Animal and Human Bite Skin Soft Tissue Infection (SSTI)

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What is a Clinical Pathway?

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

Objectives

- Standardize treatment of animal and human 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?

- 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?

- 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 and Human Bite clinical pathway was developed to ensure an optimal consistent approach to the surgical and medical management of children who present with animal and human bites

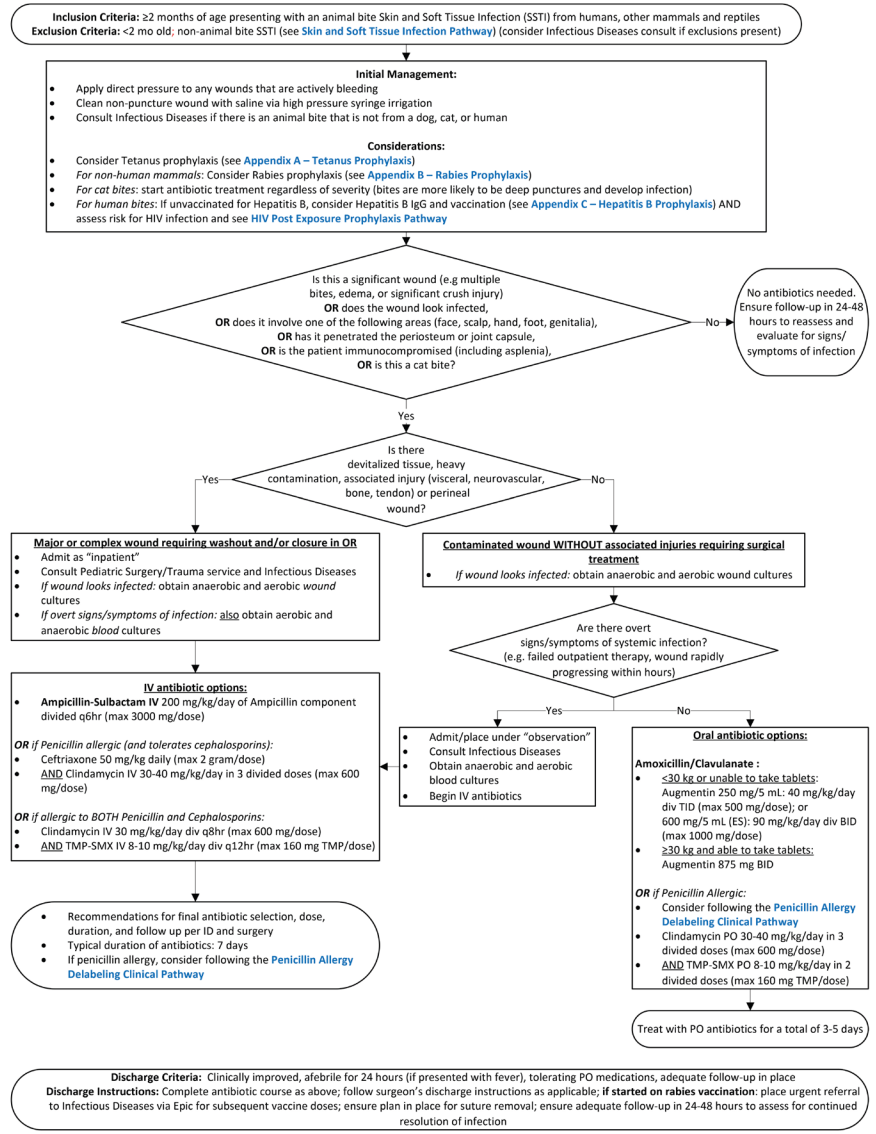
This is the Animal and Human Bite Skin Soft Tissue Infection Clinical Pathway.

We will be reviewing each component in the following slides.

CLINICAL PATHWAY:

Animal and Human Bite Skin and Soft Tissue Infection

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



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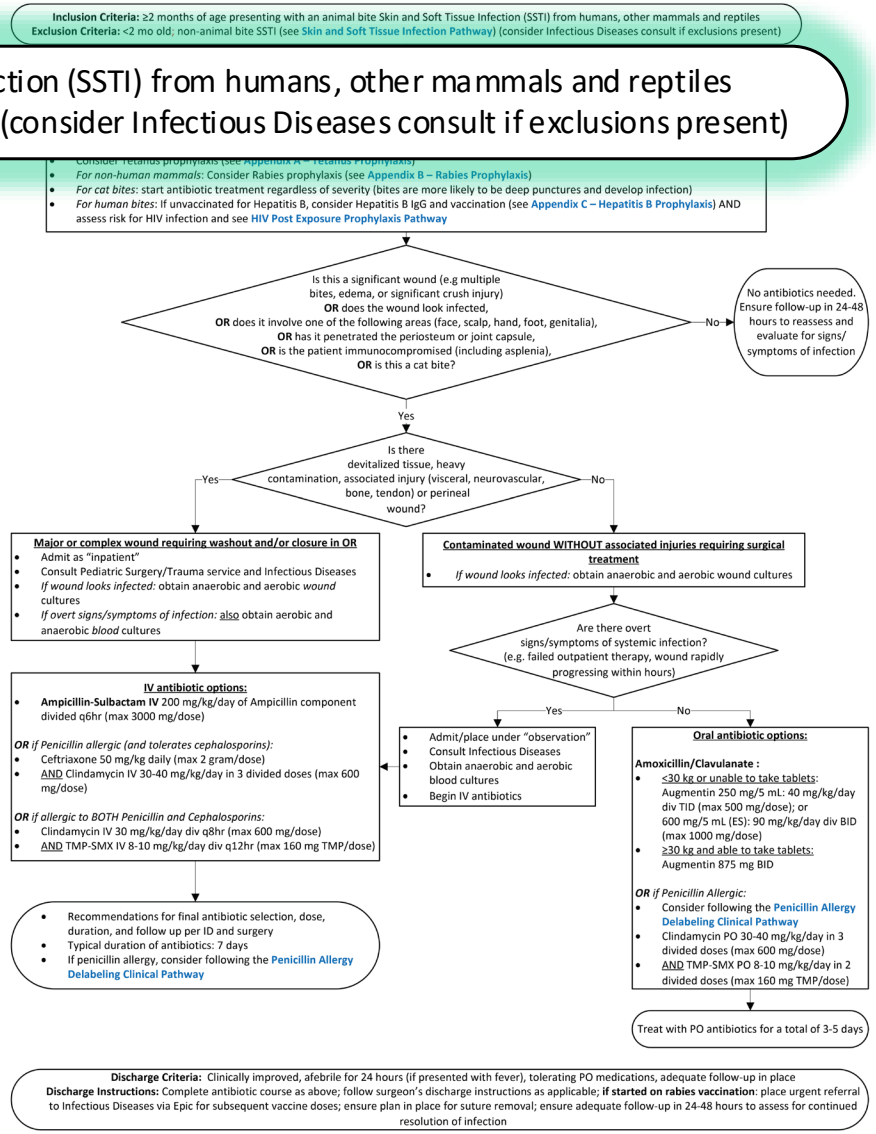
Inclusion Criteria: ≥2 months of age presenting with an animal bite Skin and Soft Tissue Infection (SSTI) from humans, other mammals and reptiles
Exclusion Criteria: <2 mo old; non-animal bite SSTI (see **Skin and Soft Tissue Infection Pathway**) (consider Infectious Diseases consult if exclusions present)

