Mammalian bites - Emergency management in children

Purpose

This document provides clinical guidance for all staff involved in the care and management of a child presenting to an Emergency Department (ED) following a mammalian bite in Queensland.

This guideline has been developed by senior ED clinicians, with input from infectious diseases, plastics and pharmacy teams, Queensland Children’s Hospital, Brisbane.

Introduction

Key points

- Mammalian bites are a common ED presentation in children; most are minor.
- Take a detailed history to identify the children who need further investigation.
- Assess vaccination status and consider the need for vaccinations/post exposure prophylaxis.
- Clenched fist injuries (“fight bites”) that penetrate deep tissues and late presentations are considered high risk for severe infections.
- In most cases there is no indication for blood work or prophylactic antibiotics. Adequate washout is the most pivotal part of the treatment.

Australia has one of the highest rates of pet ownership in the world. Worldwide around 2% of the total population are bitten annually\(^1,2,3\). Most bites are from domestic animals and majority of bite victims are children\(^1,2\).

Dog (80-90%) and cat (5 to 10%) bites represent the majority of mammalian bites followed by humans (2 to 3%) and rodents (2 to 3%)\(^1,2,4,5\).

Risk factors for dog bites are male gender and younger age\(^1,2\). Face, neck and head bites are more frequent in children\(^13\).

Bite related injury can vary greatly depending on the biting animal’s characteristics and the anatomic location of the bite. Dog bites usually comprise crush injuries, lacerations and abrasions. Cat bite injuries are usually a puncture wound that could seem minimal at the skin surface but can penetrate deeper layers including into joints\(^1\).
Psychological trauma, including post-traumatic stress disorder, is very common in children who have experienced dog attacks\textsuperscript{1,2,6}.

Infection rates of bite wounds can vary depending on the animal’s oral flora, the environment or the host skin flora\textsuperscript{1}. Different mammalian species have characteristic oral flora, but all infections caused by mammalian bites should be considered to be polymicrobial\textsuperscript{1}. The chance of a bite site being infected varies by species – human and cat bites are the more likely to be infected \textsuperscript{1,6}.

- \textit{Pasteurella sp.} should be considered in rapidly progressive skin and soft tissue infection following mammalian bites (common in oral flora of many mammals including dogs and cats). The incubation period for \textit{Pasteurella multocida} infection is one to three days.

- \textit{Capnocytophaga canimorsus} can cause bacteremia and fatal sepsis after animal bites, especially in patients with asplenia or underlying hepatic disease. The incubation period for \textit{C. canimorsus} infection is one to three days.

- \textit{Bartonella henselae} may be transmitted via the bite of an infected cat; other forms of transmission include cat scratches and contact with cat saliva via broken skin or mucosal surfaces. The incubation period for \textit{B. henselae} infection is 7 to 14 days.

- \textit{Francisella tularensis} may be transmitted by infected possum bites/scratches and cause Tularemia disease. Symptoms usually appear suddenly and include high fever, a skin ulcer at the site of the bite or skin exposure, and swelling of the nearby lymph glands chills, fatigue, general body aches, headache and nausea and develop between 3 and 5 days after being infected.

- \textit{Macacine alphaherpesvirus 1} transmitted by infected macaque monkeys can cause severe CNS disease including encephalitis.

- Rat bite fever (caused by \textit{Streptobacillus moniliformis} or \textit{Spirillum minus}) should be considered in a child presenting with fever, rash and arthritis 4 to 10 days following a rodent bite.

- Hendra Virus is known to have infected 7 people after high levels of exposure to infected horses. It should be considered in a child with a influenza-like illness 5 -21 days post exposure to a sick horse\textsuperscript{15}.

Clenched fist injuries (“fight bites”) are considered the most severe human bite injuries and result from the patient striking another person’s teeth. They usually occur at the metacarpophalangeal joints of the dominant hand of the patient. In these cases, there is a higher risk for septic arthritis and osteomyelitis \textsuperscript{2,6}.

Human immunodeficiency virus (HIV), Hepatitis B virus (HBV) and Hepatitis C virus (HCV) can be transmitted following a human bite\textsuperscript{10,11}. (For elaboration see the CHQ-GDL-65664 Post-Exposure Prophylaxis for HIV and contact the Public Health and the Infection Disease consultant on service to discuss any suspected cases).

