

September 10, 2019

Dear Colleague:

Re: TICKBORNE INFECTIONS IN MANITOBA

- **Incidence rates of tick-borne diseases (TBD), notably Anaplasmosis and Lyme Disease (LD), continue to rise**, and 2018 was the most active year to date. Rates are highest in the Interlake-Eastern and Southern Health-Santé Sud Health Regions.
- Physicians need to be familiar with signs and symptoms of known **and** emerging TBDs.
- Patients may present at any stage of LD, and those with co-infections may present with more severe illness that may require multiple different therapies.
 - Consultation with an appropriate specialist is recommended for patients presenting with disseminated or late LD, and those with possible co-infections. Consultation may also be considered for patients presenting with symptoms of other known or emerging TBDs.
- Early treatment improves outcome; **where early LD is suspected treatment should be initiated without waiting for laboratory confirmation**. Consult the LD communicable disease management protocol for treatment options (www.gov.mb.ca/health/publichealth/cdc/protocol/lyme.pdf).
- **Blacklegged ticks**, the primary vector of the three reportable TBDs, **are established throughout much of southern Manitoba wherever suitable habitat is found**.
- **Taking a complete exposure history** (re: suitable habitat) **is critical** as nearly 2 in 3 TBD cases have no recollection of a tick bite.
- Though TBD exposures range from April through November, the majority occur in May through July, which corresponds with the peak in juvenile blacklegged tick nymph activity.

ANAPLASMOSIS

In 2018, 21 Anaplasmosis cases were reported in Manitoba. Based on a recent sero-survey, this number is likely an under-estimation of the true prevalence¹.

Since Anaplasmosis became provincially reportable in 2015 the following trends have been noted:

- 94% of cases indicated likely local exposure (all cases reported in 2018 were likely locally acquired).
- 70% of cases had no recollection of a tick bite.
- 82% of cases were exposed between May and July.
- 96% of cases had contact with suitable tick habitat².

BABESIOSIS

A single asymptomatic case was reported in 2018. For clinical presentation, laboratory diagnosis and treatment information see the Babesiosis communicable disease management protocol (www.gov.mb.ca/health/publichealth/cdc/protocol/babesiosis.pdf).

LYME DISEASE

In 2018, 54 confirmed and probable LD cases were reported. Incidence rates continue to increase in the province, most notably in the Interlake-Eastern and Southern Health-Santé Sud Regions. Trends observed over the past five years include:

- 87% of confirmed and probable LD cases indicated likely local exposure.
- 61% had no recollection of a tick bite.
- 81% of cases were exposed between May and July.
- 89% had contact with suitable tick habitat.

¹ Kadkhoda, K. and Gretchen, A. Retrospective study investigating the seroprevalence of *Anaplasma phagocytophilum* in Manitoba, Canada: 2011 – 2014. *Open Forum Infectious Diseases* 2016; 3 (4), 1 – 4 (doi: [10.1093/ofid/ofw199](https://doi.org/10.1093/ofid/ofw199))

² **Blacklegged ticks survive best in wooded or forested habitats as the trees provide shade and leaf litter for ground cover to protect active ticks from drying out. This habitat also supports small mammals, birds and large mammals such as deer that are natural hosts for blacklegged ticks. These wooded and forested areas can be as small as shelterbelts around farmsteads.**

Patients may present at any stage of LD including the later stages which can make diagnosis challenging. Co-infection with another TBD should be considered in patients who present with initial symptoms that are more severe than commonly observed with LD, especially when:

- A high grade fever is present for more than 48 hours despite effective LD treatment,
- Thrombocytopenia, leukopenia or anemia is present despite resolved Erythema migrans (EM) and flu-like symptoms.

In 2018, three LD cases had evidence of co-infection with Anaplasmosis. An additional seven LD cases had evidence of previous Anaplasmosis infection.

Emerging Tick-borne infections

Currently in Manitoba, blacklegged ticks are responsible for the majority of TBDs acquired locally. However, tick species and pathogens not typically found in Manitoba can be introduced via migratory birds. Consequently, any illness after a tick bite should warrant a trip to a health care provider.

MHSAL continues to work with the Public Health Agency of Canada to monitor the introduction of invasive tick species and novel tick-borne pathogens of human health importance. Surveillance has detected *Borrelia miyamotoi* and Deer tick virus (Powassan virus lineage II) in locally collected blacklegged ticks. Both pathogens have potential public health implications.

A recent sero-prevalence study demonstrated evidence of *B. miyamotoi* infection in residents with previously suspected or confirmed LD³. *B. miyamotoi* infection should be considered in patients presenting from late spring through early autumn with a febrile illness, particularly a recurrent one, without an EM. Unlike the three reportable TBDs, *B. miyamotoi* can be transmitted by larval blacklegged ticks which are typically active from late spring through late summer, peaking in August⁴
5.

While no cases of **Deer tick virus** have been detected in Manitoba, it should be cautioned that unlike other TBDs, the causative agent **can be transmitted in as little as 15 minutes of attachment**⁶.

