding
- Clean non-puncture wound with saline via high pressure syringe irrigation

**Considerations:**

- Tetanus prophylaxis (see Appendix A – Tetanus Prophylaxis)
- Rabies prophylaxis (see Appendix B – Rabies Prophylaxis)
- Hepatitis B IgG and vaccination (see Appendix C – Hepatitis B Prophylaxis)
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Is there devitalized tissue, heavy contamination, associated injury (visceral, neurovascular, bone, tendon) or perineal wound?

**Major or complex wound requiring washout and/or debride**

- Consult pediatric surgery/trauma service
- If wound looks infected: obtain anaerobic and aerobic wound cultures
- If overt signs/symptoms of infection: also obtain aerobic and anaerobic blood cultures

**Contaminated wound WITHOUT associated injuries requiring surgical treatment**

- If wound looks infected: obtain anaerobic and aerobic wound cultures

**IV antibiotic options:**

- Ampicillin-Sulbactam IV 200 mg/kg/day of Ampicillin component divided q6hr (max 3000 mg/dose)
- OR if Penicillin allergic (and tolerates cephalosporins):
  - Ceftriaxone 50 mg/kg daily (max 2 gram/dose)
  - AND Clindamycin IV 30-40 mg/kg/day in 3 divided doses (max 600 mg/dose)
- OR if allergic to BOTH Penicillin and Cephalosporins:
  - Clindamycin IV 30-40 mg/kg/day in 3 divided doses (max 600 mg/dose)
  - AND TMP-SMX IV 8-10 mg/kg/day in 2 divided doses (max 160 mg TMP/dose)

Are there overt signs/symptoms of systemic infection? (e.g. failed outpatient therapy, wound rapidly progressing (i.e. within hours))

**Oral antibiotic options:**

- Amoxicillin/Clavulanate:**
  - <30 kg or unable to take tablets: Augmentin 250 mg/5 mL: 40 mg/kg/day div TID (max 500 mg/dose); or 600 mg/5 mL (ES): 90 mg/kg/day div BID (max 1000 mg/dose)
  - ≥30 kg and able to take tablets: Augmentin 875 mg BID
- OR if Penicillin Allergic:
  - Clindamycin PO 30-40 mg/kg/day in 3 divided doses (max 600 mg/dose)
  - AND TMP-SMX PO 8-10 mg/kg/day in 2 divided doses (max 160 mg TMP/dose)

Clinical Improvement? (expectation: no worse at 24 hours improving after 48 hours)

**No** → Obtain Peds ID consult and treat off pathway

**Yes** → Transition to oral antibiotics for a total of 7 days

Treat with PO antibiotics for 3-5 days

**Discharge Criteria:** Clinically improved, afebrile for 24 hours (if pre-sented with fever), tolerating PO medications, adequate follow-up in place  
**Discharge Instructions:** Complete antibiotic course as above; follow surgeon's discharge instructions as applicable; if started on rabies vaccination: follow up with Infectious Disease outpatient for subsequent vaccines by placing a referral to Infectious Disease via Epic; ensure plan in place for suture removal; ensure adequate follow up in 24-48 hours to assess for signs/symptoms of infection

**Assess for wound severity:**

- Evaluate presence of infection, location, involvement, and underlying immunocompromise

If the wound is simple, clean, non-infected, not from a cat, and the patient is healthy:

- Antibiotics are not necessary
- Ensure that patient has follow up in 24-48 hours for re-assessment.

