Chlamydia (*Chlamydia trachomatis*) Infection

Manitoba
Public Health Branch

1. Etiology

Chlamydia trachomatis is an obligate intracellular bacterium that infects mainly ocular and genitourinary epithelium (1). There are at least 18 serologic variants (serovars), including the oculogenital serovars A – K and the lymphogranuloma venereum serovars L1, L2, and L3 (2). Management of lymphogranuloma venereum (LGV) serovars are excluded from this protocol but are covered in the Manitoba Health, Seniors and Active Living Lymphogranuloma Venereum protocol http://www.gov.mb.ca/health/publichealth/cdc/protocol/lgv.pdf .

2. Case Definition

2.1 Confirmed Case – Genital Infections:

Detection of *C. trachomatis* nucleic acid in genitourinary specimens (e.g., urine, endocervical, male urethral) (3).

2.2 Confirmed Case – Extra-genital Infections:

Detection of *C. trachomatis* nucleic acid in rectum, conjunctiva, pharynx and other extra-genital sites (3).

2.3 Confirmed Case – Perinatally Acquired Infections:

a) Detection of *C. trachomatis* nucleic acid in nasopharyngeal or other respiratory tract specimens from an infant in whom pneumonia develops in the first six months of life (3).

OR

b) Detection of *C. trachomatis* nucleic acid in conjunctival specimens from an infant who develops conjunctivitis in the first month of life (3).

NOTE: Culture of *C. trachomatis* is not performed for diagnostic purposes in Manitoba, nor is antigen detection. If such tests were conducted in Manitoba residents in other provinces/territories and referred to Manitoba Health, Seniors and Active Living, a positive result would be accepted in Manitoba and the person considered a case, as these tests are included in the national case definition for chlamydia.

3. Reporting and Other Requirements

Laboratory:

- All positive laboratory results for *C. trachomatis* are reportable to the Public Health Surveillance Unit by secure fax (204-948-3044).

Health Professional:

- For Public Health investigation and to meet the requirement for contact notification under the Reporting of Diseases and Conditions Regulation in the *Public Health Act*, the *STI Case Investigation Form for Chlamydia, Gonorrhea, Chancroid and LGV Infections – Case Form* http://www.gov.mb.ca/health/publichealth/surveillance/docs/mhsu_6784.pdf must be completed for all laboratory-confirmed cases of chlamydia and returned to the Manitoba Health, Seniors and Active Living (MHSAL) Surveillance Unit confidential fax (204-948-3044) within 5 business days of case interview. Regional Public Health or First Nations Inuit Health Branch may assist with completion and return of the form.
- Regulations under the *Public Health Act* require health professionals to report all known sex contacts of chlamydia cases to

the MHSAL Surveillance Unit. The *STBBI Contact Investigation Form (for Contacts to Chlamydia, Gonorrhea, Chancroid, LGV, Hepatitis B/C,* HIV and Syphilis Infections) http://www.gov.mb.ca/health/publichealth/surveillance/docs/mhsu_6782.pdf must be completed and returned for all identified contacts within 5 business days of interview with the contact. Regional Public Health or First Nations Inuit Health Branch may assist with completion and return of the form.

- Under the *Child and Family Services Act*, any person who has information that leads him/her to reasonably believe that a child (defined as under 18 years of age) is being abused (e.g., sexual abuse) has the legal duty to report their concern to the local Child and Family Services (CFS) agency. Refer to the *Reporting of Child Protection and Child Abuse: Handbook and Protocols for Manitoba Service Providers* available at: http://www.pacca.mb.ca/ESW/Files/Handbook_Child_Protection_and_Child_Abuse_Web_Links.pdf for more information. Contact information is found on pages 150-151.

