Tick-borne diseases (excluding Lyme disease)

CANADIAN PAEDIATRIC SURVEILLANCE PROGRAM
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REPORTING INFORMATION (To be completed by the CPSP)	
Report number:	
Month of reporting:	
Province:	
Today's date:	

Please complete the following sections for the case identified above. If the information asked for below is not readily available, please leave it blank. Strict confidentiality of information will be assured. For further information, refer to our privacy notice.

CASE DEFINITION FOR TICK-BORNE DISEASES (EXCLUDING LYME DISEASE)

Report any patient less than 18 years of age (up to their 18th birthday) with a **confirmed** *OR* **suspected** case of one of the following tick-borne diseases (TBDs):

- *Anaplasmosis*
- *Babesiosis*
- *Powassan virus*
- *Relapsing fever (hard tick relapsing fever or soft tick relapsing fever)*
- *Rocky Mountain spotted fever*

A **confirmed** case meets confirmatory laboratory criteria, with or without meeting clinical criteria (see Appendix 1).

A **suspected** case meets supportive laboratory criteria AND clinical criteria (see Appendix 1).

- *Tick paralysis*

A **confirmed** case meets confirmatory clinical criteria (see Appendix 1).

Exclusion criteria

- Cases with confirmation of an alternative diagnosis, including other TBDs not listed here, which fully explains all symptoms
- Cases diagnosed by methods and/or laboratories not recommended by the Public Health Agency of Canada or the U.S. Centers for Disease Control and Prevention

TBD being reported: (select ONE)

❍ Anaplasmosis ❍ Babesiosis ❍ Powassan virus ❍ Relapsing fever ❍ Rocky Mountain spotted fever ❍ Tick paralysis

The case is: ❍ Confirmed ❍ Suspected

* **If the patient contracted more than one TBD, please contact the CPSP office to report any additional TBDs.**

SECTION 1 – PATIENT DEMOGRAPHIC INFORMATION

1.1 Month/year of birth: _____ /_____
MM YYYY

1.2 Sex assigned at birth: ❍ Male ❍ Female ❍ Intersex ❍ Unknown

1.3 Province/territory of permanent residence: _____

1.4 Province/territory of diagnosis: _____

1.5 First 3 digits of patient's postal code: ____ ____ ____

1.6 Does your practice setting collect patient-reported race/ethnicity/Indigenous identity data? ❍ Yes ❍ No ❍ Unknown

1.6.1 *If Yes,* which of the following identities were declared by the patient or family? (Select all that apply)

❑ Arab	❑ First Nations	❑ Latin American	❑ South Asian (e.g., Indian, Pakistani, Sri Lankan)
❑ Black	❑ Inuit	❑ Métis	❑ Southeast Asian (e.g., Vietnamese, Cambodian)
❑ Chinese	❑ Japanese	❑ White	❑ West Asian (e.g., Iranian, Afghan)
❑ Filipino	❑ Korean	❑ Unknown/did not ask	❑ Other; specify: _____

SECTION 2 – ENVIRONMENTAL EXPOSURE HISTORY

2.1 Did the patient have a history of a tick bite within 60 days of onset of the symptoms? ❍ Yes ❍ No ❍ Unknown

2.1.1 *If Yes*, when did the tick bite occur? ____/____/_____ ❍ Unknown
DD MM YYYY

2.1.2 *If Yes*, where on the body did the tick bite occur? ❍ Head ❍ Neck ❍ Chest ❍ Back ❍ Arms ❍ Hands ❍ Abdomen ❍ Genitals ❍ Buttocks ❍ Legs ❍ Feet ❍ Unknown

2.1.3 *If Yes*, where geographically did the tick bite occur? Country: _____ Province/State: _____
County: _____ Town or City _____ Park: _____ ❍ Unknown

2.1.4 *If No* or *Unknown*, where was the most likely location for tick exposure? Country: _____ Province/State: _____
County: _____ Town or City _____ Park: _____ ❍ Unknown

2.2 What was the type of environment where tick exposure most likely occurred?
❍ Farmland/Meadow ❍ Municipal park ❍ Private yard or public garden ❍ Other; specify_____
❍ Forest ❍ National or provincial park ❍ Unknown