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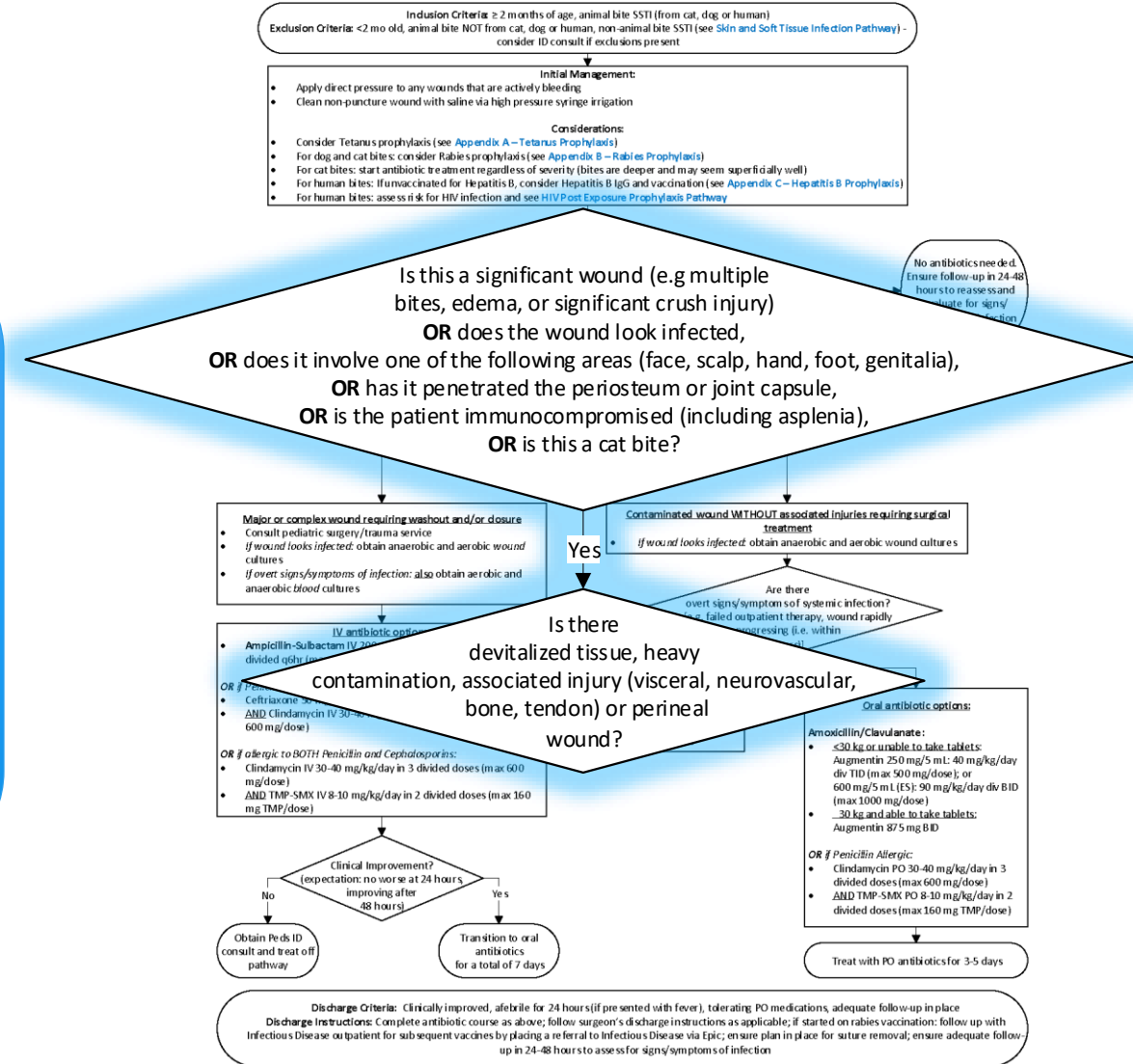


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If a wound is significant or from a cat bite, a distinction must then be made as to wound complexity.

A major or complex wound will contain any of the following:

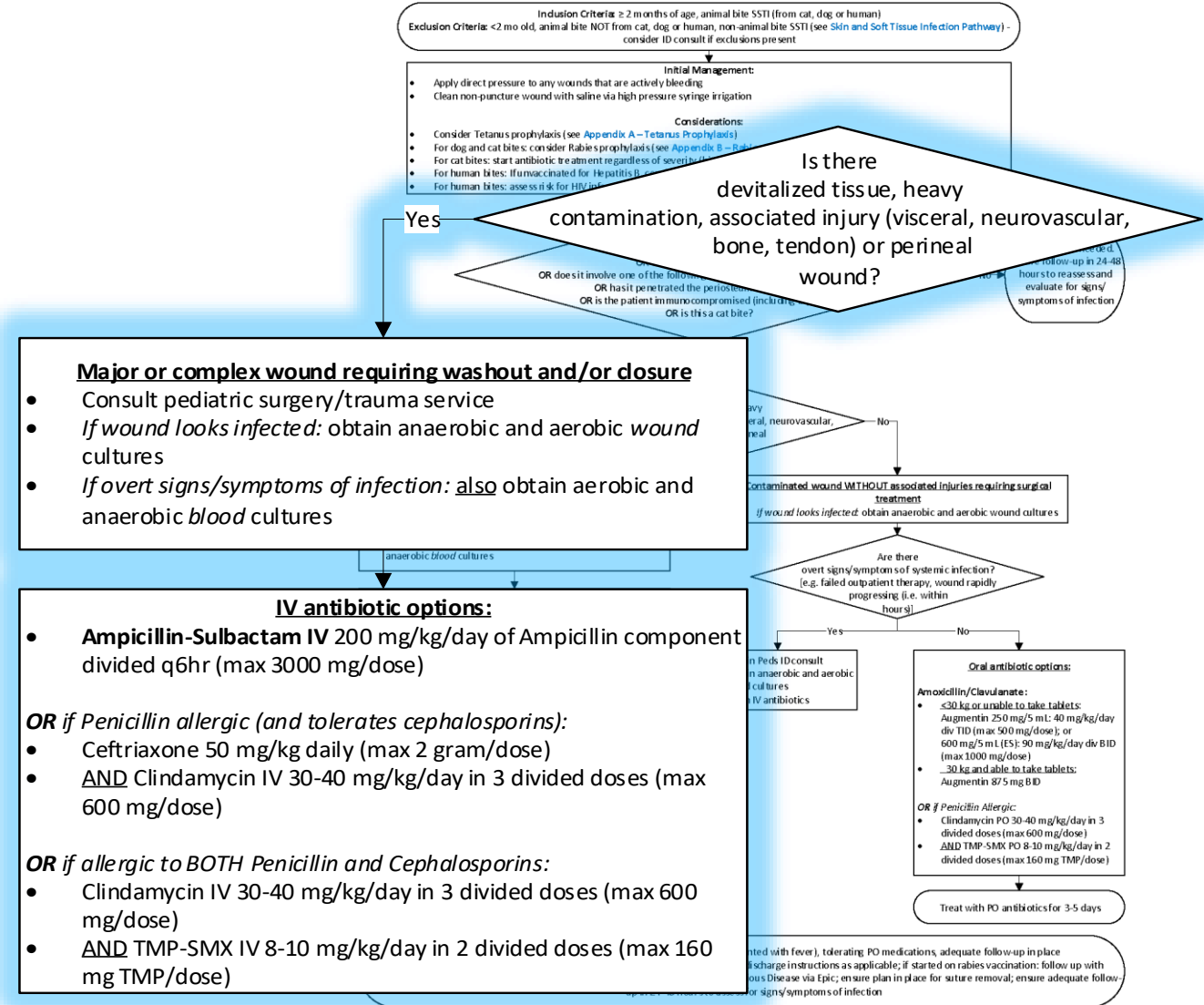
- devitalized tissue
- heavy contamination
- associated injury
- any perineal wound