Additional information regarding emerging TBDs (including links and the 2018 physician letter) and prevention measures can be found on the MHSAL TBD site at www.gov.mb.ca/health/publichealth/cdc/tickborne/index.html.

Tick-Borne diseases and Travel

Presently in Manitoba, blacklegged ticks are responsible for transmitting the three reportable TBDs. **Most out-of-province Anaplasmosis and Lyme disease cases among Manitobans are associated with travel to northwestern Ontario, Minnesota and Wisconsin.** In fact, nearly 60% of the reportable TBD cases with out-of-province exposure have come from Ontario. Additional exposures have been linked with travel to other parts of Canada, the northeast US and Europe.

Where tick vectors and pathogens co-circulate there is a risk of exposure to TBDs. In North America and elsewhere there are many tick species capable of transmitting pathogens of human health concern. Consequently, travelling out of province can expose individuals to other tick species and additional diseases not found in Manitoba. When travelling abroad Manitobans should adopt prevention measures to minimize their risk of exposure to TBDs. Additional information on common TBDs in North America and globally can be found at www.cdc.gov/ticks/tickbornediseases/index.html

Ticks

Blacklegged ticks can be active whenever temperatures are consistently greater than 4°C. In Manitoba the risk of exposure is typically between April and November, although activity outside this period has also been recorded when conditions are appropriate.

The risk of exposure to TBDs is highest in 'Blacklegged tick risk areas' where surveillance efforts have revealed established blacklegged tick populations (see most recent surveillance map at

³ Kadkhoda, K., Dumouchel, C., Brancato, J., Gretchen, A. and Krause, P. J. Human Seroprevalence of *Borrelia miyamotoi* in Manitoba, Canada, in 2011 – 2014: A Cross-Sectional Study. *CMAJ Open* **2017**, 5 (3): E690 – E693 ([10.9778/cmajo.20170070](https://doi.org/10.9778/cmajo.20170070))

⁴ Breuner, N. E., Hojgaard, A., Replogle, A. J., Boegler, K. A. and Eisen, L. Transmission of the relapsing fever spirochete, *Borrelia miyamotoi*, by single transovarially-infected larval *Ixodes scapularis* ticks. *Ticks and Tick-Borne Diseases* **2018**, 9 (6): 1464 – 1467 (<https://doi.org/10.1016/j.ttbdis.2018.07.006>).

⁵ Lindquist, E. E., Galloway, T. D., Artsob, H., Lindsay, L. R., Drebot, M., Wood, H. and Robbins, R. G. **2016** A Handbook to the Ticks of Canada (Ixodida: Ixodidae, Argasidae). *Biological Survey of Canada Monograph Series No. 6*. <https://biologicalsurvey.ca/monographs/read/18>

⁶ Eisen, L. Pathogen Transmission in Relation to Duration of Attachment by *Ixodes scapularis* Ticks. *Ticks and Tick-borne Diseases* **2018**, 9 (3): 535 – 542 (<https://doi.org/10.1016/j.ttbdis.2018.01.002>)

www.manitoba.ca/tickborne). However, the risk of exposure is not uniform within, nor solely confined to, these risk areas, as ticks can be transported great distances by migrating birds and deer. Consequently, **TBDs can potentially be acquired anywhere in the southern part of the province where there is suitable tick habitat.**

Thank you for your anticipated cooperation.

Sincerely,

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TICK-BORNE DISEASE QUICK REFERENCE