2.3 Describe the activity(ies) that the patient was engaged in when they were likely exposed to tick(s)? (Select all that apply)
❑ Camping ❑ Picnicking ❑ Playing ❑ Other; specify: _____
❑ Dog walking ❑ Hiking ❑ Sports ❑ Unknown

SECTION 3 – CLINICAL HISTORY

3.1 Date of onset of first symptoms: ____/____/_____ ❍ Unknown
DD MM YYYY

3.2 Main presenting symptoms:

	Yes	No	Unknown		Yes	No	Unknown
General				**Cardiovascular**			
Fatigue	❍	❍	❍	Signs of heart failure	❍	❍	❍
Fever/Sweats/Chills	❍	❍	❍	Hypotension	❍	❍	❍
Malaise/Asthenia	❍	❍	❍	**Respiratory**			
Neurologic				Cough	❍	❍	❍
Ataxia	❍	❍	❍	Hemoptysis	❍	❍	❍
Confusion/Altered mental status/Disorientation	❍	❍	❍	Shortness of breath	❍	❍	❍
Diplopia	❍	❍	❍	**Gastrointestinal**			
Dizziness	❍	❍	❍	Abdominal pain	❍	❍	❍
Drooling	❍	❍	❍	Anorexia	❍	❍	❍
Drowsiness	❍	❍	❍	Diarrhea	❍	❍	❍
Dysarthria	❍	❍	❍	Hepatomegaly	❍	❍	❍
Dysphagia	❍	❍	❍	Jaundice	❍	❍	❍
Headache	❍	❍	❍	Nausea	❍	❍	❍
Irritability	❍	❍	❍	Splenomegaly	❍	❍	❍
Loss of consciousness/Syncope	❍	❍	❍	Vomiting	❍	❍	❍
Loss of coordination	❍	❍	❍	**Genitourinary**			
Neck stiffness	❍	❍	❍	Haemoglobinuria	❍	❍	❍
Paralysis	❍	❍	❍	**Musculoskeletal**			
Paresthesia	❍	❍	❍	Arthralgia	❍	❍	❍
Photophobia	❍	❍	❍	Arthritis	❍	❍	❍
Seizure	❍	❍	❍	Myalgia	❍	❍	❍
Speech difficulty	❍	❍	❍	**Dermatologic**			
Head and Neck				Diffuse rash	❍	❍	❍
Loss of vision	❍	❍	❍	Focal rash	❍	❍	❍
Sore throat	❍	❍	❍	**Other**			
				Other; specify: _____	❍	❍	❍

3.3 Are any of the following co-morbidities present? (Select all that apply)
❑ Asplenia
❑ Chronic illness (e.g., diabetes); specify:_____
❑ HIV infection
❑ Immunosuppressing/Immunomodulating agents
❑ None
❑ Malignancy under active chemotherapy or radiotherapy
❑ Primary immunodeficiency
❑ Transplant at any time; **specify**: ❑ Bone marrow ❑ Solid organ

SECTION 4 – LABORATORY DATA

4.1 Haematology (select all that apply): Date of testing: ____/____/_____
DD MM YYYY
❑ Anemia (haemoglobin <100 g/L) ❑ Leukopenia (white blood cell count <4x10^9/L)
❑ Thrombocytopenia (platelet count <150x10^9/L) ❑ Tests not done ❑ Results unavailable

4.2 Biochemistry: Date of testing: ___/____/_____ ❍ Transaminitis (ALT >35 U/L) ❍ Tests not done ❍ Results unavailable
DD MM YYYY

4.3 Microscopy (select all that apply): Date of testing: ____/____/_______ (DD MM YYYY)

- ❑ Thick and thin Giemsa-stained blood smear; specify: ❍ *Babesia sp.* found ❍ *Babesia sp.* not found ❍ Unavailable
  If Babesia sp. found, what was the parasitemia? ____ % ❍ Unavailable
- ❑ Peripheral blood smear; specify: ❍ Spirochetes seen ❍ Morulae seen ❍ Unavailable
- ❑ Other; specify: ______________________
- ❑ Tests not done