- 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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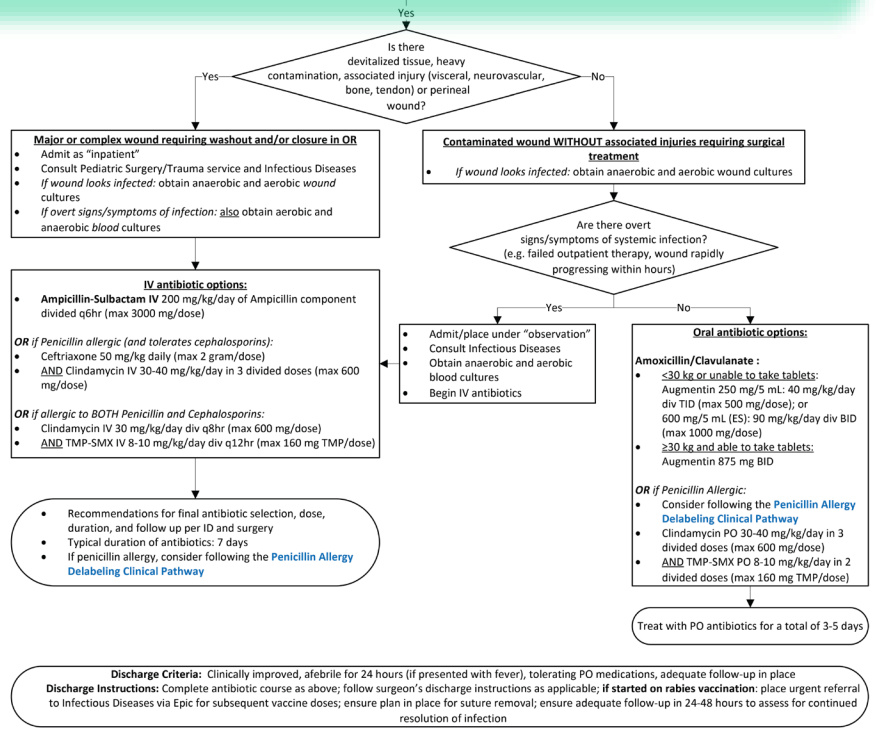
- Clean non-puncture wound with saline via high pressure syringe irrigation
- Consult Infectious Diseases if there is an animal bite that is not from a dog, cat, or human

Considerations:

- Consider Tetanus prophylaxis (see **Appendix A – Tetanus Prophylaxis**)
- *For non-human mammals*: Consider Rabies prophylaxis (see **Appendix B – Rabies Prophylaxis**)
- *For cat bites*: start antibiotic treatment regardless of severity (bites are more likely to be deep punctures and develop infection)
- *For human bites*: If unvaccinated for Hepatitis B, consider Hepatitis B IgG and vaccination (see **Appendix C – Hepatitis B Prophylaxis**) AND 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
- Consult Infectious Diseases if there is an animal bite that is not from a dog, cat, or human



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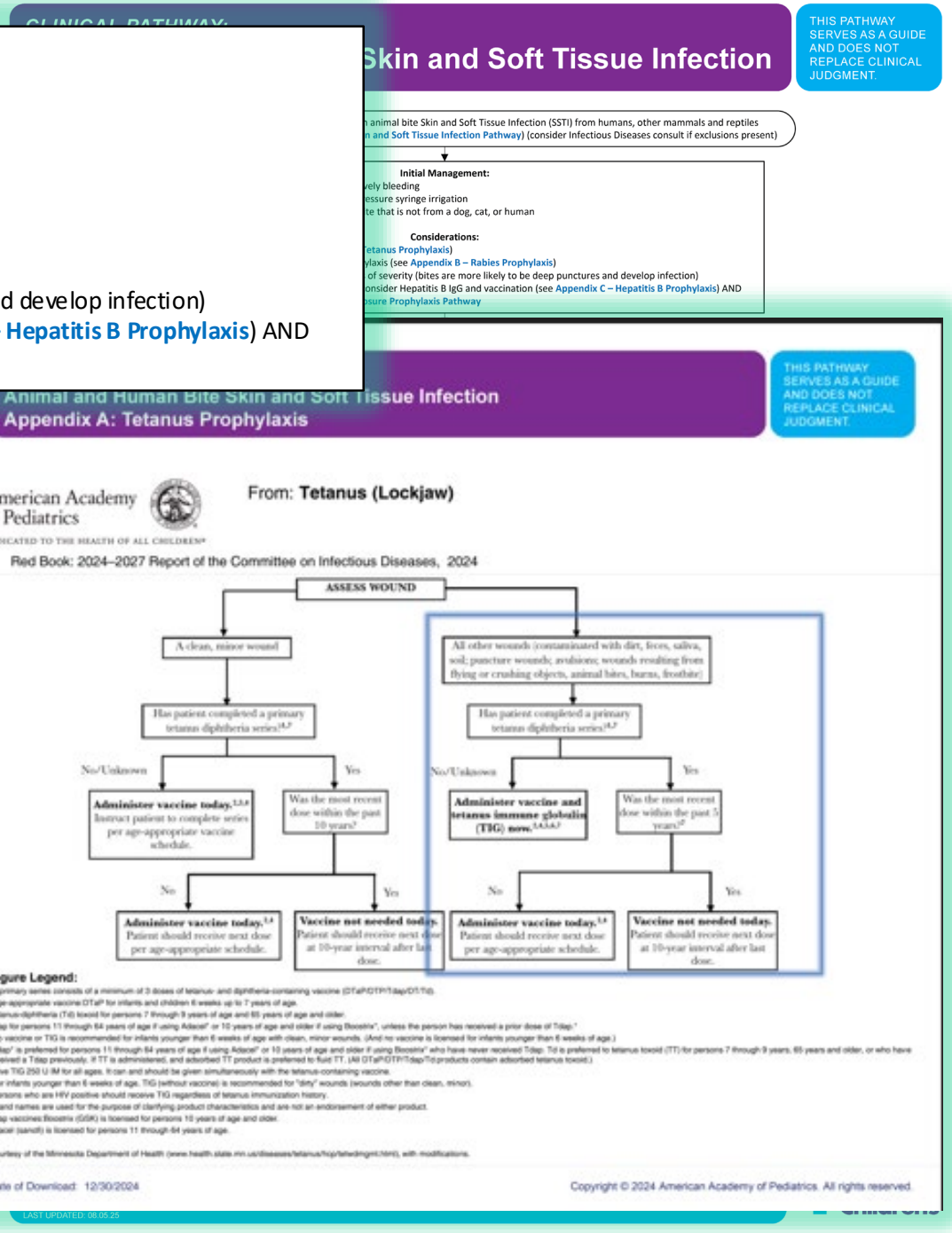
Tetanus prophylaxis recommendations are listed in Appendix A , per Red Book: 2024–2027 Report of the Committee on Infectious Diseases.



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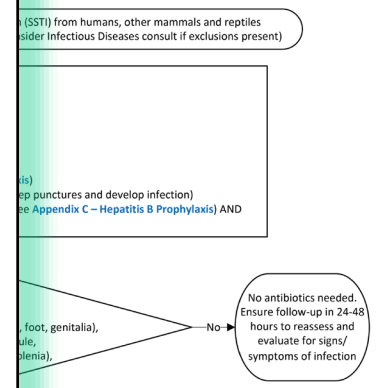

Rabies prophylaxis is listed in Appendix B, per AAP recommendations.

RABIES POST-EXPOSURE PROPHYLAXIS

Animal Type	Evaluation and Disposition of Animal	Postexposure Prophylaxis Recommendations
Dogs, cats, and ferrets	Healthy and available for 10 days of observation	Prophylaxis only if animal develops signs of rabies[a]
	Rabid or suspected of being rabid[a]	Immediate immunization and RIG[c]
	Unknown (escaped)	Consult Infectious Diseases; consider starting PEP promptly
Bats, skunks, raccoons, foxes, mongooses[c], and most other carnivores; groundhogs	Regarded as rabid until animal proven negative by laboratory tests[a]	Immediate immunization and RIG[b]
Livestock, rodents, and lagomorphs (rabbits, hares, and pikas)	Consider individually	Consult Infectious Diseases; 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.

[a]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.
[b]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.
[c]See below and text in reference.

American Academy of Pediatrics. Rabies. In: Kimberlin DW, Banerjee R, Barnett ED, Lynfield R, Sawyer MH, eds. *Red Book: 2024 Report of the Committee on Infectious Diseases*. American Academy of Pediatrics; 2024.

The above chart has been adapted to Connecticut Children's local recommendations.