Mammalian bites in locations with endemic rabies (not including Australia) can transmit rabies and bat bites/scratches within Australia can transmit the Australian bat lyssavirus (similar to rabies virus). Three patients have died due to Australian bat lyssavirus infection. (For elaboration see the CHQ-GDL-00719 Management of children presenting with potential Lyssavirus (rabies) exposures - Emergency Management in Children and contact Infection Disease consultant on service to discuss suspected cases).
Assessment

The primary aim of the assessment is to identify children who need urgent management.

History
History should include specific questioning on:

- Circumstances of the bite:
  - Animal species
  - Provocation
  - Timing
  - Geographical location
- Immunisation status (including tetanus, rabies, hepatitis)
- Medical comorbidities

Examination

- Careful physical examination is needed including exploration even of apparently minor injuries.
- Assess the wound location and severity, degree of penetration of bone or joint, tendon function and neurovascular function.

Explore the wound (local or general anaesthetic if needed)

- Look for foreign bodies (e.g. animal teeth).
- For late presentation, assess for established infection (e.g. pain, swelling, erythema or discharge from wound, significant pain on passive movement of the MCPJ).
Investigations

Investigations for the management of mammalian bites in children

<table>
<thead>
<tr>
<th>Investigation type</th>
<th>Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-ray</td>
<td>In cases of suspected fracture/deep tissue involvement/foreign body</td>
</tr>
<tr>
<td>Ultrasound</td>
<td>Can be used for suspected soft tissue injury when a non-radiopaque foreign body is suspected</td>
</tr>
<tr>
<td>Blood tests (including blood cultures, FBC, CHEM20 and C-reactive protein)</td>
<td>Indicated only in specific cases of suspected soft tissue infection in late presentations. There is no need to take bloods for recent bite unless the patient is systemically unwell/ life-threatening injuries.</td>
</tr>
<tr>
<td>Wound swab for culture</td>
<td>Cultures from infected bite wounds should be obtained to establish the microbiology of the infection and to guide antibiotic therapy. Wound cultures are not indicated in clinically uninfected bite wounds because results do not correlate with subsequent infection.</td>
</tr>
</tbody>
</table>

Management

Any life-threatening injuries should be treated according to standard guidelines.

Wound management:

- Remove any foreign bodies.
- Clean wound thoroughly with water and soap or saline. Use enough fluid to remove all visible dirt and foreign material (usually 250 mL is adequate).
- Open wounds should be irrigated under high pressure using a 19 or 20 gauge needle or plastic catheter on a large syringe and non-viable tissue should be debrided.

**ALERT** – Note: care should be taken when irrigating small puncture wounds as high pressure irrigation may result excessive infiltration of the soft tissues with irrigation fluid.

Wound closure:

- As there is limited evidence, decisions regarding wound closure should be made on a case by case basis
- In areas where cosmetic outcome is important – primary closure could be considered after explaining to the parents the risks of wound closure. Primary closure of head and neck wounds is associated with 1% of risk infection.
- In cases where there is a high infection rate – no primary closure is recommended.
High risk cases for infection:

- Puncture and crush wounds
- Penetration of bone/joint/tendon/vascular structures
- Wounds of hands/feet/face or genitals
- Delayed presentation > 8 hours
- Cat bite wounds
- Water immersed wound infection
- Immunocompromised patients (including asplenic children) \(^6,1,14,10\)

Complex bite wounds:

- Elevate injured extremity for the first 2-3 days.
- Significant hand wounds can benefit from 3-5 days of immobilisation.
- A fracture associated with a bite should be managed as a compound fracture with IV antibiotic treatment and hospital/specialist referral.

Vaccinations/ postexposure prophylaxis:

- Rabies vaccine and postexposure prophylaxis (HRIG) should be administered to all bat bites/scratches and children with a mammalian bite wound from a rabies endemic area (including Indonesia/Bali).
  - If the patient is vaccinated (documented), then rabies immunoglobulin (HRIG) is not required however they should receive two additional doses of rabies vaccine. Contact Public Health authorities for advice and access to rabies vaccine.
  - No rabies postexposure prophylaxis should be administered to children bitten in Australia by any animal other than a bat.
- Tetanus vaccination should be administered according to the Tetanus Prophylaxis in Wound Management
- For human bites including clenched fist injuries consider hepatitis B if not immune and HIV prophylaxis (if at high risk seek ID advice).

ALERT – In any child suspected to be bitten by a mammal in a rabies endemic country / Bitten/scratched by a bat in Australia – HRIG and rabies vaccination should be given according to protocol on advice from Public Health.
Antibiotic treatment:

- Prophylactic treatment is indicated in human bites and hand injuries\(^3\).