4. Clinical Presentation/Natural History

Chlamydia trachomatis causes cervicitis and urethritis in women and urethritis in men as well as extra-genital infections including rectal and oropharyngeal infections (4). Asymptomatic infection is more common than symptomatic infection in both men and women (4). Symptoms of uncomplicated chlamydial infection in women may include abnormal vaginal discharge, dysuria, and post-coital and intermenstrual bleeding (4). Symptomatic men usually present with urethral discharge and dysuria, sometimes accompanied by testicular pain (4). Rectal infection may manifest as a rectal discharge, rectal pain or blood in the stools, but is asymptomatic in most cases (4). The natural history is not well defined but many infections resolve without treatment, while many are long-lasting (1). Complications in women include pelvic inflammatory disease, endometritis, salpingitis, tubal infertility, ectopic pregnancy, reactive arthritis and perihepatitis (5). Complications in men include epididymo-orchitis and reactive arthritis (5, 6).

Infection in Children:

Prepubertal children may have conjunctival, vaginal, urethral or rectal infection (2). Asymptomatic infection of the nasopharynx, conjunctivae, vagina and rectum can be acquired at birth (2).

Infection in Pregnancy:

Maternal infection is associated with serious adverse outcomes in neonates including pre-term birth, low birth weight, conjunctivitis, nasopharyngeal infection and pneumonia (4).

Neonatal Infection:

Initial *C. trachomatis* neonatal infection involves the mucous membranes of the eye, oropharynx, urogenital tract, and rectum, although infection might be asymptomatic in these locations (7). Neonatal conjunctivitis develops a few days to several weeks after infection acquired at birth (2). *C. trachomatis* can also cause subacute, afebrile pneumonia (7). Perinatally acquired *C. trachomatis* can persist in an infant for up to 3 years (6).

Interrelationship between Chlamydia and HIV:

For people with HIV, chlamydial infection may increase the amount of HIV in bodily fluids and may increase the chance of HIV transmission to sex partners (8, 9). Individuals with Chlamydia

infection may be more likely to become infected with HIV if they are exposed to HIV during sex (8, 9).

5. Epidemiology

5.1 Reservoir and Source:

Infected humans (4). Asymptomatic individuals provide an ongoing reservoir for infection (2).

5.2 Transmission:

Transmission occurs through sexual contact with the penis, vagina, mouth or anus of an infected partner (10). Oculogenital serovars of *C. trachomatis* can be transmitted from the genital tract of infected mothers to their infants during birth (2). Acquisition occurs in approximately 50% of infants born vaginally to infected mothers and in some infants born by caesarean delivery with membranes intact (2). Asymptomatic infection of the newborn can be acquired at birth (2).

5.3 Occurrence:

General: Chlamydia occurs most commonly among young sexually active adolescents and adults (4). The World Health Organization (WHO) estimates that in 2012, 131 million new cases of Chlamydia occurred among adults and adolescents aged 15 - 49 years worldwide, with a global incidence rate of 38 per 1000 females and 33 per 1000 males (4). The highest prevalence is in the WHO Region of the Americas and the WHO Western Pacific Region (4). In many countries, the incidence of chlamydia is highest among adolescent girls aged 15-19 years, followed by young women aged 20-24 years (4).

Canada: Between 2005 and 2014, the rates of reported cases of chlamydia increased by 49.3%, from 206.0 to 307.4 per 100,000 (11). The highest relative rate increase (65%) occurred among males (11). In 2014, the rate of reported chlamydia cases was 1.7 times higher in females as compared to males; persons aged 15-29 comprised nearly 80% of chlamydia cases reported (11). The increases in rates are explained by a variety of factors including a true rise in incidence as well as the implementation of improved detection methods such as the more sensitive nucleic acid amplification testing (NAAT) (11). More effective screening and contact tracing practices may also have contributed to the observed rise in the rate of reported cases (11). In 2015, the reported rate of chlamydia was 325.0 per 100,000 population (12). Individuals aged 15-24 years represented 56.8% of all reported chlamydia cases in 2015, although they accounted for only 12.6% of the overall population (12).

