College of Registered Nurses of Saskatchewan

Bites: Adult & Pediatric

Skin and Integumentary

Clinical Decision Tools for RNs with Additional Authorized Practice [RN(AAP)s]

Effective Date: February 1, 2022

Background

A bite is a wound from dogs, cats, or other animals, including humans. In most cases bites may result in puncture wounds, lacerations, and in some cases, crush injuries. All bites, regardless of the source, are contaminated wounds and have a substantial risk of infection (Dunphy, Winland-Brown, Porter, & Thomas, 2019).

Further information about this condition is as follows:

- Prevalence of dog-bite injury hospitalizations are higher in areas with lower socioeconomic status as well as in rural and remote regions of Canada (Raghavan, Martens, & Birch, 2014).
- Adult human bites are often the result of one person striking another in the mouth with a clenched fist whereas pediatric human biting usually occurs between children (Simerson, 2021).

Immediate Consultation Requirements

The RN(AAP) should seek immediate consultation from a physician/NP when any of the following circumstances exist:

- wounds are extensive and/or deep;
- muscle, tendon, nerve, or vascular compromise is present or suspected;
- significant edema or crush injury;
- "fight bite" (over a joint in the hand from hitting someone in the mouth);
- significant blood loss;
- open fracture or amputation of digits;
- bites involving the face, genitalia, or deep abdomen;
- signs of sepsis (e.g., fever, tachycardia, hypotension, tachypnea, altered mental status);
- fever;
- spreading cellulitis with or without significant adenitis;

- the client is pregnant;
- the client is immunocompromised; or
- bite from a potentially rabid animal (wild animal bites, or unprovoked bites, domestic or wild) (Interprofessional Advisory Group [IPAG], personal communication, July 19, 2019).

Pathogens Associated with Bite Source

The *Anti-infective Guidelines for Community-acquired Infections* (Anti-infective Review Panel, 2019) provide the most common pathogens associated with bite sources as follows:

Dog Bites
• *Pasteurella spp.* is present in 50% of bites. • Also found: *Viridans streptococci, Staphylococcus aureus (S. aureus), Staphylococcus intermedius, Bacteroides, Capnocytophaga canimorsus, Fusobacterium.*
Cat Bites
• *Pasteurella spp.* is present in 75% of bites. • Also found: *Streptococcus spp. (including Streptococcus pyogenes), Staphylococcus spp.* (including methicillin-resistant *S. aureus*), *Fusobacterium spp., Bacteroides spp., Porphyromonas spp., Moraxella spp.*
Human Bites
• *Streptococcus spp., S.* aureus, Eikenella corrodens, and various anaerobic bacteria (e.g., • *Fusobacterium, Peptosstreptococcus, Prevotella,* and *Porphyromonas spp.*). • *Capnocytophaga canimorsus* is a human pathogen that can lead to septicaemia, endocarditis, and meningitis in high-risk individuals. • Although rare, case reports have suggested transmission of viruses such as hepatitis, human immunodeficiency virus (HIV), and herpes simplex.
Rodent Bites
• *Streptobacillus moniliformis* or *Spirillum minor*, which causes rat-bite fever.
Reptile Bites
• In addition to snake venom tissue necrosis: *Pseudomonas aeruginosa, Proteus spp., Salmonella, Bacteroides fragilis*, and *Clostridium spp.*

Predisposing and Risk Factors

The risk of bite-wound infection depends on the wound location, tissue damage, client characteristics (e.g., immunosuppression, age, chronic disease, immunization status), time elapsed before treatment, and the type of animal that inflicted the wound (Dunphy et al., 2019). Other risk factors for infection include:

- exposure to unfamiliar domestic animals;
- acts of violence;

- presence of male dogs, as they are more likely to bite;
- clenched fist human bites are frequently associated with the use of alcohol; and
- clients who present greater than eight hours following the bite, as they are at greater risk of infection (Dunphy et al., 2019).

Health History and Physical Exam

Subjective Findings

The circumstances of the bite injury should be determined. These include:

- area(s) of the body injured;
- time elapsed since the injury;
- loss of function in nearby tendons, ligaments, and nerves (sensation);
- medical history (diabetes, immunocompromised client, peripheral vascular disease, chemotherapy);
- medication history;
- status of tetanus vaccination;
- previous rabies immunization;
- allergies (drugs, dressings, local anesthetic);
- type of animal (including breed);
- current location of the animal;
- relationship of the animal to the client;
- vaccination and health status of the animal or human biter (e.g., Hepatitis B or C); and
- if the attack was provoked or unprovoked (Dunphy et al., 2019).