4.4 Cell culture (select all that apply): Date of testing: ____/____/_______ (DD MM YYYY)

- ❑ Tissue biopsy: ❍ Positive ❍ Negative ❍ Indeterminate ❍ Unavailable
- ❑ Cerebrospinal fluid (CSF): ❍ Positive ❍ Negative ❍ Indeterminate ❍ Unavailable
- ❑ Other; specify: ____________ ❍ Positive ❍ Negative ❍ Indeterminate ❍ Unavailable
- ❑ Tests not done

4.5 Nucleic acid amplification test (e.g., PCR, RT-PCR) (select all that apply): Date of testing: ____/____/_______ (DD MM YYYY)

- ❑ Blood: ❍ Positive ❍ Negative ❍ Indeterminate ❍ Unavailable
- ❑ CSF: ❍ Positive ❍ Negative ❍ Indeterminate ❍ Unavailable
- ❑ Bone marrow: ❍ Positive ❍ Negative ❍ Indeterminate ❍ Unavailable
- ❑ Tissue biopsy: ❍ Positive ❍ Negative ❍ Indeterminate ❍ Unavailable
- ❑ Tests not done

4.6 Immunohistochemistry: Date of testing: ____/____/_______ (DD MM YYYY)

- ❑ Type of specimen: ____________; specify: ❍ Antigen present ❍ Antigen not present ❍ Unavailable
- ❑ Tests not done

4.7 Serological testing (enter all tests completed, including repeat tests):

Date of test	Serological test*	Specimen type	Reactive	Non-reactive	Indeterminate	Result
____/____/_______ DD MM YYYY	❑ IFA ❑ ELISA ❑ HI ❑ PRNT	❑ Blood ❑ CSF	❑ IgM ❑ IgG ❑ Titre: _____	❑ IgM ❑ IgG ❑ Titre: _____	❑ IgM ❑ IgG ❑ Titre: _____	❑ Unavailable
____/____/_______ DD MM YYYY	❑ IFA ❑ ELISA ❑ HI ❑ PRNT	❑ Blood ❑ CSF	❑ IgM ❑ IgG ❑ Titre: _____	❑ IgM ❑ IgG ❑ Titre: _____	❑ IgM ❑ IgG ❑ Titre: _____	❑ Unavailable
____/____/_______ DD MM YYYY	❑ IFA ❑ ELISA ❑ HI ❑ PRNT	❑ Blood ❑ CSF	❑ IgM ❑ IgG ❑ Titre: _____	❑ IgM ❑ IgG ❑ Titre: _____	❑ IgM ❑ IgG ❑ Titre: _____	❑ Unavailable
____/____/_______ DD MM YYYY	❑ IFA ❑ ELISA ❑ HI ❑ PRNT	❑ Blood ❑ CSF	❑ IgM ❑ IgG ❑ Titre: _____	❑ IgM ❑ IgG ❑ Titre: _____	❑ IgM ❑ IgG ❑ Titre: _____	❑ Unavailable
____/____/_______ DD MM YYYY	❑ IFA ❑ ELISA ❑ HI ❑ PRNT	❑ Blood ❑ CSF	❑ IgM ❑ IgG ❑ Titre: _____	❑ IgM ❑ IgG ❑ Titre: _____	❑ IgM ❑ IgG ❑ Titre: _____	❑ Unavailable

*Indirect immunofluorescence assay (IFA), enzyme-linked immunosorbent assay (ELISA), hemagglutination inhibition (HI), plaque reduction neutralization test (PRNT)

4.8 Tick species identification: ❍ *Ixodes scapularis* ❍ *Ixodes pacificus* ❍ *Dermacentor andersoni* ❍ *Dermacentor variabilis* ❍ *Ornithodoros hermsi* ❍ Unknown

4.9 Was the patient also tested for Lyme disease? ❍ Yes ❍ No ❍ Unknown

4.9.1 *If Yes*, what was the serology result? ❍ Reactive ❍ Non-reactive ❍ Indeterminate ❍ Unavailable

4.9.2 *If Yes,* specify nucleic acid amplification test (select all that apply):

- ❑ CSF: ❍ Positive ❍ Negative ❍ Indeterminate ❍ Unavailable
- ❑ Synovial fluid: ❍ Positive ❍ Negative ❍ Indeterminate ❍ Unavailable
- ❑ Tests not done