Manitoba: In 2014, Manitoba reported a chlamydia rate (490.9 per 100,000) significantly higher than the national rate of 307.4 per 100,000 (11). For 2014, the rate of infection for women was reported to be 611.1 per 100,000 compared to 350.4 per 100,000 for males (13). The highest incidence was reported in the 20 - 24 year age group for both males (1633.7 per 100,000) and females (3028.2 per 100,000) (13). The annual reported incidence of Chlamydia has remained at a high but stable annual incidence since 2009 (13). In 2015, Manitoba reported a chlamydia rate of 504.6 per 100,000 population (12).

5.4 Incubation:

The incubation period is not well defined but is believed to be 7 – 14 days or longer (10). Neonatal conjunctivitis develops a few days to several weeks after birth (2). Pneumonia may develop within the first six months of life in infants born to infected mothers (3).

5.5 Risk Groups:

Geographic and racial/ethnic disparities in chlamydia prevalence have been observed in some countries (10). In Canada, the following risk

factors have been observed for chlamydia infection:

- Sexually active youth/young adults 15 to 24 years of age;
- Sexual contact with a chlamydia-infected person;
- Individuals with a new sexual partner or more than two sexual partners in the past year;
- Individuals with a history of sexually transmitted infection(s);
- Vulnerable populations (e.g., including but not limited to injection drug users, incarcerated individuals, sex trade workers, street youth) (6).

5.6 Host Susceptibility and Resistance:

Natural infection with *C. trachomatis* appears to confer little protection against reinfection, and the limited protection that is conferred is believed to be short-lived (1).

5.7 Period of Communicability:

Infected individuals are presumed to be infectious (10). Without treatment, infection can persist for months to years (2, 10). Infection is not known to be communicable among infants and children (2).

6. Diagnosis

Diagnosis is based on a combination of history, physical examination and laboratory investigation. A diagnosis of chlamydia should be considered in anyone with signs or symptoms compatible with chlamydia. Cadham Provincial Laboratory (CPL) performs assays for both chlamydia and gonorrhea **only** on genitourinary specimens and eye swab specimens submitted for Nucleic Acid Amplification Testing (NAAT). All other sources will only have chlamydia testing performed and reported by NAAT.

CPL is currently the sole laboratory provider of NAAT diagnostic and screening services in Manitoba for chlamydia and gonorrhea. NAAT results are acceptable for medico-legal purposes in Manitoba for diagnosis of chlamydia. In rare circumstances, residual specimens may be sent to the National Microbiological Laboratory or another external reference laboratory for repeat testing.

6.1 Adult Genital Infections:

- **Adult Male/Female Urine:** Urine is the preferred specimen for males and it is the only recommended specimen for females without a cervix (e.g., due to hysterectomy) or those refusing a complete genital examination. The patient should not have voided for at least one hour prior to specimen collection. The first 20-30 mL (not midstream) of urine should be collected in a sterile plastic preservative-free container. Transfer the urine as soon as possible (within 24 hours of collection) into the urine specimen transport tube provided in the CPL-provided urine specimen collection kit. Store at 2° - 30° C until transportation to CPL is available.
- **Adult Male Urethral and Female Endocervical Swab Specimens:** The CPL-provided Unisex Swab Collection Kit is used for female endocervical and male urethral swab specimens. Males should **NOT** have urinated one hour prior to specimen collection. Only the swab in the NAAT kit should be used. After collection of the endocervical/urethral specimen, place the collection swab into the swab specimen transport tube. Refer to the Aptima manufacturer's instructions for specimen collection and handling.

6.2 Adult Extra-genital Infections:

All practitioners that perform sampling from extra-genital sites (e.g., throat, rectal, nasopharyngeal, eye) for *C. trachomatis* should

use the Aptima Unisex Swab Collection Kit (available from CPL; using the provided blue swab, follow specimen collection and handling steps c. to g. listed on the package). This Unisex Swab Collection Kit is identical to the one currently used for sampling of female endocervical and male urethral sites. When submitting Unisex Collection Kit Swabs, please indicate the specimen source in the "Specimen Source" box on the CPL General Requisition.