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A major or complex wound requires surgical washout and/or closure.

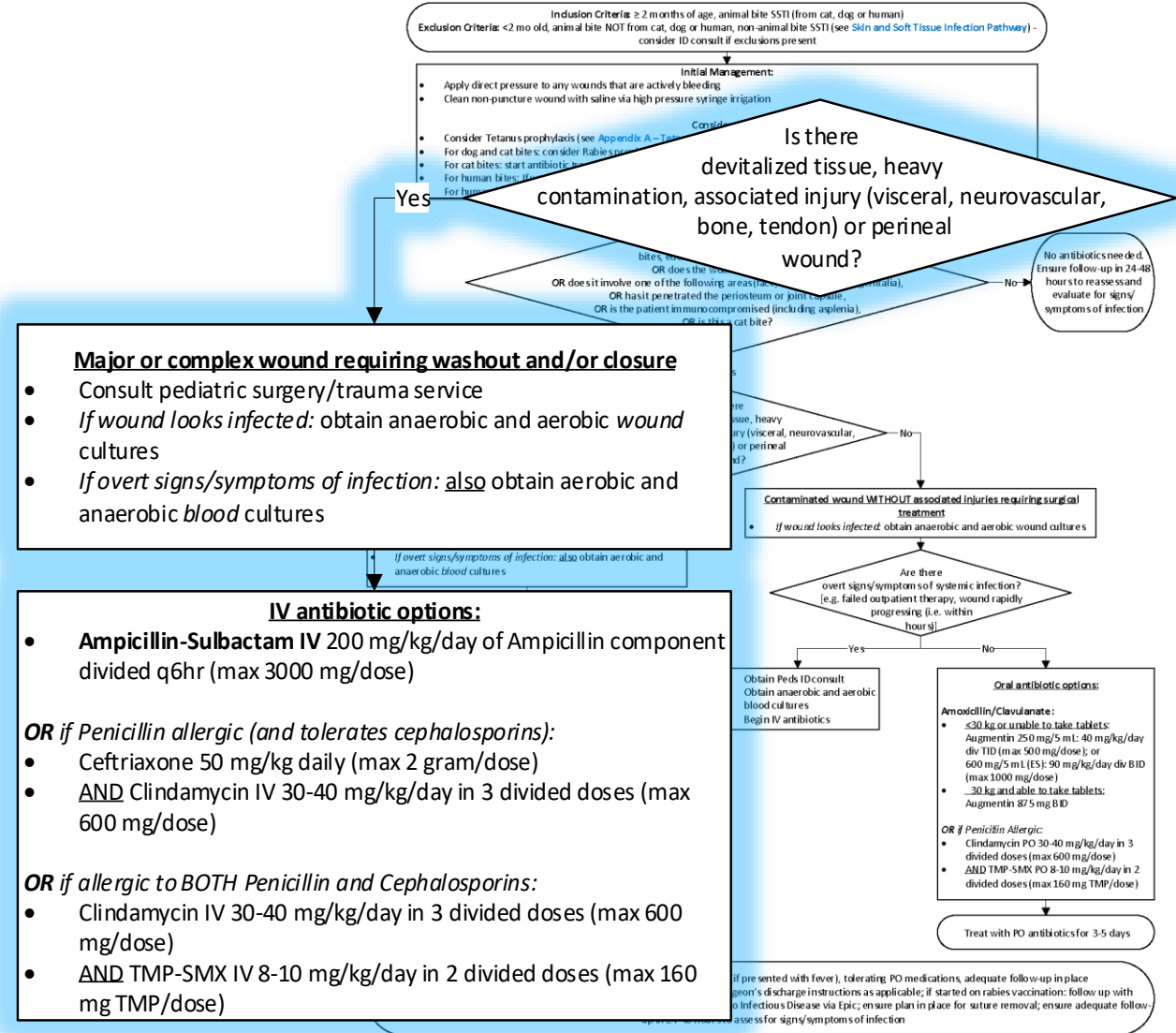
- Consult pediatric surgery/trauma service
- If the wound looks infected, obtain wound cultures (anaerobic and aerobic)
- If there are overt signs/symptoms of infection, also obtain blood cultures (anaerobic and aerobic)