- Despite the lack of strong evidence, prophylactic treatment is commonly given in cases of severe dog and cat bites wounds.
  
  - For empiric antibiotic recommendations, refer to the CHQ-GDL-01202 CHQ Paediatric Antibiocard: Empirical Antibiotic Guidelines
    
    - If water-related/immersed wound infection, also refer to CHQ-GDL-63000 Management of Water-immersed Wound Infections in Children and contact Infection Management team for advice.
    
    - If open globe/penetrating eye injury, also refer to CHQ-GDL-01074 Acute management of Open Globe Injuries (penetrating eye injury) and contact Ophthalmology team for advice.

Reporting:

- Brisbane Council responds to reports of dog attacks and aggressive dogs 24 hours a day, 7 days a week and can be reported by calling Council on 07 3403 8888.

**When to escalate care**

Follow your local facility escalation protocols for children of concern. Transfer is recommended if the child requires care beyond the level of comfort of the treating hospital. Clinicians can contact the services outlined below to escalate the care of a paediatric patient.

**Indications for referral:**

- Systemic signs of infection
- Refractory to oral antibiotics
- Multiple and severe injuries
- Involvement of joint/bone/nerve/tendon
- Wound requiring surgical intervention
- Significant hands, feet or facial bites
- Human bites with puncture wounds
- Immunocompromised host

 Contact specialist teams, infectious diseases, plastics or ortho via CATCH depending on indication
### Statewide Paediatric Guideline

#### Emergency

<table>
<thead>
<tr>
<th>Service</th>
<th>Reason for contact by clinician</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Local Paediatric service</strong></td>
<td>For specialist paediatric advice and assistance with local transfers as per local arrangements.</td>
<td>As per local arrangements</td>
</tr>
<tr>
<td><strong>Children’s Advice and Transport Coordination Hub (CATCH)</strong></td>
<td>For access to specialist paediatric advice and assistance with inter-hospital transfer of non-critical patients into and out of Queensland Children’s Hospital. For assistance with decision making regarding safe and appropriate inter-hospital transfer of children in Queensland. For Queensland Health (QH) staff, <a href="#">click here</a> for the QH Inter-hospital transfer request form (access via intranet).</td>
<td>13 CATCH (13 22 82) 24 hours <a href="#">CATCH website</a></td>
</tr>
<tr>
<td><strong>Telehealth Emergency Management Support Unit (TEMSU)</strong></td>
<td>For access to generalist and specialist acute support and advice via videoconferencing, as per locally agreed pathways, in regional, rural and remote areas in Queensland.</td>
<td><a href="#">TEMSU QHEPS website</a> 24 hours</td>
</tr>
<tr>
<td><strong>Retrieval Services Queensland (RSQ)</strong></td>
<td>For access to telehealth support for, and to notify of, critically unwell patients requiring retrieval in Queensland. For any patients potentially requiring aeromedical retrieval or transfer in Queensland.</td>
<td><a href="#">RSQ QHEPS website</a> 24 hours</td>
</tr>
</tbody>
</table>
When to consider discharge

Consider discharge in non-severe cases, systemically well children with no other indication for admission.

Follow-up

- In 24 to 48 hours by General Practitioner (GP) unless advised otherwise by a specialist.

When to consider admission

Admission should be considered in any case of:
- Systemic signs of infection
- Refractory to oral antibiotics
- Multiple and severe injuries
- Involvement of joint/bone/nerve/tendon

Related documents

Information for families

Recommendations for prevention
- https://raisingchildren.net.au/newborns/safety/home-pets/dogs

Guidelines

- CHQ-GDL-01023 Tetanus Prophylaxis in Wound Management
- CHQ-GDL-00719 Management of children presenting with potential Lyssavirus (rabies) exposures - Emergency Management in Children
- CHQ-GDL-01202 CHQ Paediatric Antibiocard: Empirical Antibiotic Guidelines
- CHQ-GDL-63000 Management of Water-immersed Wound Infections in Children
- CHQ-GDL-01074 Acute management of Open Globe Injuries (penetrating eye injury)
### References


8. Ozanne-Smith J, Ashby K, Stathakis VZ. Dog bite and injury prevention:


13. AIDS 2006;20:631–2


CHQ-GDL-60031 Mammalian Bites – Emergency management in children

- 10 -