As the Aptima test is not Health Canada approved for use with non-genital specimens, reports will include the following comment: "NAAT-based detection of *Chlamydia trachomatis* from non-genital specimens is not Health Canada approved, but is validated at CPL. Clinical correlation is required." Despite this comment, studies consistently show that Aptima testing of non-genital specimens is both reliable and more sensitive than the MicroTrak (Direct Fluorescent Antibody) test used previously.

6.3 Testing in Prepubertal Children:

For suspected genital infection in boys and girls, first void urine (not midstream) should be collected and tested by NAAT. Refer to collection procedure under Section 6.1 Adult Male/Female Urine. Urethral or vaginal swabs are not recommended for testing in prepubertal boys and girls. **Indicate boldly on the requisition that the specimens are from young children (i.e., under 12 years of age).**

NOTE: If a urine or discharge specimen tests positive for chlamydia, further testing is indicated. Refer to Section 8.1 under Children for management.

6.4 Testing in Newborns:

Pulmonary, tracheal secretions and nasopharyngeal aspirates should be submitted in sterile containers. When in doubt as to procedure, please phone Cadham Provincial Laboratory (204-945-7204) for advice.

7. Key Investigations for Public Health Response

- Interview cases for history of exposure, risk assessment, contacts and adequacy of treatment. Provide education on safer sex practices.
- Interview contacts, offer testing and provide empiric treatment. Perform a risk assessment and promote safer sex practices.

8. Control

8.1 Management of Cases:

Refer to Appendix A for the management of acute pelvic inflammatory disease (PID).

- Where resources are limited, priority for active follow up of cases by public health should be directed toward youth/young adults < 25 years of age (6), and cases with identified risk factors such as pregnancy, co-infections, repeat infections, immunocompromised, non-genital infections.
- Symptomatic individuals should be always treated for BOTH chlamydia and gonorrhea infection, without waiting for results of laboratory testing for either. Refer to Table 1 for chlamydia treatment and the MHSAL Gonorrhea protocol http://www.gov.mb.ca/health/publichealth/cdc/protocol/gonorrhea.pdf .
- Asymptomatic persons with laboratory-confirmed chlamydial infection and negative laboratory testing for gonorrhea need not be treated for gonorrhea.
- Serologic testing for syphilis, HIV and hepatitis B and C is recommended if status is unknown (6, 7).

- Lymphogranuloma venereum (LGV) testing is recommended for men who have sex with men (MSM) who are diagnosed with anorectal chlamydia. Refer to Manitoba Health, Seniors and Active Living Lymphogranuloma Venereum protocol http://www.gov.mb.ca/health/publichealth/cdc/protocol/lgv.pdf .
- Immunization against hepatitis B is recommended for non-immune, non-immunized individuals (6).
- Human papillomavirus (HPV) vaccine should be discussed with cases as per the recommendations outlined in the National Advisory Statement on Immunization https://www.canada.ca/en/public-health/services/publications/healthy-living/updated-recommendations-human-papillomavirus-immunization-schedule-immunocompromised-populations.html .
- Cases should be instructed to abstain from unprotected intercourse until:
    - Seven days after initiation of single-dose therapy or until completion of a longer antimicrobial regimen;
    - All sex partners have also completed treatment (7).
- Case interviews for contact identification should occur as soon as possible, preferably within 5 working days of receiving the confirmed lab report.
- Hospitalized cases should be managed with Routine Practices in health care as per Manitoba Health, Seniors and Active Living's *Routine Practices and Additional Precautions: Preventing the Transmission of Infection in Health Care* available at: http://www.gov.mb.ca/health/publichealth/cdc/docs/ipc/rpap.pdf .

Children:

Sexual abuse must be considered when genital, rectal or pharyngeal chlamydia is diagnosed in any prepubertal child; however, perinatally acquired *C. trachomatis* infection can persist in an infant for up to 3 years (6).