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For major or complex wounds:  
Initiate the appropriate IV antibiotic treatment plan



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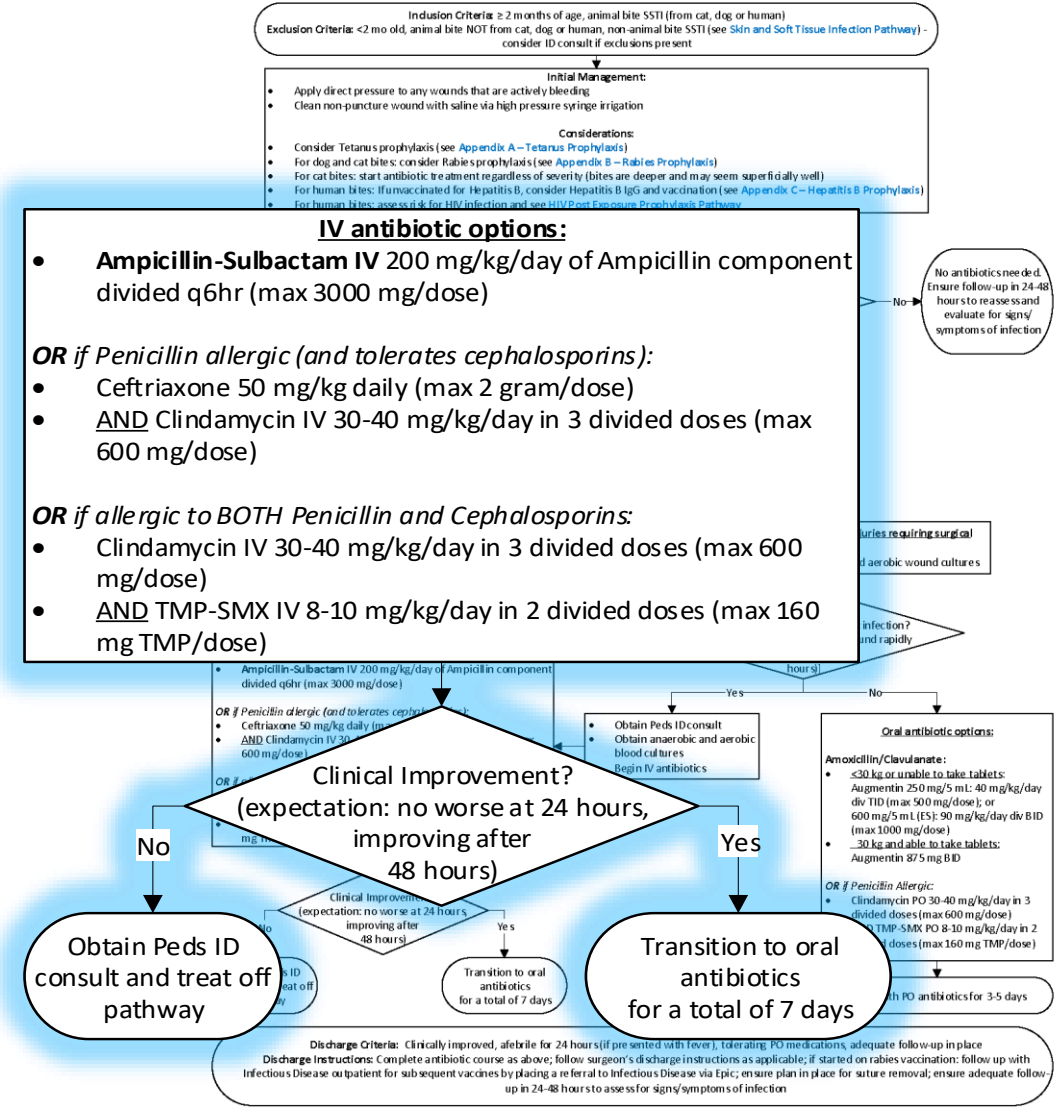
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After IV antibiotics are started, assess for clinical improvement

- Includes, at minimum, no worsening at 24 hours and improving after 48 hours

If there is no clinical improvement, it would be important to obtain an ID consult to determine best treatment options.

Otherwise, a patient can transition to oral antibiotics for a TOTAL antibiotic course of 7 days.