4.10 Was the patient diagnosed with another concurrent infection? ❍ Yes; specify: ___________ ❍ No ❍ Unknown

SECTION 5 – TREATMENT AND OUTCOME

5.1 Was a tick found on the patient? ❍ Yes ❍ No ❍ Unknown

5.1.1 *If Yes*, did tick removal lead to rapid resolution of symptoms? ❍ Yes ❍ No ❍ Unknown

5.2 If the patient had a history of a tick bite, did they receive a prophylactic treatment? ❍ Yes ❍ No ❍ Not applicable

5.2.1 *If Yes*, what medication: ❍ Doxycycline ❍ Other; specify: _________ Duration of prophylaxis: _____day(s)

5.3 Highest level of care at any time required for this illness:
❍ Outpatient clinic ❍ Emergency department ❍ Inpatient hospital ward ❍ Intensive care unit (ICU)

5.3.1 *If hospitalized*, how many days was the patient hospitalized? _____day(s) ❍ Unknown ❍ Still admitted

5.3.2 *If admitted to ICU*, how many days was the patient in the ICU? _____day(s) ❍ Unknown ❍ Still admitted

5.4 Date of antimicrobial initiation: ____/____/_______ (DD MM YYYY) ❍ Antimicrobial not yet initiated ❍ Antimicrobial not indicated

***If antimicrobial not yet initiated or not indicated*, please skip to question 6.1.**

5.4.1 Was an antimicrobial initiated empirically prior to confirmation of diagnosis: ❍ Yes ❍ No

5.4.2 Was antimicrobial initiated with confirmation of diagnosis: ❍ Yes ❍ No

5.5 List of medications used in empiric or definitive treatment: ❍ Unknown ❍ Not indicated

Medication	Yes	No	Duration (days) (actual or planned)
Doxycycline	❍	❍	
Ceftriaxone	❍	❍	
Atovaquone	❍	❍	
Azithromycin	❍	❍	
Other; specify: _____	❍	❍	

5.6 Has the patient completed treatment? ❍ Yes ❍ No

5.6.1 *If Yes*, what is the outcome?

❍ Full medical recovery

❍ Persistent or recurrent symptoms; specify: _____ Duration of symptom(s): _____day(s)

❍ Death

❍ Unknown

SECTION 6 – REPORTING PHYSICIAN

6.1 Are you willing to be contacted by the Canadian Paediatric Surveillance Program (CPSP) for further information on this questionnaire? ❍ Yes ❍ No

First name_____ Surname_____

Address_____

City_____ Province_____ Postal code_____

Telephone number_____ Fax number_____

E-mail_____ Date completed_____

Thank you for completing this form

Appendix 1

Anaplasmosis

Confirmatory laboratory tests include:

- Four-fold or greater increase in *Anaplasma phagocytophilum* IgG-specific antibody titres by indirect immunofluorescence assay (IFA) between acute and convalescent sera taken 2-4 weeks apart; **OR**
- Detection of *A. phagocytophilum* nucleic acid by molecular methods from an appropriate clinical specimen (e.g., whole blood, buffy coat, cerebrospinal fluid [CSF], or bone marrow/tissue biopsy); **OR**
- Detection of *A. phagocytophilum* antigen by immunohistochemistry (IHC) in a biopsy/autopsy sample; **OR**
- Isolation of *A. phagocytophilum* in cell culture from an appropriate clinical specimen followed by molecular confirmation

Supportive laboratory tests include:

- Elevated *A. phagocytophilum* IgG antibody titres by IFA where the endpoint titre is four-fold greater than the screening dilution of the assay; **OR**
- Identification of typical morulae (microcolonies of *A. phagocytophilum*) in the cytoplasm of granulocytes by microscopic examination from a peripheral blood smear

Clinical criteria include:

- Fever AND at least one of the following: headache, malaise/asthenia, arthralgia/myalgia, mild anemia, thrombocytopenia, leukopenia, elevated hepatic transaminase concentrations, or elevated numbers of immature neutrophils

Babesiosis

Confirmatory laboratory tests include:

- Detection of *Babesia* species *(*e.g., *Babesia microti, B. duncani*, *B. divergens, B. venatorum)* nucleic acid by molecular methods from a whole blood specimen; **OR**
- Identification of *Babesia* sp. organisms by microscopic examination from an appropriate specimen (e.g., Giemsa-stained blood smear)