If sexual abuse is suspected in a child with chlamydia, refer to Section 3 for reporting requirements. ALL children under 12 years of age or any child with concern of abuse should be referred to the Child Protection Centre at the Children's Hospital, Winnipeg, Manitoba (204-787-2811) PRIOR to initiating treatment and further testing. Staff at the centre will coordinate the forensic and medical investigation, including further testing, and treatment.

Siblings and other children possibly at risk should also be evaluated (10).

Refer to Table 1 below for treatment recommendations.

Management of Chlamydial Infections in Pregnancy, at Delivery and in the Postnatal Period

- Refer to Table 1 for treatment regimens recommended for chlamydial infection during pregnancy or at delivery.
- All cases of conjunctivitis in the newborn should be tested for both *N. gonorrhoeae* and *C. trachomatis* because of the possibility of mixed infection.
- Women who are identified to have chlamydial infection in the postnatal period should be investigated for possible co-existing sexually transmitted infections, particularly gonorrhea, but including HIV and Hepatitis B which may need to be serologically reassessed even if tested earlier in pregnancy. They should be treated appropriately with a recommended regimen. The infant should be examined carefully for

ophthalmia neonatorum and pneumonia. If infection is suspected, the appropriate site(s) should be tested. If six weeks or more have elapsed since birth and the infant has no clinical evidence of disease, it may not be necessary to perform laboratory tests.

Neonatal Infection:

- Refer to Table 1 below for initial treatment recommendations. For neonatal *C. trachomatis* conjunctivitis, there is no evidence that additional topical therapy provides further benefit (6, 7). Consult a pediatrician for infants under one week of age.

Infection Prevention and Control: Hospitalized cases should be managed with Routine Practices in health care as per Manitoba Health, Seniors and Active Living's *Routine Practices and Additional Precautions: Preventing the Transmission of Infection in Health Care* available at: http://www.gov.mb.ca/health/publichealth/cdc/docs/ipc/rpap.pdf .

Treatment:

Treatment recommendations for chlamydia (refer to Table 1 below) are based on the Canadian Guidelines on Sexually Transmitted Infections Chlamydia Chapter. They do not provide a comprehensive list of all possible treatment regimens, but rather those regimens that meet general criteria of efficacy, safety, ease of administration and cost. Where possible, single dose oral therapy is preferred. Persons who have chlamydia and HIV infection should receive the same treatment regimen as those who do not have HIV infection (7).

MHSAL provides the drugs listed in Table 1 for treatment of bacterial STIs to practitioners in the provincial jurisdiction at no charge. To order the publicly-funded STI drugs, refer to the *Manitoba Health STI Medication Order Form*: http://www.gov.mb.ca/health/publichealth/cdc/protocol/form11.pdf

Follow-up of Cases:

- Routine test of cure is not recommended. Test of cure is indicated only in the following situations:
  - Signs and symptoms of infection are still present;
  - Re-exposure to an untreated partner has occurred;
  - Compliance has been suboptimal;
  - An alternative treatment regimen was used;
  - In all prepubertal children;
  - In all pregnant women (6).
- Test of cure using a NAAT, if needed, should be performed at 3-4 weeks after the completion of effective treatment to avoid false-positive results due to the presence of non-viable organisms (6).
- Repeat testing in all individuals with *C. trachomatis* infection is recommended six months post-treatment, or sooner (based on clinical judgment), as reinfection risk is high (6).
- Recurrent chlamydial infections after treatment with the recommended regimens may be due to reinfection, and indicate a need for improved contact tracing and patient education.