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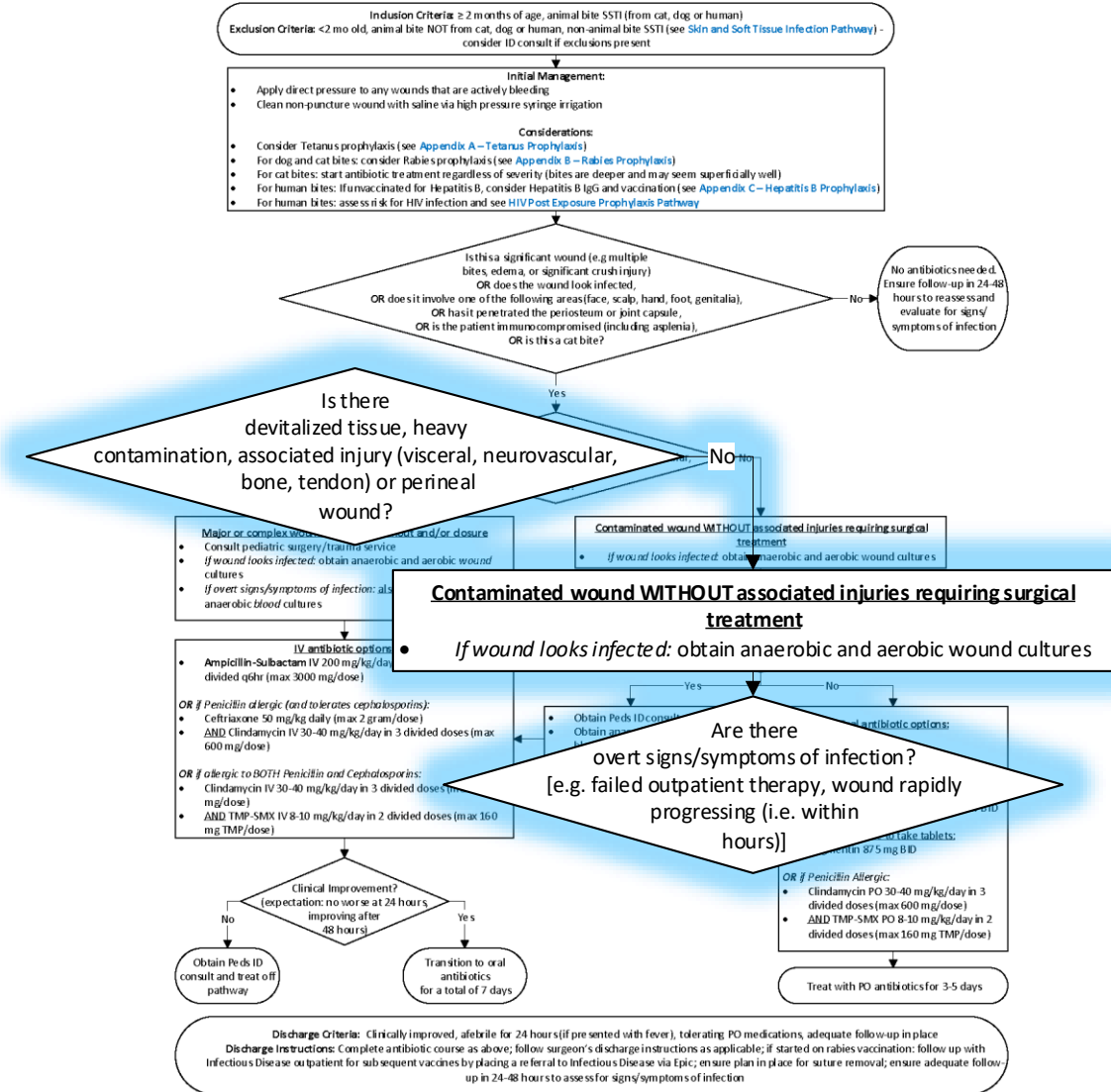
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A contaminated wound **without** associated injuries is considered a significant wound, but does not require surgical treatment.

- If the wound looks infected, obtain wound cultures (anaerobic and aerobic)



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Are there overt signs/symptoms of systemic infection? [e.g. failed outpatient therapy, wound rapidly progressing (i.e. within hours)]

Animal bite SSTI (from cat, dog or human) - see Appendix B - Rabies Prophylaxis  
Animal bite SSTI (see Skin and Soft Tissue Infection Pathway) - see Appendix B - Rabies Prophylaxis  
For cat bites: see Appendix B - Rabies Prophylaxis  
For dog bites: see Appendix B - Rabies Prophylaxis  
For human bites: see Appendix B - Rabies Prophylaxis  
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- Yes**
- Obtain Peds ID consult
  - Obtain anaerobic and aerobic blood cultures
  - Begin IV antibiotics

**No**

Is this a significant wound (e.g. multiple bites, edema, or significant crushing injury)?