Objective Findings

Many of the bite wounds seen in clinic will be in the extremities where the client handled or attempted to avoid the animal or another person. Injuries to the head and neck are the next most common bite wounds. Dunphy and colleagues (2019) recommend the following physical exam:

- Inspect the skin and soft tissues, noting the presence or absence of lacerations, punctures, scratches, abrasions, swelling, crush injuries, and/or devitalized tissue. Estimate blood loss.
- Carefully examine all puncture wounds and assess the likelihood of injury to structures under the skin.
- Perform a vascular examination, noting skin temperature, capillary refill time, and relevant pulses.
- Assess the range of motion of all affected areas, evaluating the functional status of potentially involved tendons. Note motor and sensory nerve function and compare to the uninjured side.
- Evaluate for a skeletal injury, carefully assessing for neurovascular, joint, tendon, and osseous injury.
- If the client does not present with the bite wound until several hours or days following the injury, search for evidence of local or systemic infection and regional adenopathy. Maintain a

high index of suspicion for the possibility of a retained foreign body (e.g., tooth fragment) at a puncture wound site.

Differential Diagnosis

The diagnosis is typically straightforward by history and physical exam. No differential diagnoses are indicated.

Making the Diagnosis

Because organisms may be difficult to culture, the diagnosis of specific infections is often based on the type of animal bite (e.g., dog, cat, human) (Dunphy et al., 2019).

Investigations and Diagnostic Tests

An x-ray should be done if a fracture is suspected, a foreign body is present, if a bone, joint, or tendon has been penetrated, or if a puncture wound has become infected (Dunphy et al., 2019). Consider serology for HIV, Hepatitis B, and Hepatitis C for human bites (Dunphy et al., 2019).

Management and Interventions

Goals of Treatment

The primary goals of immediate treatment are to manage pain, restore function, minimize risk of infection, and repair tissue integrity (Dunphy et al., 2019).

Non-Pharmacological Interventions

The RN(AAP) should apply the following non-pharmacological interventions:

- Do not attempt closure of bite wounds.
- Irrigate wound with normal saline or dilute povidone-iodine solution.
- (High-pressure irrigation is the most effective means of cleansing, use a 60 mL syringe with 16 or 18-gauge IV catheter).
- Remove superficial debris, necrotic tissue, and foreign bodies.
- Report all animal bites to Public Health.
- Check employer policy regarding completion of reports (e.g., human blood and bodily fluid exposure; animal bite report; rabies) (Dunphy et al., 2019).

Pharmacological Interventions

The pharmacological interventions contained within are in accordance with the *Anti-infective Guidelines for Community-acquired Infections* (Anti-Infective Review Panel, 2019) and the *RxFiles Drug Comparison Charts* (RxFiles Academic Detailing Program, 2021).

The RN(AAP) should:

- Assess the need for anti-rabies therapy.
- Provide tetanus toxoid immunization for those whose tetanus status is unknown, who have not completed the three-dose series, or whose last dose was greater than five years ago.
- Be aware that HIV post exposure prophylaxis is generally not recommended for human bites, given the extremely low risk for transmission.
- Refer to the information below to guide antibiotic selection and length of therapy.

Prophylactic Antibiotics

Prophylactic antibiotics should be considered for clients with a fresh bite, and any of the following:

- bitten by a cat;
- hand, face, or upper limb bite;
- moderate to severe tissue damage;
- one or more puncture wounds; or
- a suppressed immune system.

A three-to-five-day course of antibiotics is considered sufficient if the client presents within 12 hours of the bite. Otherwise, a full course of antibiotics should be prescribed. Longer treatment is also required if there is bone or joint involvement.

Cat Bites

High rate of infection (up to 80%). Prophylaxis within 12 hours for all significant cat bites. For treatment of moderate to severe bites, consult a physician/NP.

Dog Bites

As the infection rate is approximately 5%, prophylaxis should only be prescribed if any of the following situations are present:

- there is a moderate to severe crush injury/edema;
- puncture wound is present;
- there is bone/joint involvement;
- injuries to the hand, face, or genitalia are present; or
- the client has had his/her spleen removed or is otherwise immunocompromised.

Human Bites

Rate of infection is approximately 50%. The use of MetroNIDAZOLE is added to Amoxicillin-Clavulanate or Ciprofloxacin as anaerobic coverage is required and should be considered in moderate to severe presentations.