Table 1: Recommended treatment for uncomplicated urethral, endocervical, rectal and conjunctival chlamydia infection

Indication	Preferred Treatment	Alternate Treatment
Adults and adolescents > 9 years of age	Azithromycin* 1g orally in a single dose OR Doxycycline[µ] 100 mg BID for 7 days	Erythromycin base 500 mg QID for 7 days[&] OR Amoxicillin[#] 500 mg TID for 7 days
Pregnant Women and Nursing Mothers	Amoxicillin[#] 500 mg PO TID for 7 days OR Erythromycin[&] 2 g/day PO in divided doses for 7 days OR Erythromycin[&] 1 g/day PO in divided doses for 14 days	Azithromycin* 1 g PO in a single dose if poor compliance with a preferred regimen is expected.
Children 1 month to 9 years of age	Azithromycin 12-15 mg/kg (maximum 1g) orally in a single dose	
Children 1 week to 1 month	Erythromycin[β] 40 mg/kg/day orally in 4 divided doses for 14 days	
First week of life (infants > 2000 g)	Erythromycin[β] 30 mg/kg/day orally in divided doses for 14 days	
First week of life (infants ≤ 2000 g)	Erythromycin[β] 20 mg/kg/day orally in divided doses for at least 14 days	

Based on *Canadian Guidelines on Sexually Transmitted Infections* https://www.canada.ca/en/public-health/services/infectious-diseases/sexual-health-sexually-transmitted-infections/canadian-guidelines.html

* Although there are limited data on the safety of azithromycin during pregnancy, significant adverse effects have not been observed. The theoretical risk of adverse effects during pregnancy (particularly during the first trimester) should be weighed against the risk of non-compliance with the recommended alternative.

[µ] Doxycycline is contraindicated in pregnant and lactating women (6).

[&]The estolate formulation is contraindicated in pregnancy. Testing after completion of therapy is recommended.

[#] Limited data exist concerning the efficacy of this treatment, thus a test of cure is recommended. Consultation with an infectious disease specialist may be indicated.

[β] As the use of erythromycin in children under 6 weeks of age has been associated with infantile hypertrophic pyloric stenosis (IHPS), it is important to monitor for signs and symptoms of IHPS (6). Testing after completion of therapy is recommended.

8.2 Management of Contacts:

Where resources are limited, priority for partner notification should be directed toward partners < 25 years of age. Refer to Section 3 for the requirements for reporting contacts.

- All partners who have had sexual contact with the index case within 60 days prior to symptom onset (or date of diagnosis where asymptomatic) should be tested and treated (6). If there is no partner during this period, then the most recent partner should be tested and treated (6).
- Parents of infected neonates (i.e., mother and her sex partner[s]) and persons implicated in sexual abuse cases must be

located, clinically evaluated and treated (6).

- **Contact Notification:**
  - Public Health or health professional initiated contact notification (or in combination) is recommended.
  - If the contact was tested and tested negative for chlamydia, no further follow-up is required. If the contact has not been tested, follow-up should occur with the contact. If the contact is known or believed to be pregnant, if possible, public health may connect with the pregnant woman's health care provider.
  - Where resources permit, public health practitioners should complete interviews for contacts and contact notification for all contacts identified within 30 days of index case presentation to a health care provider. While this timeline is desirable, circumstances may require extending this period (e.g., contact gets in touch after 30 days, contact does not live in same community, contact is very young, or known to be pregnant, delayed receipt of contact form).

Neonatal Contacts:

- Neonates born to women with chlamydial infection are at high risk of pneumonia and conjunctivitis. Infants should be examined carefully and testing of the eyes and nasopharynx should be performed. Infants testing positive should be treated with the regimens described for neonatal infection under "Management of Cases". Prophylaxis is not recommended unless follow-up cannot be guaranteed (6).

8.3 Preventive Measures:

- Instruction and encouragement for the practice of safer sex.
- Screening and case finding in at risk groups:
  - All pregnant women at their first prenatal visit. For those who are positive or at high risk for infection (refer to groups listed below), rescreening in the third trimester is recommended.
  - Sexually active youth/young adults 15 to 24 years of age.
  - Individuals with a new sex partner or more than two sex partners in the past year.
  - Individuals with a history of previous sexually transmitted infections.
  - Vulnerable populations (including but not limited to injection drug users, incarcerated individuals, sex trade workers, street youth).
- Cases and their contacts should refrain from sexual intercourse until 1 week after 1 dose treatment or until completion of a longer antimicrobial regimen (7).
- Prenatal screening and treatment of pregnant women is the best method for preventing chlamydial infection among neonates (7).