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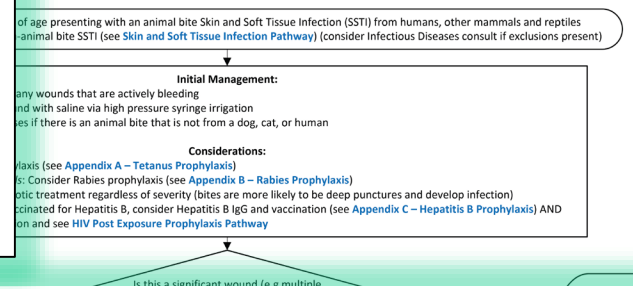

If rabies vaccine series is started, subsequent doses can be given in the ID clinic +/- 1 day of the administration schedule.

ED staff should 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. Do NOT administer in the same muscle as RIG if given.
- Dose: 1 ml/dose
- Administration Schedule:
  - Immunocompetent patients: give on days 0, 3, 7, and 14.
  - Immunocompromised patients: Discuss with ID. Consider the following: give on days 0, 3, 7, 14. After 4th dose, obtain antibody titer to ensure minimum cut off of 0.5 IU/mL has been reached or give 5th dose on day 28.
  - Patients who have had rabies vaccine in the past: give on days 0 and 3.

RABIES IMMUNE GLOBULIN (RIG) ADMINISTRATION

- Dose: 20 IU/kg given in a single dose
- Administration:
  - Give as soon as possible after exposure (day 0)
  - 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.
  - If person has been previously vaccinated with rabies, RIG is not recommended. They should instead receive 2 booster doses of rabies vaccine as above on day 0 and 3. If immunocompromised, discuss with ID.

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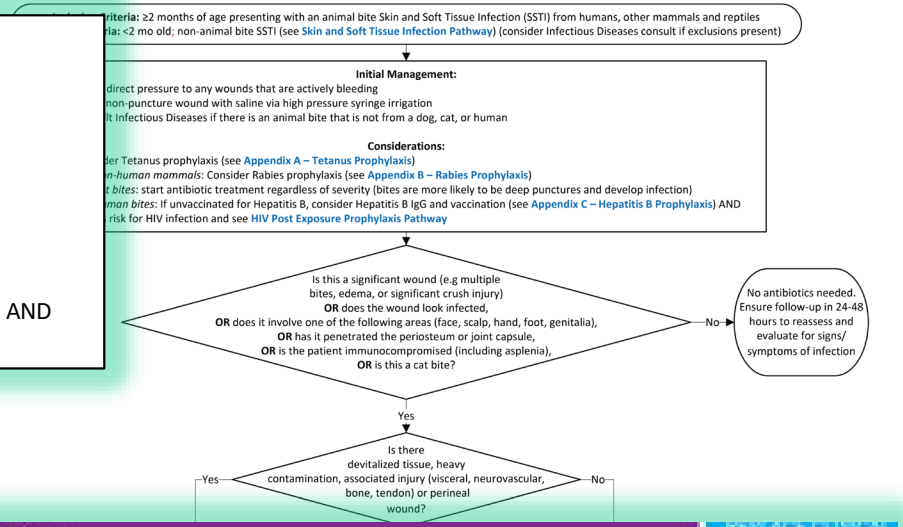

Appendix C has hepatitis B prophylaxis, which is based on human bites, the hepatitis B status of the source, and the vaccination status of the patient.

Appendix C: Hepatitis B Prophylaxis

REPLACE CLINICAL JUDGMENT

Table 3.23. Guidelines for Postexposure Prophylaxis[a] of People With Nonoccupational Exposures[b] to Blood or Body Fluids That Contain Blood, by Exposure Type and Vaccination Status

Exposure	Treatment	
	Unvaccinated Person[c]	Previously Vaccinated Person[d]
HBsAg-positive source		
Household member	Consider testing. If significant exposure, if negative administer hepatitis B vaccine series	Ensure completion of vaccine series
Percutaneous (eg, bite or needlestick) or mucous membrane exposure to HBsAg-positive blood or body fluid	Administer hepatitis B vaccine series and hepatitis B immune globulin (HBIG)	Administer hepatitis B vaccine booster dose
Sexual or needle-sharing contact of an HBsAg-positive person	Administer hepatitis B vaccine series and HBIG	Administer hepatitis B vaccine booster dose
Person who has been sexually assaulted or abused by a perpetrator who is HBsAg-positive	Administer hepatitis B vaccine series and HBIG	Administer hepatitis B vaccine booster dose
Source with unknown HBsAg status		
Person who has been sexually assaulted or abused by a perpetrator with unknown HBsAg status	Administer hepatitis B vaccine series	No treatment
Percutaneous (eg, bite or needlestick) or mucous membrane exposure to potentially infectious blood or body fluids from a source with unknown HBsAg status	Administer hepatitis B vaccine series	No treatment
Sexual or needle-sharing contact of person with unknown HBsAg status	Administer hepatitis B vaccine series	No treatment

HBsAg indicates hepatitis B surface antigen.

[a] When indicated, immunoprophylaxis should be initiated as soon as possible, preferably within 24 hours. Studies are limited on the maximum interval after exposure during which postexposure prophylaxis is effective, but the interval is unlikely to exceed 7 days for percutaneous exposures or 14 days for sexual exposures. The hepatitis B vaccine series should be completed.

[b] These guidelines apply to nonoccupational exposures. Guidelines for occupational exposures are can be found in Schillie S, Murphy TV, Sawyer M, et al. CDC guidelines for evaluating health-care personnel for hepatitis B virus protection and for administering post exposure management. MMWR Recomm Rep. 2013;62(RR-10):1-19.

[c] A person who is in the process of being vaccinated but who has not completed the vaccine series should complete the series and receive treatment as indicated.

[d] A person who has written documentation of a complete hepatitis B vaccine series and who did not receive postexposure testing.

Source: Schillie S, Vellozzi C, Reingold L, et al. Prevention of hepatitis B virus infection in the United States: recommendations of the Advisory Committee on Immunization Practices. MMWR Recomm Rep. 2018;67(RR-1):1-31.

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Is this a significant wound (e.g multiple bites, edema, or significant crush injury) **OR** does the wound look infected, **OR** does it involve one of the following areas (face, scalp, hand, foot, genitalia), **OR** has it penetrated the periosteum or joint capsule, **OR** is the patient immunocompromised (including asplenia), **OR** is this a cat bite?

No

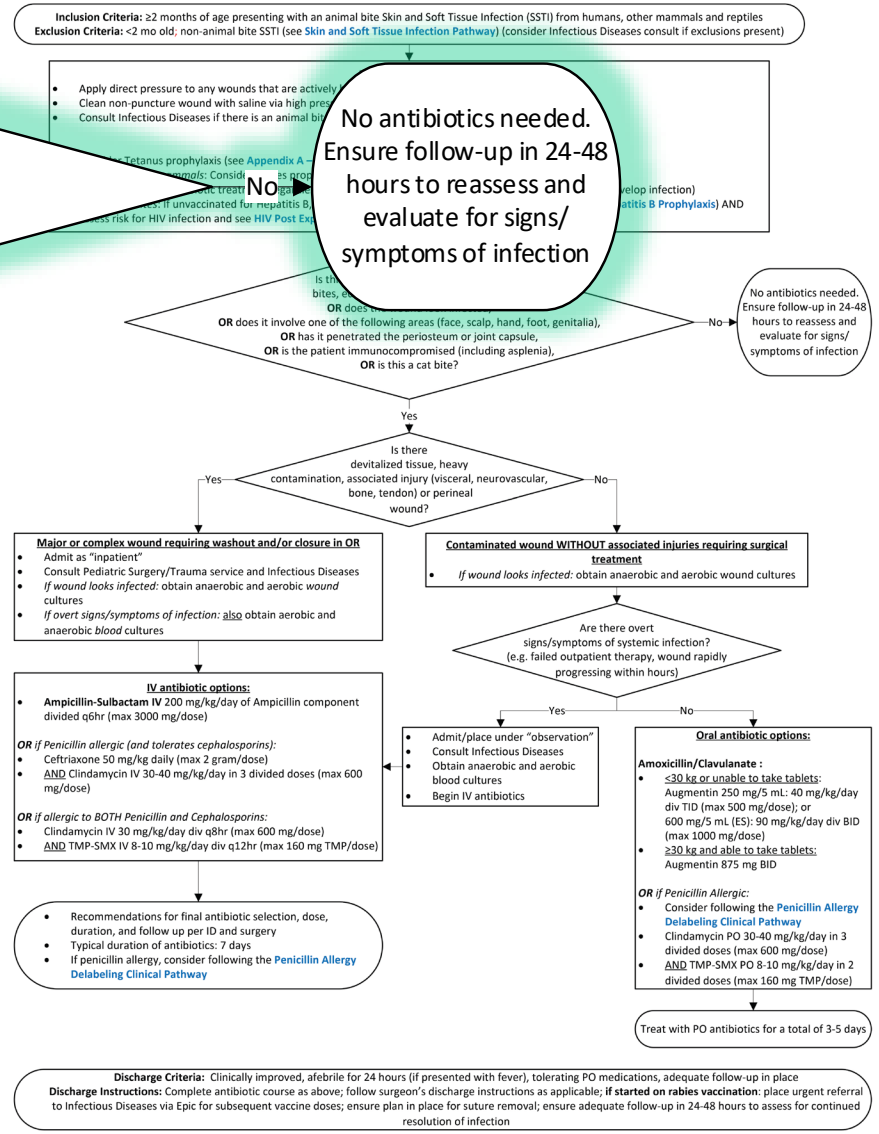
No antibiotics needed. Ensure follow-up in 24-48 hours to reassess and evaluate for signs/ symptoms of infection