Disease	Incubation Period	Presentation	Laboratory Investigation	Initial Treatment
Anaplasmosis	5 to 21 days	<ul style="list-style-type: none"> • Acute onset of fever, chills, headache, arthralgia, nausea and vomiting often in association with leukopenia, thrombocytopenia and/ or elevated liver enzymes. • Severe manifestations are rare, though more common in older patients (> 60 years of age) and those with co-morbidities. 	<ul style="list-style-type: none"> • Serological evidence of a 4-fold change in IgG antibody titre in paired serum samples (2 – 4 weeks apart). Titre in convalescent sample \geq 1:128. 	<ul style="list-style-type: none"> • Doxycycline 100mg PO BID for 2 weeks, unless contraindicated.
Babesiosis	1 to 6 weeks (<i>may be up to 6 months following transfusion with infected blood products</i>)	<ul style="list-style-type: none"> • Can be life threatening, particularly in older adults (> 50 years of age) and those with co-morbidities. • Gradual onset of malaise and fatigue accompanied by intermittent fever. Additional symptoms may include: chills, drenching sweats, anorexia, headache, myalgia, nausea, non-productive cough, arthralgia and generalized weakness. • Severe manifestations can include: acute respiratory distress syndrome, disseminated intravascular coagulation, hemodynamic instability, congestive heart failure, renal failure, hepatic compromise, myocardial infarction, severe hemolysis, splenic rupture and death. 	<ul style="list-style-type: none"> • Detection of parasites in blood smear by microscopy, OR • Serological evidence of IgG antibody titre of \geq 1:256. • Note 4-fold rise in antibody titre between acute and convalescent sera confirms recent infection. • Titres \geq 1:1024 suggest recent or active infections, those \leq 1:64 suggest previous infection. 	<ul style="list-style-type: none"> • Does not include Doxycycline. • Consultation with an infectious diseases specialist is strongly recommended at an early stage for suspected clinical cases.
Lyme disease (LD)	Symptoms, incubation period, laboratory diagnostics and treatments vary depending on the stage			
	Early localized LD – 3 to 30 days	<ul style="list-style-type: none"> • Erythema migrans (EM) and non-specific flu-like symptoms (i.e. fatigue, fever, headache, mildly stiff neck, arthralgia or myalgia and lymphadenopathy). 	<ul style="list-style-type: none"> • Acute & convalescent sera are recommended (3-4 weeks apart). • Serological tests may be negative within 1st 6 weeks of infection. • Some individuals treated early (within 6 weeks) may not sero-convert and hence never meet Western Blot positivity criteria. 	<ul style="list-style-type: none"> • Doxycycline 100mg PO BID for 2 – 3 weeks, unless contraindicated.
	Early disseminated LD – days to months	<ul style="list-style-type: none"> • Multiple EM, CNS (lymphocytic meningitis, and rarely, encephalomyelitis) & PNS (radiculopathy, cranial neuropathy, and mononeuropathy multiplex) symptoms and cardiac (intermittent atrioventricular heart block, myoepicarditis) symptoms. 	<ul style="list-style-type: none"> • Some individuals treated early (within 6 weeks) may not sero-convert and hence never meet Western Blot positivity criteria. 	<ul style="list-style-type: none"> • Early localized LD oral regimen, OR; • Ceftriaxone 2g IV for 2 – 4 weeks for those with neuro or cardiac Sx.
Late LD – months to years	<ul style="list-style-type: none"> • Intermittent recurring arthritis (usually monoarticular) and neurological symptoms. 	<ul style="list-style-type: none"> • A single sera sample is sufficient. 	<ul style="list-style-type: none"> • Doxycycline 100mg PO BID for 4 weeks, OR; • Ceftriaxone 2g IV for 2 – 4 weeks. 	

- **Treatment should be initiated based on clinical suspicion of disease.** Depending on symptoms and timing of diagnosis, some cases may require a longer or repeat course of treatment. Where above treatments are contraindicated consult the communicable disease management protocols available at www.gov.mb.ca/health/publichealth/cdc/tickborne/index.html for additional options.
- **Co-infection should be considered if there is a more severe clinical presentation, if symptoms persist or there is a poor response to recommended therapies.** Consultation with an infectious diseases specialist is strongly recommended for all complex tick-borne diseases including co-infections.
- Additional information can be found in the disease specific communicable disease management protocols.

Tick-borne disease Laboratory Diagnosis Quick Reference for Health Care Providers

Reportable tick-borne infections

Note: Cadham Provincial Laboratory (CPL) will only screen for organisms selected on the general requisition [form](#). As co-infection with TBDs is possible, health care providers should select and indicate all infectious organisms for which testing is required (e.g. Lyme Ab, *A. phagocytophilum* and *B. microti*). If not listed use the 'other tests or requests' box.

Anaplasmosis:

Includes direct and indirect detection. For the former, care providers may send a minimum 5ml EDTA whole blood (purple-topped tube) at room temperature to PL for microscopy and PCR **BEFORE** antibiotics are given. It is recommended that a serum sample (clotted blood; red-topped tube) be sent to CPL at the same time for *Anaplasma* serology.

Babesiosis:

Includes direct and indirect detection. For the former, care providers may send minimum 5 ml EDTA whole blood (purple-topped tube) at room temperature to CPL for microscopy and PCR **BEFORE** antibiotics are given. It is recommended that a serum sample (clotted blood; red-topped tube) be sent to CPL at the same time for *Babesia* serology.

Lyme disease:

It is recommended that a serum sample (clotted blood; red-topped tube) be sent to CPL at the same time for Lyme serology **BEFORE** antibiotics are given. Providers are also encouraged to consider skin biopsy, where applicable, for Lyme PCR. The latter works best when done before institution of antibiotics and from the leading edge of the EM rash.

Emerging tick-borne infections

Note: For emerging tick-borne infections, clinical presentation should support diagnostic requests. Consultation with infectious disease and the CPL (see below) is recommended.

***Borrelia miyamotoi* and *Borrelia mayonii*:**

Includes direct detection only. Care providers may send minimum 5 ml EDTA whole blood (purple-topped tube) at room temperature to CPL for *Borrelia* species PCR **BEFORE** antibiotics are given. Both *B. miyamotoi* and the newly described *B. mayonii* may be detected by PCR.

Powassan virus lineage II (Deer Tick virus):

Includes direct and indirect detection. Care providers may send minimum 5 ml EDTA whole blood (purple-topped tube) at room temperature to CPL for Powassan virus/Deer tick virus RT-PCR. It is recommended that a serum sample (clotted blood; red-topped tube) be sent to CPL at the same time for Powassan virus/ Deer tick virus serology.

Additional information regarding tick-borne disease laboratory testing (selection and interpretation) may be obtained by contacting the CPL Serology section Clinical Microbiologist at (204) 945-7545.