**Oral antibiotic options:**

**Amoxicillin/Clavulanate :**

- <30 kg or unable to take tablets:  
Augmentin 250 mg/5 mL: 40 mg/kg/day div TID (max 500 mg/dose); or  
600 mg/5 mL (ES): 90 mg/kg/day div BID (max 1000 mg/dose)
- ≥30 kg and able to take tablets:  
Augmentin 875 mg BID

**OR if Penicillin Allergic:**

- Clindamycin PO 30-40 mg/kg/day in 3 divided doses (max 600 mg/dose)
- AND TMP-SMX PO 8-10 mg/kg/day in 2 divided doses (max 160 mg TMP/dose)

Major or complex wound requiring washout:  
• Consult pediatric surgery/trauma service  
• If wound looks infected: obtain anaerobic and aerobic blood cultures  
• If overt signs/symptoms of infection: also obtain anaerobic blood cultures

IV antibiotic options:  
• Ampicillin-Subactam IV 200 mg/kg/day of divided q6hr (max 3000 mg/dose)  
OR if Penicillin allergic (and tolerates cephalosporins)  
• Ceftriaxone 50 mg/kg daily (max 2 gram/dose)  
AND Clindamycin IV 30-40 mg/kg/day in 3 divided doses (max 600 mg/dose)  
OR if allergic to BOTH Penicillin and Cephalosporins  
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Clinical Improvement? (expectation: no worse at 24 h improving after 48 hours)

**No**

Obtain Peds ID consult and treat off pathway

**Treat with PO antibiotics for 3-5 days**

**Discharge Criteria:** Clinically improved, afebrile, and tolerating oral intake

**Discharge Instructions:** Complete antibiotic course as prescribed. If patient is not improving or worsening, return to the Infectious Disease outpatient for subsequent vaccines by placing a referral to Infectious Disease via Epic, ensure plan in place for suture removal, ensure adequate follow up in 24-48 hours to assess for signs/symptoms of infection

Antibiotic selection will depend on overt signs of infection.

Examples of overt signs/symptoms of infection include:

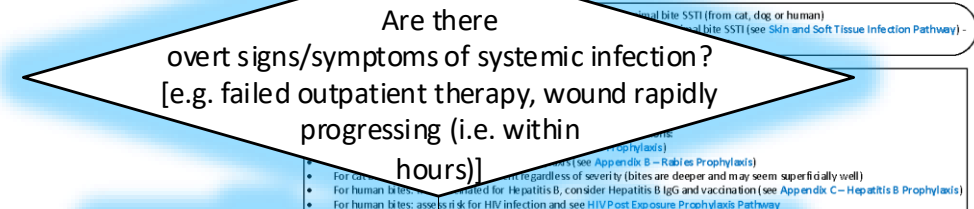
- Failing outpatient therapy
- Wound is rapidly (i.e. within hours) progressing

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- Obtain Peds ID consult
  - Obtain anaerobic and aerobic blood cultures
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**No**

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**Oral antibiotic options:**

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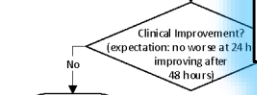
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**Discharge Criteria:** Clinically improved, afebrile, and tolerating oral intake

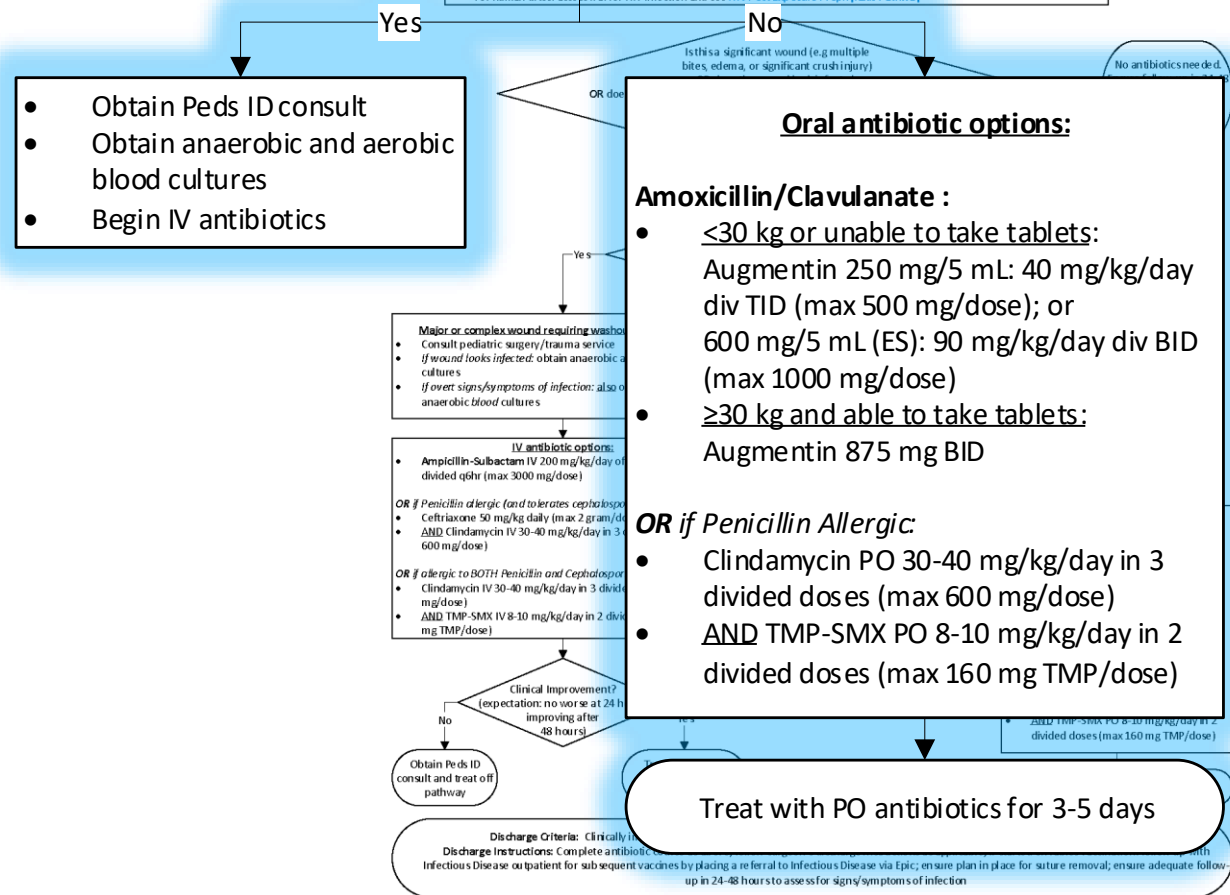
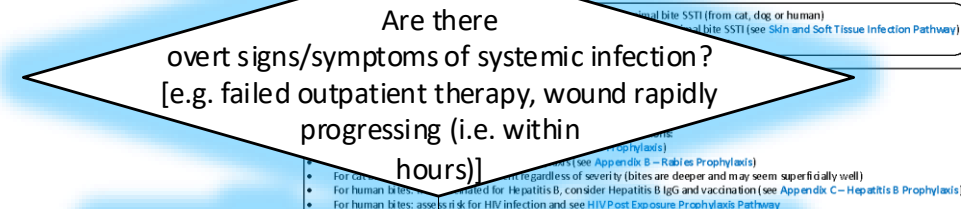
**Discharge Instructions:** Complete antibiotic course. Refer to Infectious Disease outpatient for subsequent vaccines by placing a referral to Infectious Disease via Epic, ensure plan in place for suture removal, ensure adequate follow up in 24-48 hours to assess for signs/symptoms of infection