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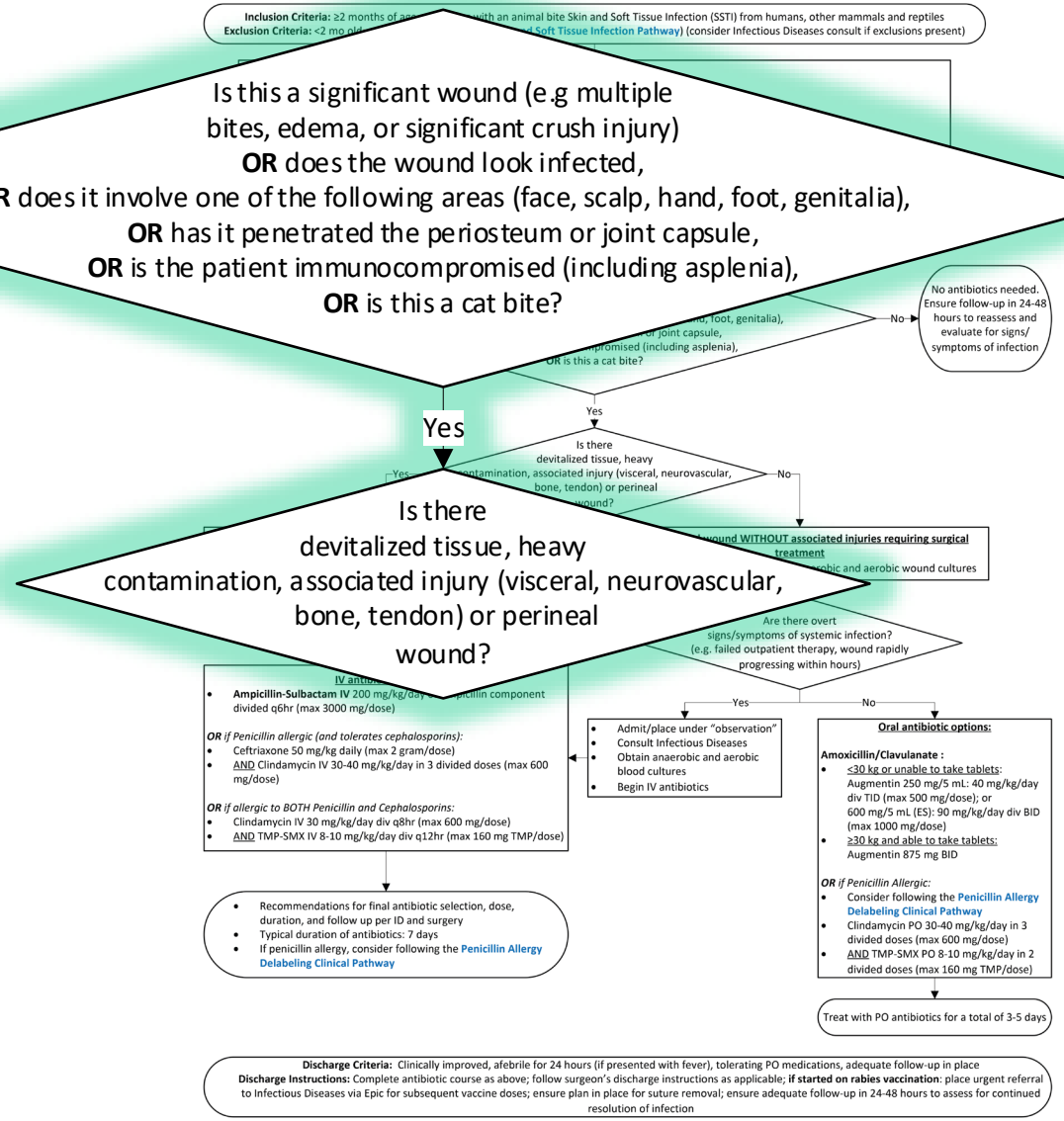
If a wound is significant or from a cat bite, a distinction must then be made as to wound complexity.

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.

- Admit as “inpatient”
- Consult Pediatric Surgery/Trauma service AND Infectious Diseases
- 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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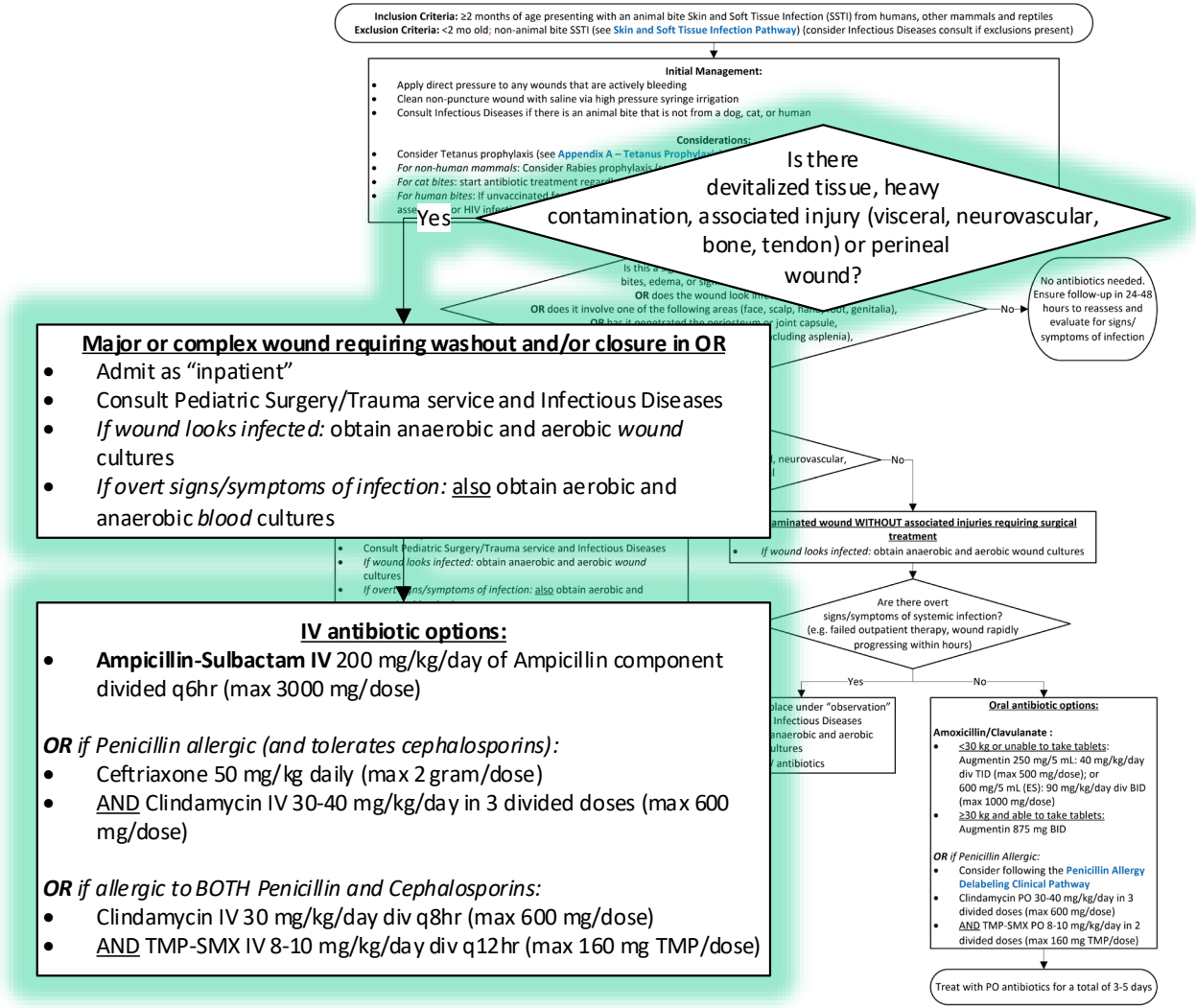