APPENDIX A: Management of Acute Pelvic Inflammatory Disease (PID)

Early diagnosis and treatment are crucial to the maintenance of fertility (14).

- Acute pelvic inflammatory disease results from the ascending spread of microorganisms from the vagina and endocervix to the upper female genital tract including the endometrium, fallopian tubes, pelvic peritoneum and contiguous structures (14).

- This syndrome includes any combination of endometritis, salpingitis, tubo-ovarian abscess and pelvic peritonitis (7).

- Etiologic agents include *N. gonorrhoeae, C. trachomatis* and other organisms such as anaerobes, enteric Gram-negative rods, streptococci and some mycoplasma.

- Acute PID may be difficult to diagnose because of the wide variation in presenting symptoms and signs. Many women with PID have subtle or mild symptoms.

- There is no single historical, physical or laboratory finding that is both sensitive and specific for the diagnosis of PID (7, 14).

- The minimum diagnostic criteria for PID includes the following:
    - Lower abdominal tenderness and
    - Uterine/adnexal tenderness or
    - Cervical motion tenderness (7, 14).

- Additional criteria that support a diagnosis of PID and enhance the specificity of the diagnosis, in addition to the minimum criteria include:
    - Oral temp > 38.3°C
    - Presence of white blood cells (WBC) on saline microscopy of vaginal secretions/wet mount
    - Elevated erythrocyte sedimentation rate
    - Elevated C - reactive protein
    - Abnormal cervical or vaginal mucopurulent discharge
    - Laboratory documentation of cervical infection with *N. gonorrhoeae* or *C. trachomatis* (7, 14).

- Definitive diagnostic criteria include:
    - Endometrial biopsy with histopathologic evidence of endometritis (at least 1 plasma cell per x 120 field and at least 5 neutrophils per x 400 field);
    - Transvaginal sonography or other imaging techniques showing thickened fluid-filled tubes, with or without free pelvic fluid or tubo-ovarian complex; or
    - Gold standard: Laparoscopy demonstrating abnormalities consistent with PID, such as fallopian tube erythema and/or mucopurulent exudates (14).

Treatment:

- Goals of treatment are to control acute infection and to prevent long-term sequelae such as infertility, ectopic pregnancy and chronic pelvic pain (14).

- Empiric treatment for PID should be initiated in women at risk for STIs if the minimum criteria are present and no other causes for the illness can be identified.

- The management of women with PID is considered inadequate unless their sexual partners are also clinically evaluated (15).

- Treatment regimens should provide coverage for *N. gonorrhoeae*, *C. trachomatis*, Gram-negative facultative bacteria and streptococci. Anaerobic coverage (metronidazole) should be considered, but whether elimination of anaerobes from the upper tract is necessary remains to be answered even though anaerobes are detected in the majority of PID cases (14).

- The recommended combination treatment below is covered by Manitoba Health, Seniors and Active Living. There are other effective treatment regimens for PID that health care providers may wish to prescribe; however, only the regimens described below are publicly-funded in Manitoba. To order the publicly-funded STI drugs, refer to the *Manitoba Health STI Medication Order Form*: http://www.gov.mb.ca/health/publichealth/cdc/protocol/form11.pdf .

  Ceftriaxone 250 mg IM in a single dose followed by

  Doxycycline 100 mg orally twice a day for 14 days with or without

  Metronidazole 500 mg orally twice a day for 14 days.

Precautions: Ceftriaxone should not be given to persons with a cephalosporin allergy or a history of immediate and/or anaphylactic reactions to penicillins (14). Doxycycline is contraindicated in pregnancy, lactation and children under nine years of age. Patients should not drink alcohol during and for 24 hours after oral therapy with metronidazole because of a possible disulfram (antabuse) reaction (14).

For patients with contraindications to treatment with cephalosporins, recent evidence suggests that short course **azithromycin** at a dose of either 250 mg PO daily for one week or 1 gram PO weekly for two weeks **combined with oral metronidazole** is effective in producing a clinical cure for acute PID (14).