If there are overt signs/symptoms of infection:

- Obtain an ID consult
- Obtain blood cultures (anaerobic and aerobic)
- And start IV antibiotics

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If there are no overt signs and symptoms of infection:

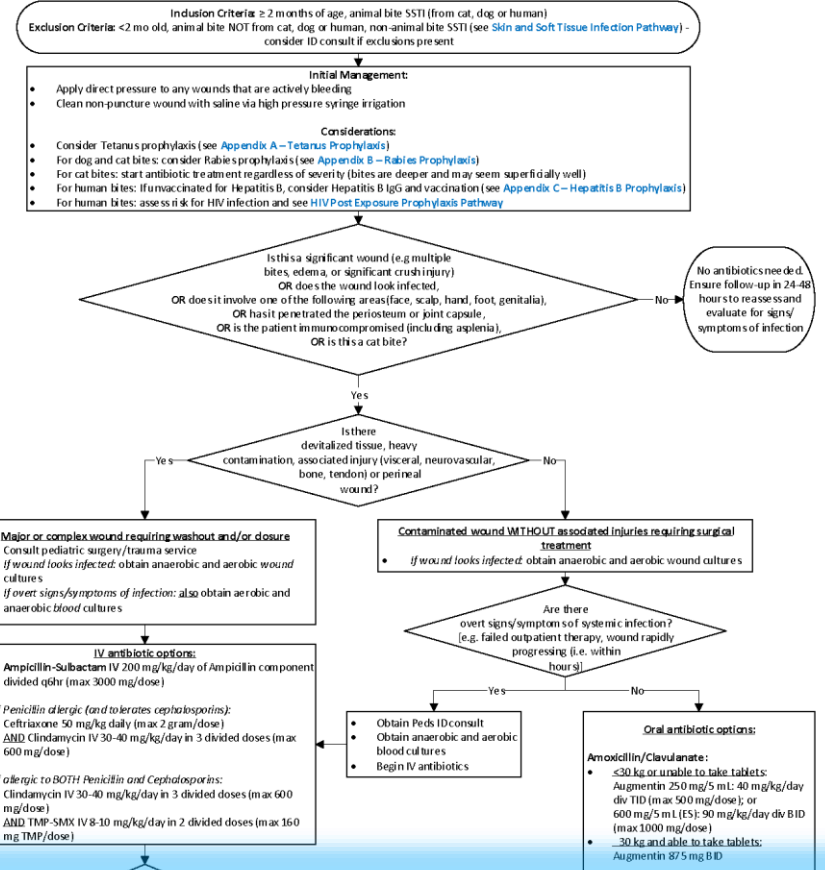
- Begin treatment with the appropriate ORAL antibiotic
- Clindamycin and TMP-SMX are preferred over doxycycline alone
- Note that the treatment duration is 3-5 days

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 SERVES AS A GUIDE  
 AND DOES NOT  
 REPLACE CLINICAL  
 JUDGMENT.



Discharge criteria and instructions are listed.