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For major or complex wounds:

Initiate the appropriate IV antibiotic treatment plan

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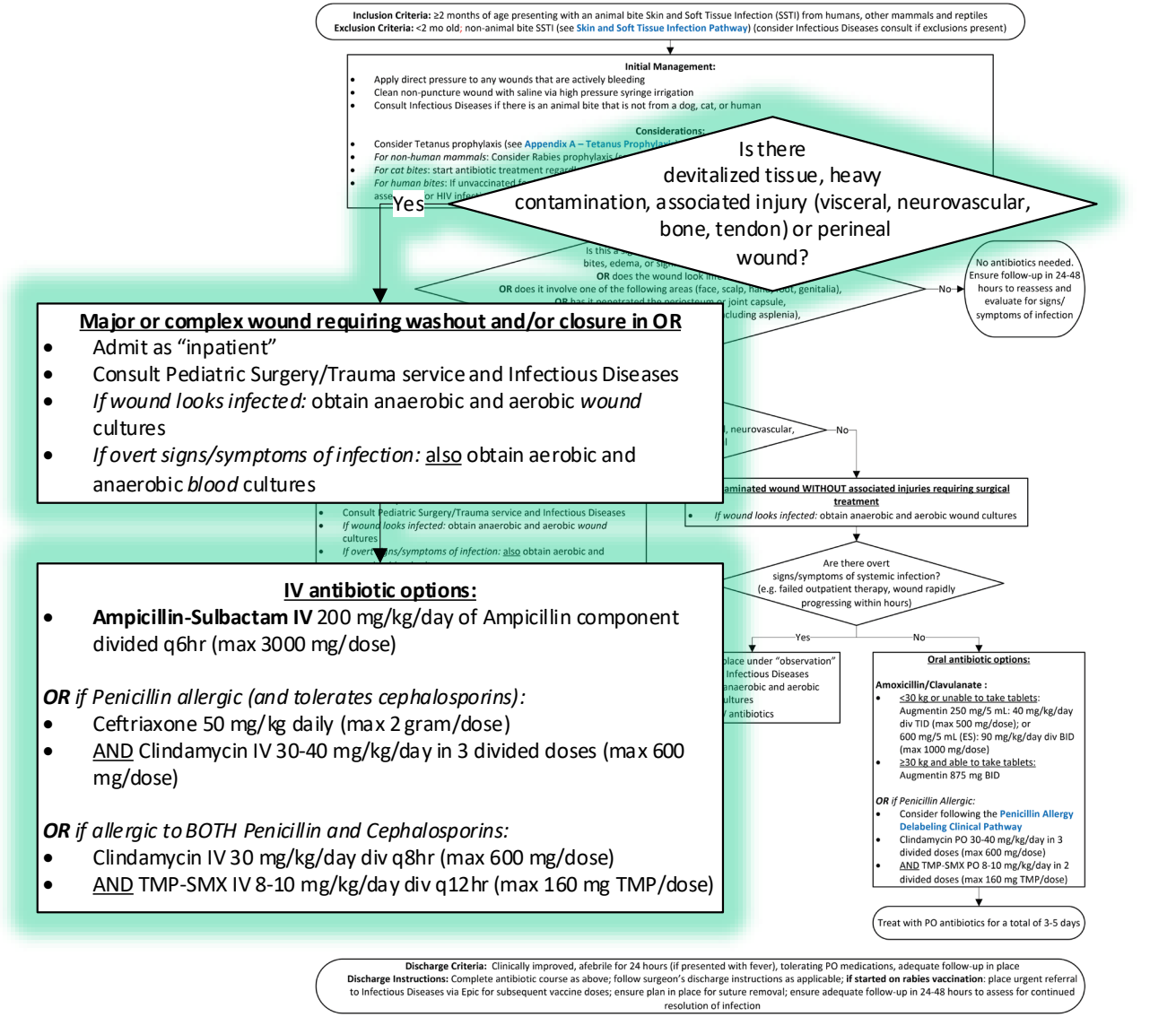

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- After IV antibiotics are started, assess for clinical improvement
- Antibiotic course details will be determined together by ID and Pediatric Surgery services
- Duration of antibiotics is typically a total of 7 days, but may vary depending on ID recommendation

- If the patient has a reported penicillin allergy, consider following the **Penicillin Allergy Delabeling Clinical Pathway**

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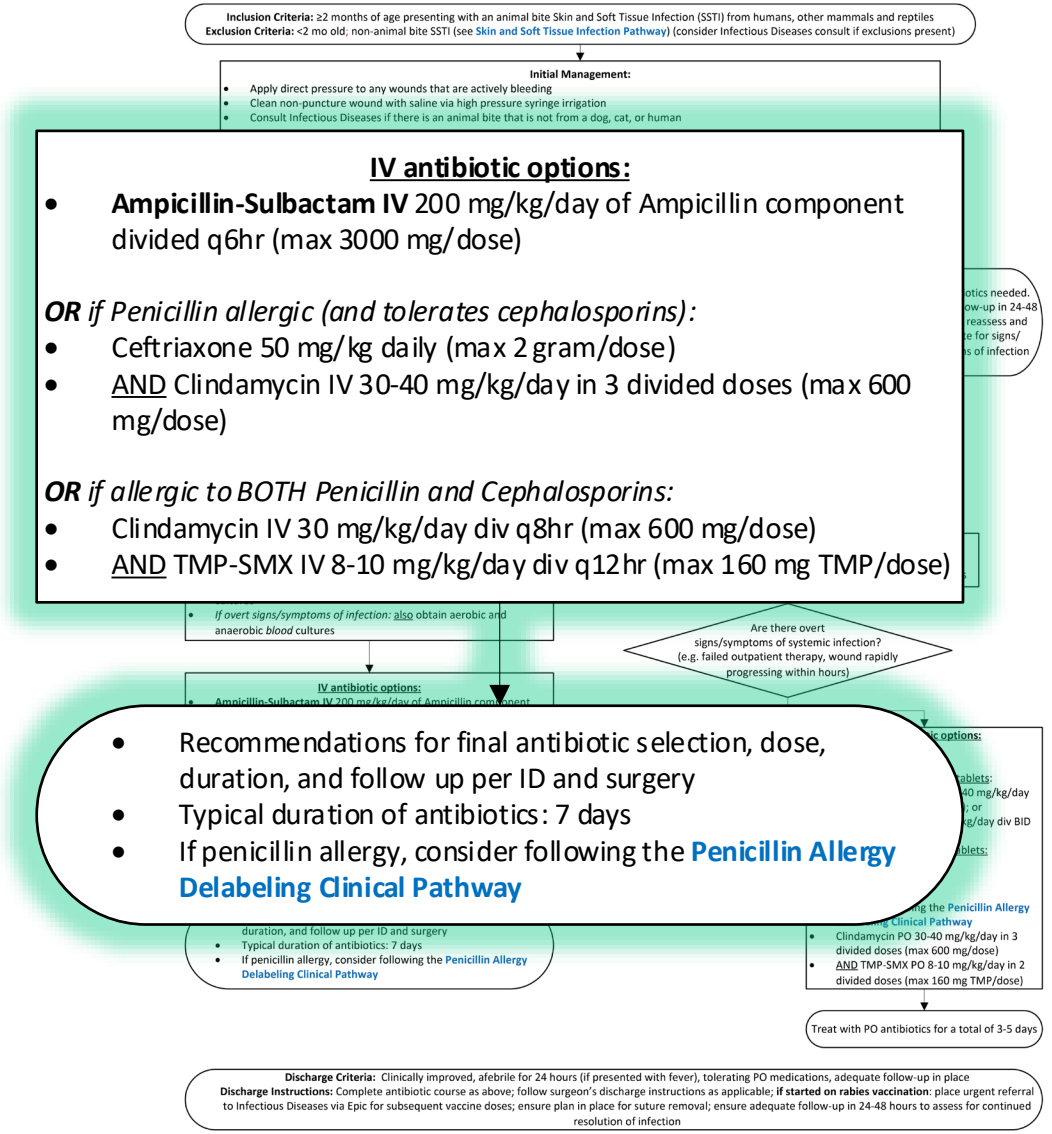