Supportive laboratory tests include:

- *B. microti* total or IgG antibody titres ≥ 1:64 by IFA; **OR**
- *B. divergens* total or IgG antibody titres ≥ 1:256 by IFA; **OR**
- *B. duncani* total or IgG antibody titres ≥ 1:512 by IFA

Clinical criteria include:

- Fever AND at least one of the following: fatigue, chills, sweats, headache, anorexia, dark urine, jaundice, myalgia, arthralgia, hepatosplenomegaly, hemolytic anemia, or thrombocytopenia

Relapsing fever (hard tick relapsing fever [HTRF] and soft tick relapsing fever [STRF])

Confirmatory laboratory tests include:

- Detection of relapsing fever *Borrelia* sp. (e.g., *B. miyamotoi*, *B. hermsii*) nucleic acid in an appropriate clinical specimen by molecular method;
- Four-fold increase in *B. hermsii* total antibody titre by IFA between acute and convalescent serum (for STRF only)

Supportive laboratory tests include:

- Direct observance of spirochetes suggestive of *Borrelia* sp. on peripheral blood smear, bone marrow, or cerebrospinal fluid;
- Elevated *B. hermsii* antibody titres by IFA (for STRF only)

Clinical criteria include:

- Acute onset of fever or chills AND one or more of the following symptoms or signs: headache, sweats/chills, myalgia, arthralgia, malaise/fatigue, rash, abdominal cramps, nausea, vomiting, diarrhea, dizziness, confusion/altered mental status, photophobia, leukopenia, thrombocytopenia, or elevated aminotransferase levels

Powassan virus (POWV)

Confirmatory laboratory tests include:

- Serological detection of POWV IgM by enzyme immunoassay (EIA) and observation of an increase in POWV neutralizing antibody titres by plaque reduction neutralization testing (PRNT) between acute and convalescent serum; **OR**
- Four-fold increase in total antibody titre by hemagglutination inhibition (HI) assay between acute and convalescent serum and detection of neutralizing antibodies by PRNTs ≥20; **OR**
- Seroconversion (negative to positive) of POWV IgM by EIA or total antibody titre by HI assay between acute and convalescent sera and detection of neutralizing antibodies by PRNT ≥20; **OR**
- POWV IgM in CSF by EIA and a neutralizing antibody titre by PRNT ≥20; **OR**
- Isolation of POWV in cell culture from an appropriate clinical specimen (e.g., tissue, blood, CSF, or other body fluid); **OR**
- Detection of POWV antigen by IHC from an appropriate clinical specimen; **OR**
- Detection of POWV nucleic acid by molecular methods from an appropriate specimen

Supportive laboratory tests include:

- Serological detection of POWV IgM by EIA or HI titre ≥20 AND detection of neutralizing antibody titres by PRNT ≥20 on a single serum sample;
- Serological detection of POWV IgM by EIA without a significant increase in neutralizing antibody titre by PRNTs between acute and convalescent serum samples

Clinical criteria include:

- At least one of the symptoms of the initial febrile phase (include fever, sore throat, drowsiness, headache, and disorientation) or neuroinvasive disease (fever, vomiting, respiratory distress, loss of coordination, speech difficulties, paralysis, or seizures)

Rocky Mountain spotted fever

Confirmatory laboratory tests include:

- Detection of *Rickettsia rickettsii* nucleic acid in an appropriate clinical specimen by molecular methods; **OR**
- Four-fold increase in IgG-specific antibody titre reactive with *R. rickettsii* antigen by IFA between paired serum specimens (one taken in the first two weeks after illness onset and a second taken two to ten weeks after acute specimen collection); **OR**
- *R. rickettsii* antigen in a biopsy or autopsy specimen by IHC

Supportive laboratory tests include:

- Elevated IgG antibody reactive with *R. rickettsii* antigen by IFA within 60 days of illness onset

Clinical criteria include:

- Fever AND one or more of the following: rash, headache, myalgia, anemia, thrombocytopenia, or any hepatic transaminase elevation

Tick paralysis

Confirmatory clinical criteria include:

- Acute, ascending flaccid paralysis with rapid resolution of symptoms following tick removal