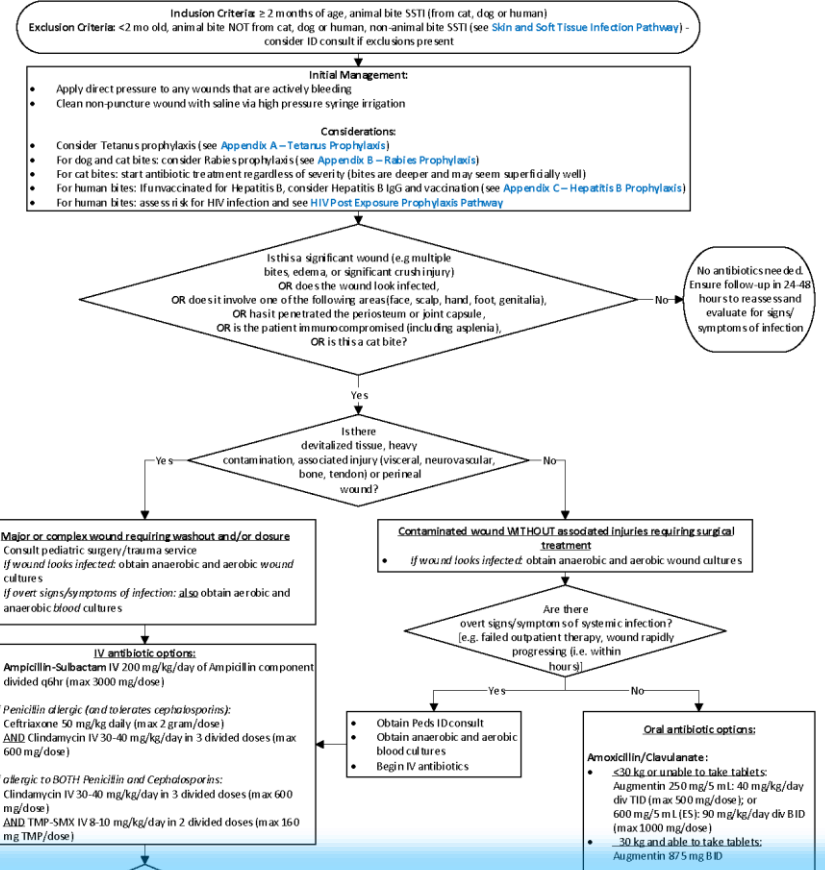
**Discharge Criteria:** Clinically improved, afebrile for 24 hours (if presented with fever), tolerating PO medications, adequate follow-up in place  
**Discharge Instructions:** Complete antibiotic course as above; follow surgeon’s discharge instructions as applicable; if started on rabies vaccination: follow up with Infectious Disease outpatient for subsequent vaccines by placing a referral to Infectious Disease via Epic; ensure plan in place for suture removal; ensure adequate follow-up in 24-48 hours to assess for signs/symptoms of infection

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Note that you may now refer to Infectious Disease for subsequent rabies vaccines via Epic.

**Discharge Criteria:** Clinically improved, afebrile for 24 hours (if presented with fever), tolerating PO medications, adequate follow-up in place  
**Discharge Instructions:** Complete antibiotic course as above; follow surgeon’s discharge instructions as applicable; if started on rabies vaccination: follow up with Infectious Disease outpatient for subsequent vaccines by placing a referral to Infectious Disease via Epic; ensure plan in place for suture removal; ensure adequate follow-up in 24-48 hours to assess for signs/symptoms of infection

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# Review of Key Points

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- Inclusion criteria includes an animal bite (from cat, dog, human) and the patient is  $\geq 2$  months of age
- Consider Tetanus, Rabies, Hepatitis B and HIV prophylaxis in select circumstances
- Cat bites always need antibiotics
- Assess wound severity to determine treatment
  - Minor, non-infected wounds need no antibiotics
- If there are overt signs/symptoms of infection, obtain anaerobic AND aerobic blood cultures
- The preferred/first choice IV antibiotic is ampicillin-sulbactam

# Quality Metrics

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- Number of Patients (Breakdown ED, IP/Obs)
- % Patients with pathway order set
- % Patients who receive recommended antibiotics per pathway
- % Patients who were prescribed correct duration antibiotics per pathway
- Return to ED within 7 days from ED visit
- Returns to ED within 7 days of discharge from IP/Obs stay
- % Patients requiring surgery that had surgery/trauma consult

# Pathway Contacts

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# Thank You!



## **About Connecticut Children's Clinical Pathways Program**

The Clinical Pathways Program at Connecticut Children's aims to improve the quality of care our patients receive, across both ambulatory and acute care settings. We have implemented a standardized process for clinical pathway development and maintenance to ensure meaningful improvements to patient care as well as systematic continual improvement. Development of a clinical pathway includes a multidisciplinary team, which may include doctors, advanced practitioners, nurses, pharmacists, other specialists, and even patients/families. Each clinical pathway has a flow algorithm, an educational module for end-user education, associated order set(s) in the electronic medical record, and quality metrics that are evaluated regularly to measure the pathway's effectiveness. Additionally, clinical pathways are reviewed annually and updated to ensure alignment with the most up to date evidence. These pathways serve as a guide for providers and do not replace clinical judgment.