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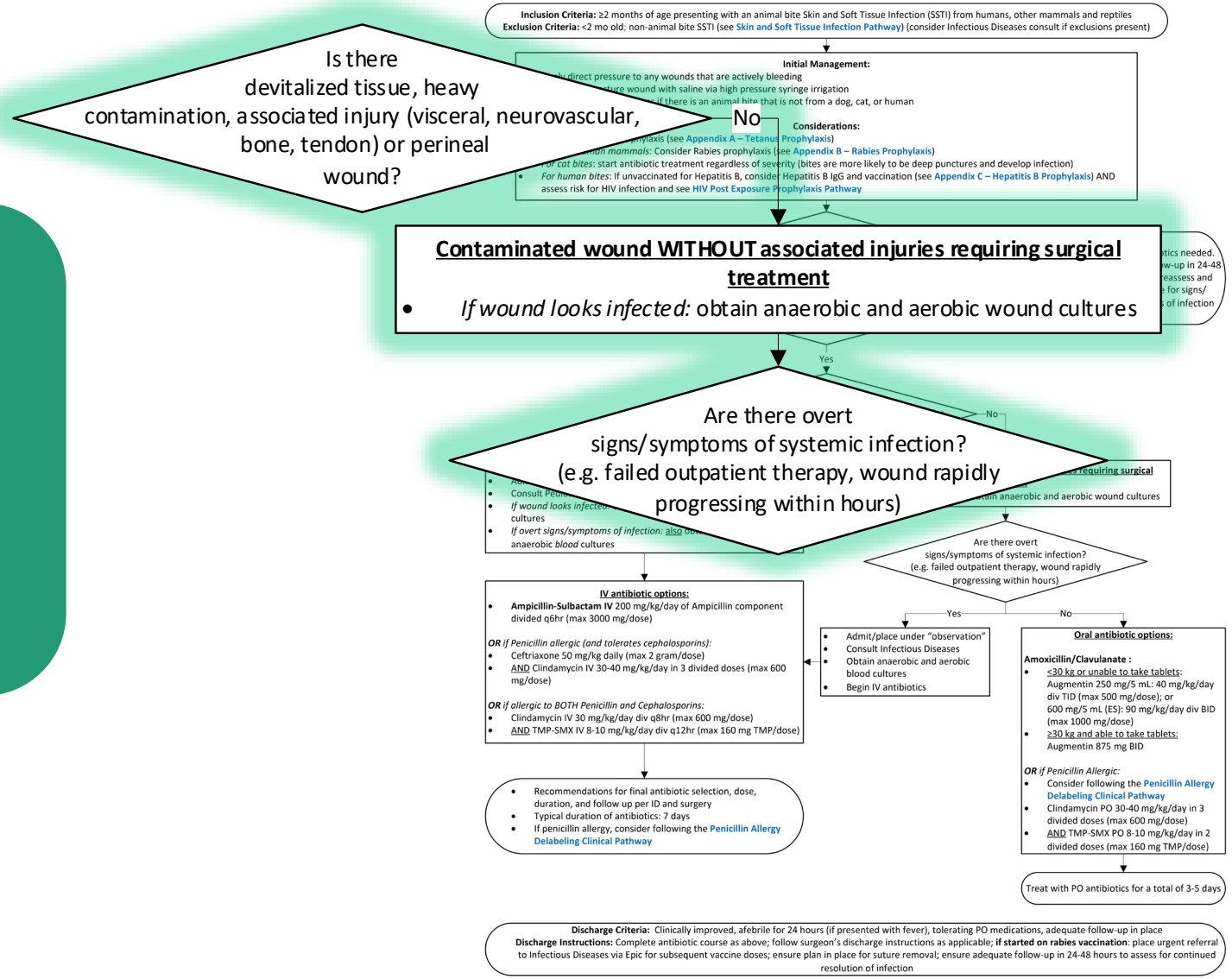
A contaminated wound **without** associated injuries is considered a significant wound, but does not require surgical treatment.

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



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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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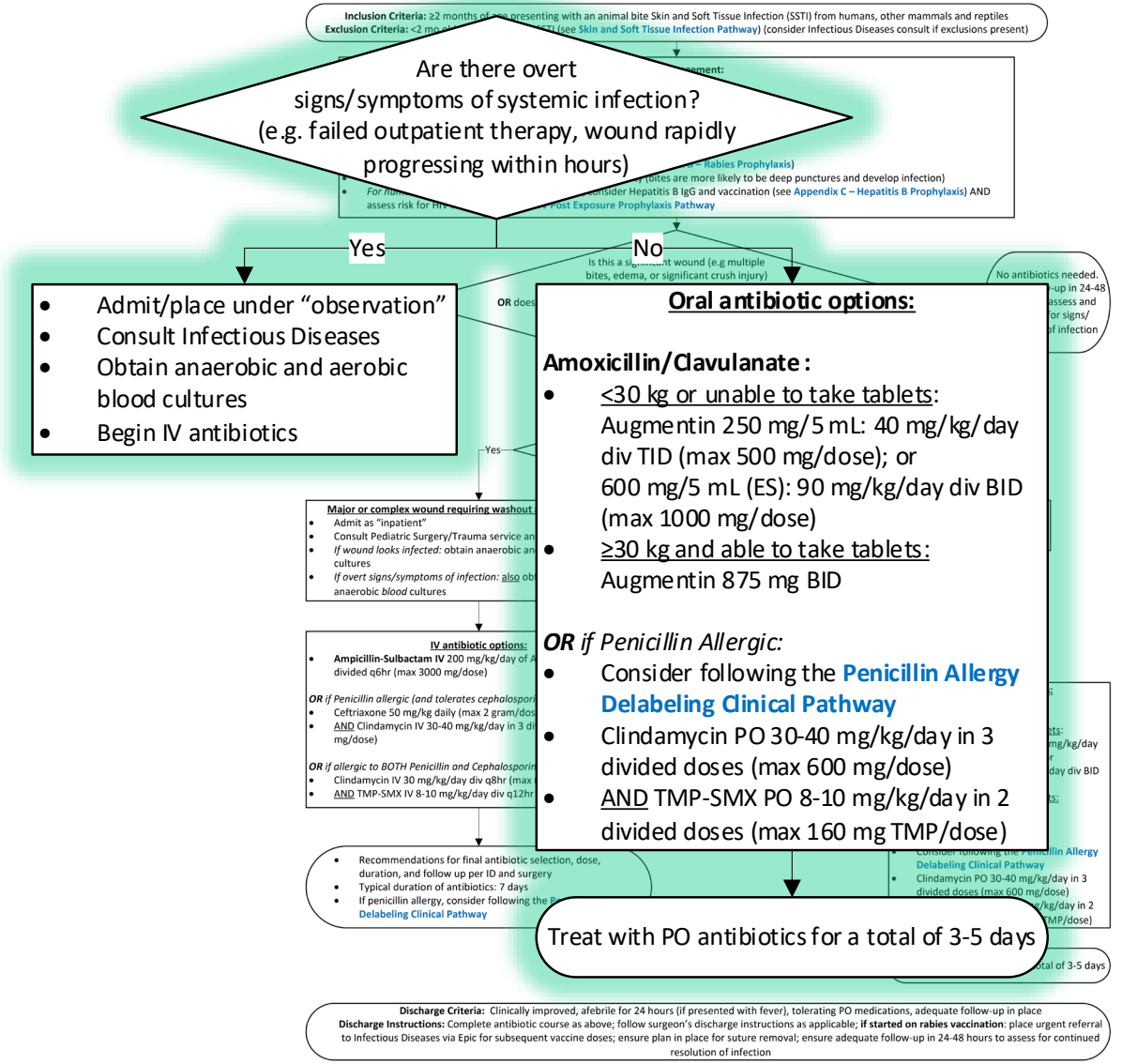