Contraindications to the use of metroNIDAZOLE include pregnancy and the use of alcohol. In this situation clindamycin would be the second choice.

Oral Antibiotics

	Drug	Dose	Route	Frequency	Duration
Pediatric (without penicillin allergy)					
	Amoxicillin-Clavulanate	40 mg/kg/day (Amoxicillin is used for calculations; do not exceed adult dose)	p.o.	divided q8h	5-10 days
PLUS	MetroNIDAZOLE (in moderate to severe presentations)	15-30 mg/kg/day	p.o.	divided q12h	5-10 days
Adult (without penicillin allergy)					
	Amoxicillin-Clavulanate	875 mg	p.o.	q12h	5-10 days
PLUS	MetroNIDAZOLE (in moderate to severe presentations)	500 mg	p.o.	q12h	5-10 days
Pediatric (≤ 8 years of age with penicillin allergy)					
	Sulfamethoxazole/ Trimethoprim (SMX/TMP)	4-5 mg/kg/day (TMP is used for calculations; do not exceed adult dose)	p.o.	divided q12h	10-14 days
PLUS	Clindamycin	10-20 mg/kg/day (do not exceed adult dose)	p.o.	divided q6h	3-5 days
Pediatric (≥ 8 years of age with penicillin allergy)					
	Doxycycline	2-4 mg/kg/day (do not exceed 100 mg per dose)	p.o.	divided q12h x 1 day and the once daily	10-14 days

	Drug	Dose	Route	Frequency	Duration
PLUS	MetroNIDAZOLE (in moderate to severe presentations)	15-30 mg/kg/day	p.o.	divided q12h	5-10 days
Adult (with penicillin allergy)					
	Sulfamethoxazole/ Trimethoprim (SMX/TMP)	1 DS tablet (800/160 mg)	p.o.	q12h	5-10 days
OR	Ciprofloxacin	500 mg	p.o.	q12h	5-10 days
PLUS	Clindamycin	300-450 mg	p.o.	q.i.d.	5-10 days
Adult (with penicillin allergy)					
	Doxycycline	100 mg	p.o.	BID for 1st day and then once daily	5-10 days
PLUS	MetroNIDAZOLE (in moderate to severe presentations)	500 mg	p.o.	q12h	5-10 days

Analgesics

	Drug	Dose	Route	Frequency	Duration
Pediatric					
	Acetaminophen	15 mg/kg/dose (maximum dose 75 mg/kg/day)	p.o.	q4-6h prn	5-7 days
AND/ OR	Ibuprofen	10 mg/kg/dose (maximum dose 40 mg/kg/day)	p.o.	q6-8h prn	5-7 days

	Drug	Dose	Route	Frequency	Duration
Adult					
	Acetaminophen	500-1000 mg (maximum dose of 4 g/day)	p.o.	q4-6h prn	5-7 days
AND/ OR	Ibuprofen	400-600 mg (maximum dose of 3200 mg/day)	p.o.	q6-8h prn	5-7 days

Client and Caregiver Education

The RN(AAP) provides client and caregiver education as follows:

- If the bite was inflicted by a wild animal or in an unprovoked attack by a domestic animal, the clinician should seek to have the animal restrained in case the animal needs to be examined for rabies. Advise to refrain from damaging the animal's head as it can spread the rabies virus and make lab testing difficult. This incident must be reported to the Medical Health Officer (MHO) who may direct that the animal be euthanized and tested for rabies.
- Remind to elevate injured extremities to prevent swelling and to return for follow-up if signs of fever, redness, or swelling occur.
- Remind of the importance of refrain from petting or feeding strange or wild animals.
- Counsel about the appropriate use of medications (dose, frequency, compliance, etc.) (Dunphy et al., 2019).

Monitoring and Follow-up

The RN(AAP) should instruct the client to return for reassessment if redness, swelling, discharge, increase in pain, or fever develops (Dunphy et al., 2019).

Complications

The following complications may occur:

- scarring,
- pain,
- local or distant spread of infection is possible,
- suppuration and abscess formation may occur,
- gas gangrene,
- sepsis,
- meningitis,
- endocarditis,
- post-traumatic stress disorder, and
- extremity cellulitis may extend into deep tissues to produce an arthritis or osteomyelitis, or it may extend proximally as a lymphangitis (Dunphy et al., 2019).

Referral

Refer to a physician/NP if client presentation is consistent with those identified in the *Immediate Consultation Requirements* section or if there is a failure to respond to the prescribed treatment (IPAG, personal communication, July 19, 2019).

References

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