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If there are overt signs/symptoms of infection:

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

Of note, these patients do not meet inpatient admission criteria and should be "admitted/placed in observation"

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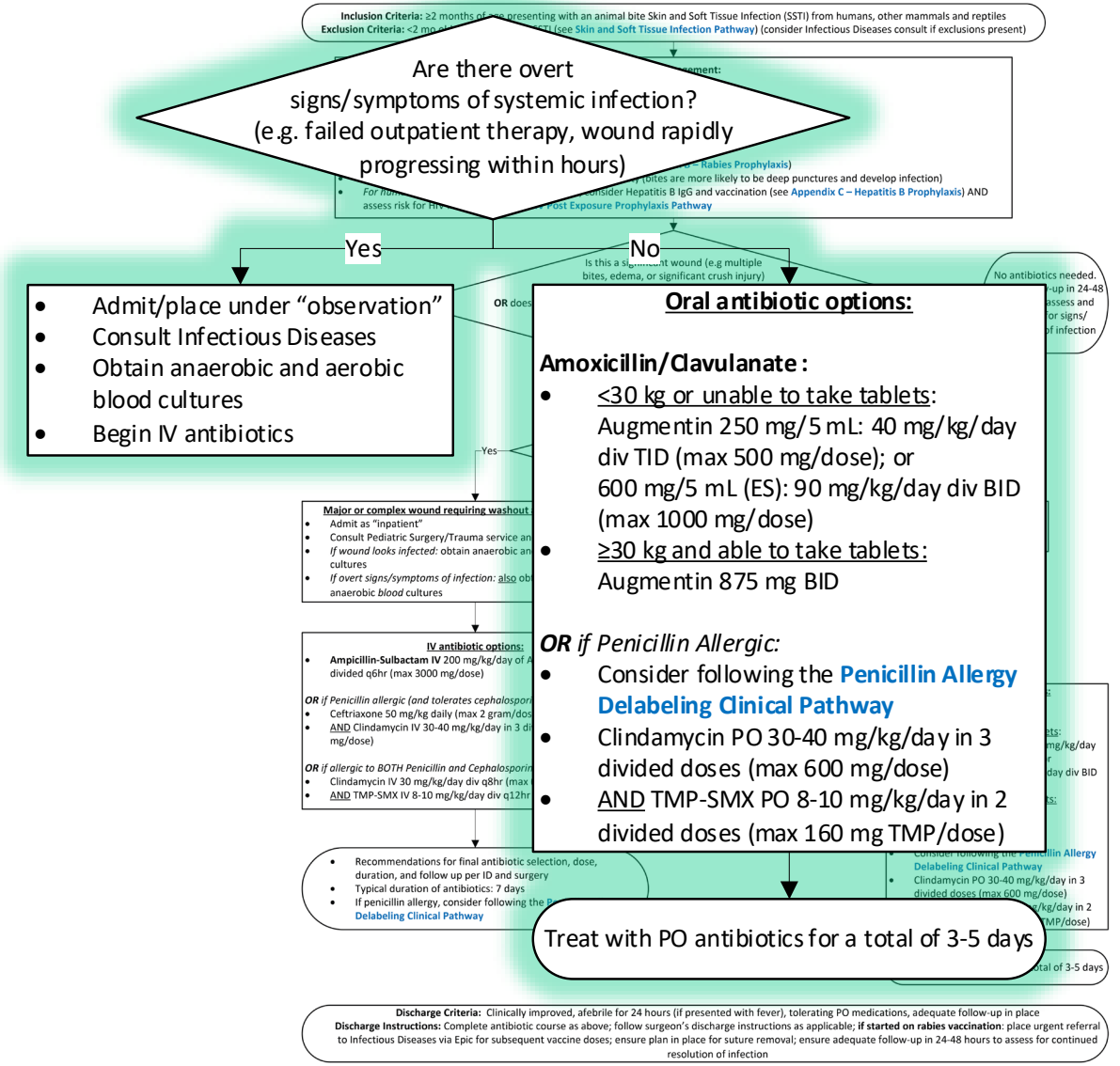

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If there are no overt signs and symptoms of infection:

- Begin treatment with the appropriate ORAL antibiotic
- If the patient has a reported penicillin allergy, consider following the **Penicillin Allergy Delabeling Clinical Pathway**
- Clindamycin and TMP-SMX are preferred over doxycycline alone for true penicillin allergy
- Note that the TOTAL treatment duration is 3-5 days

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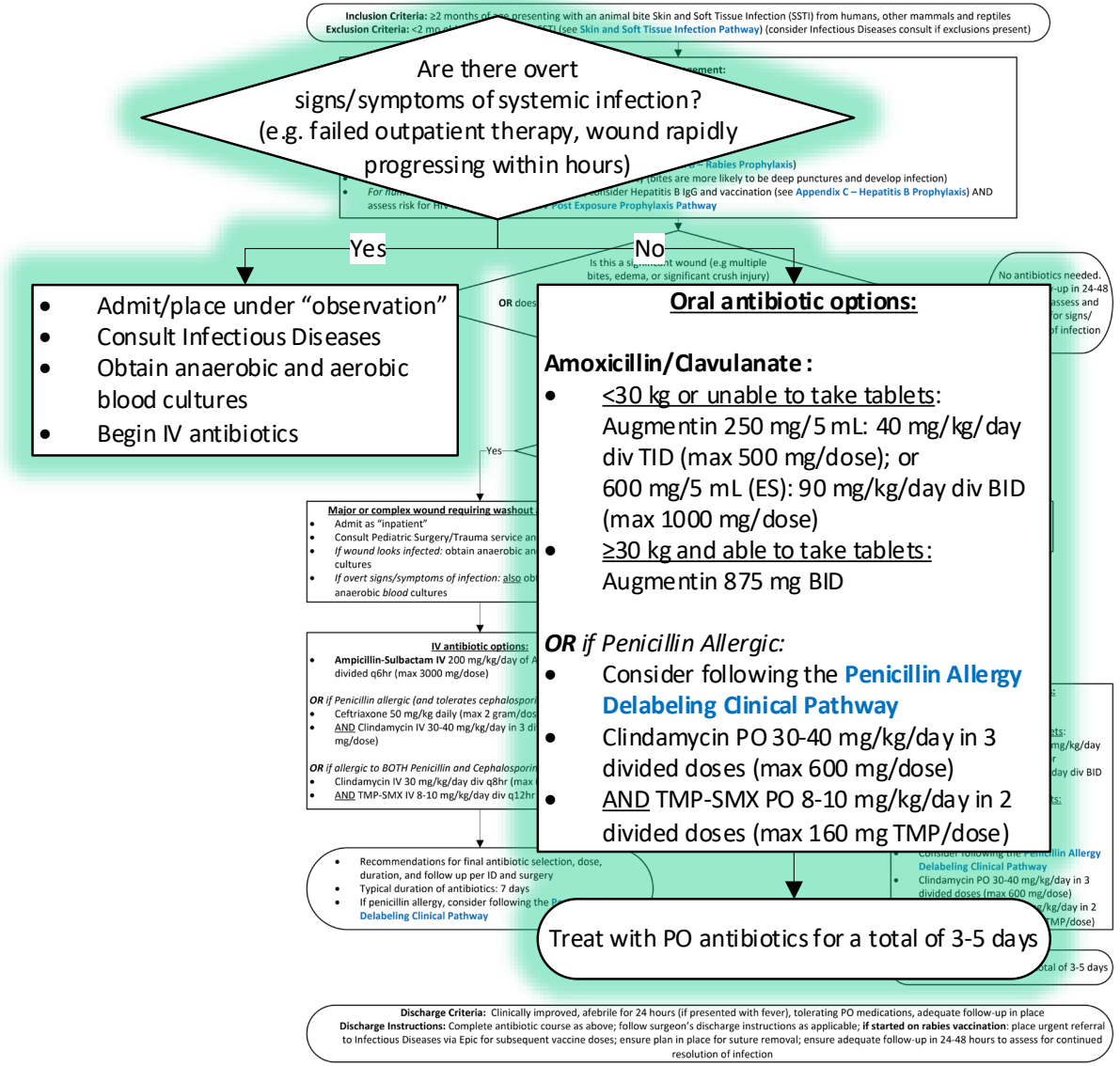

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Discharge criteria and instructions are listed

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**: place urgent referral to Infectious Diseases via Epic for subsequent vaccine doses; ensure plan in place for suture removal; ensure adequate follow-up in 24-48 hours to assess for continued resolution of infection

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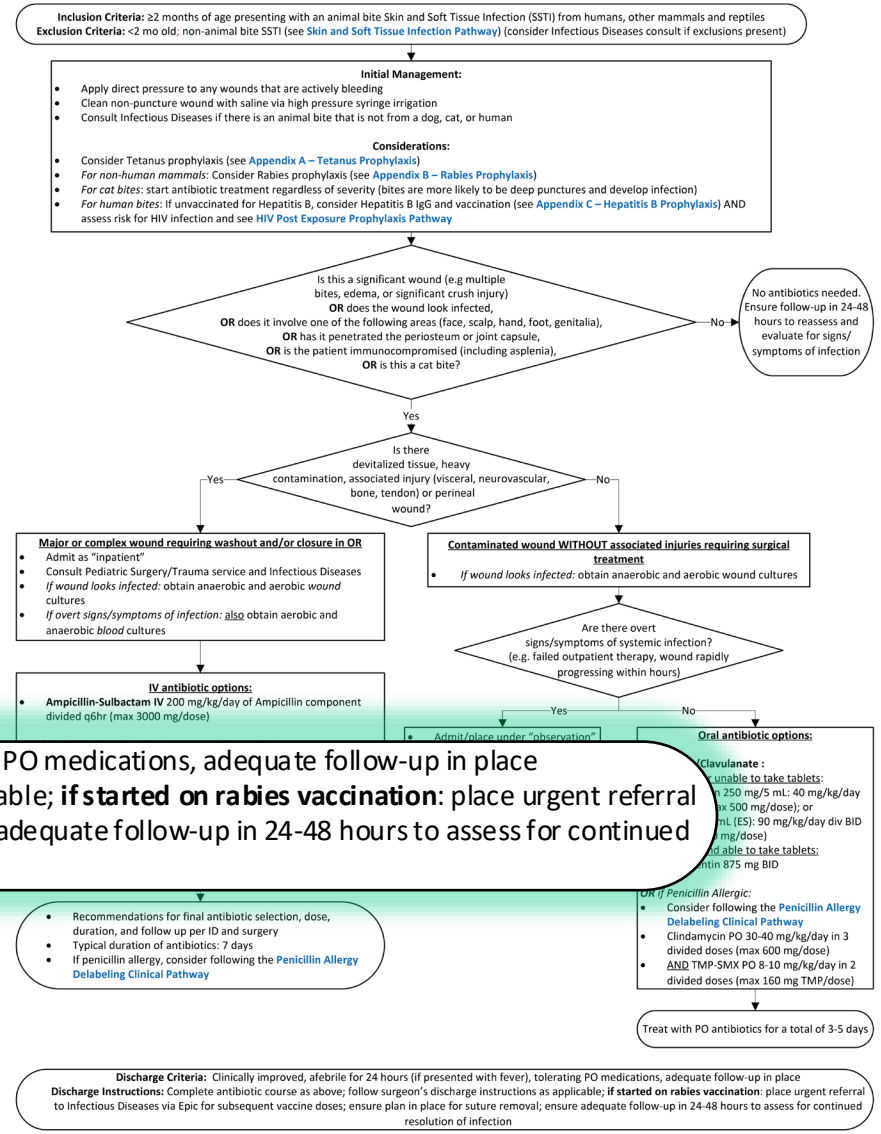

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Note that you may now refer to Infectious Disease for subsequent rabies vaccines via Epic.

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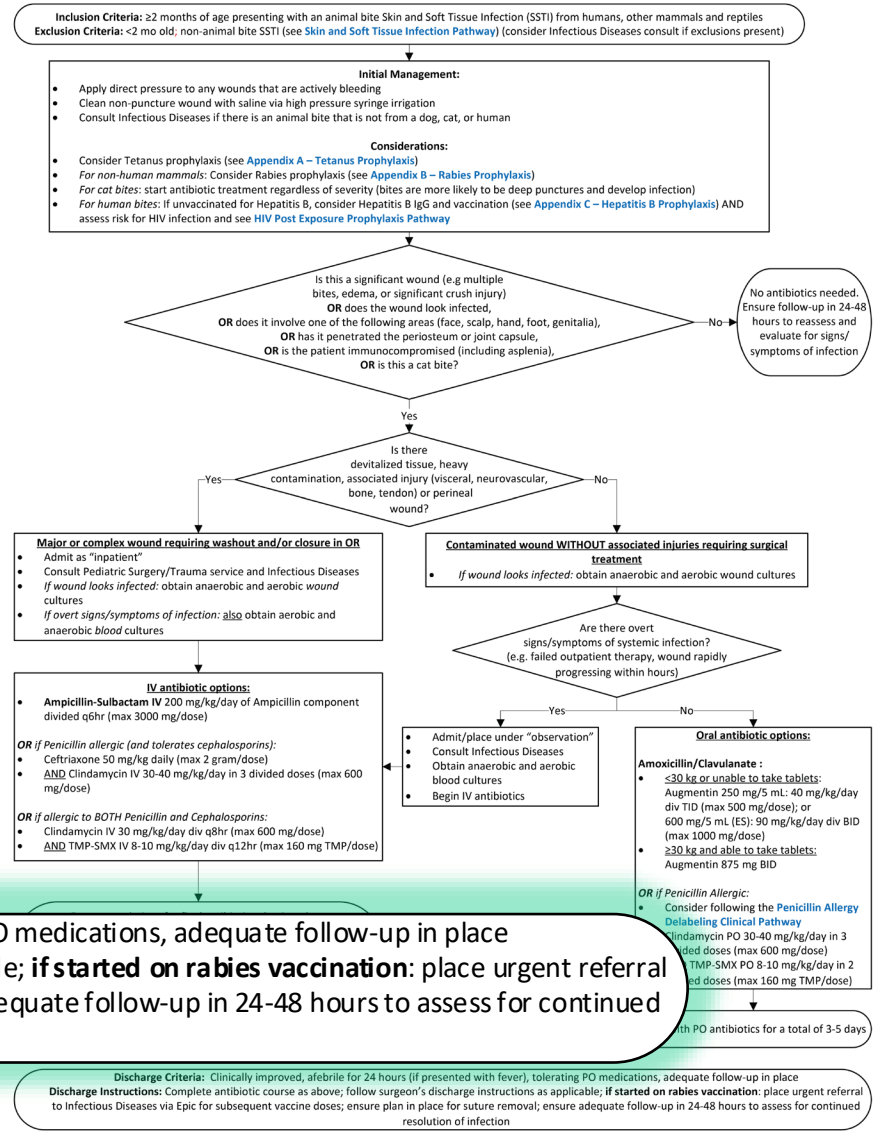

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Review of Key Points

- Inclusion criteria includes an animal bite (from cat, dog, human) and the patient is ≥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

- 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.