- Some patients will require hospitalization. The decision of whether hospitalization is necessary should be based on the assessment of the health care provider.

- Individuals treated as outpatients need careful follow-up and should be re-evaluated 2 to 3 days after therapy is initiated (14). If no clinical improvement has occurred, hospital admission for parenteral therapy, observation and consideration for laparoscopy is required; consultation with colleagues experienced in the care of these patients should be considered (14).

- In patients who have completed treatment for PID and have persistent symptoms, consideration should be given to *Mycoplasma genitalium* and *Trichomonas vaginalis* as possible causative organisms (9). Refer to current Canadian Guidelines on Sexually Transmitted Infections for management.

- Some specialists also recommend rescreening for *N. gonorrhoeae* and *C. trachomatis* four to six weeks after therapy is completed in women with documented infection.

- Pregnant patients with suspected PID should be hospitalized for evaluation and treatment with parenteral therapy; consultation with an expert should be sought.

Additional Resources for Health Professionals

- Nine Circles Community Health Centre, Winnipeg http://ninecircles.ca/education/for-health-care-professionals/ .
- Sexuality Education Resource Centre (SERC) Manitoba http://www.serc.mb.ca/ .
- STI Klinic, Klinic Community Health http://klinic.mb.ca/health-care/drop-in-services/sti-klinic/
- Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections

https://www.canada.ca/en/public-health/services/infectious-diseases/sexual-health-sexually-transmitted-infections/canadian-guidelines/sexually-transmitted-infections.html#toc

References

1. Batteiger BE and Tan M. *Chlamydia trachomatis* (Trachoma, Genital Infections, Perinatal Infections, and Lymphogranuloma Venereum. In: *Mandell, Douglas, and Bennett's* (eds) *Principles and Practice of Infectious Diseases 8th ed.* Elsevier, Philadelphia, 2015.

2. American Academy of Pediatrics. *Chlamydia trachomatis*. In: Pickering LK ed. *Redbook 2012 Report of the Committee on Infectious Diseases 29th ed.* Elk Grove Village, IL: American Academy of Pediatrics, 2012; 276-281.

3. Public Health Agency of Canada. Case Definitions for Communicable Diseases under National Surveillance. *Canada Communicable Disease Report CCDR* 2009; 35S2: 1-123.

4. World Health Organization. WHO Guidelines for the Treatment of *Chlamydia trachomatis* 2016.

5. Nwokolo NC, Dragovic B, Patel S et al. 2015 UK national guideline for the management of infection with *Chlamydia trachomatis. International Journal of STD & AIDS* 2016; 27(4):251-267.

6. Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections https://www.canada.ca/en/public-health/services/infectious-diseases/sexual-health-sexually-transmitted-infections/canadian-guidelines.html .

7. Centers for Disease Control and Prevention. Sexually Transmitted Diseases Treatment Guidelines, 2015. *MMWR Recomm Rep* 2015; 64(No.RR-3):1-137.

8. Canadian AIDS Treatment Information Exchange. What you need to know about chlamydia http://www.catie.ca/en/printpdf/fact-sheets/sti/chlamydia/key-messages-chlamydia .

9. Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections 2016 Updates Summary, April 2017 https://www.canada.ca/content/dam/phac-aspc/migration/phac-aspc/std-mts/sti-its/assets/pdf/updates-summary-eng.pdf .

10. Heymann David L. Chlamydial Infections In: *Control of Communicable Diseases Manual 20th ed*, American Public Health Association, Washington, 2015; 99-101.

11. Public Health Agency of Canada. Report on sexually transmitted infections in Canada: 2013-2014.

12. Choudhri Y, Miller J, Leon A and Aho J. Chlamydia in Canada, 2010-2015. *CCDR* 2018; 44(2):49-54.

13. Manitoba Health, Seniors and Active Living. Sexually Transmitted Infections in Manitoba 2014. http://www.gov.mb.ca/health/publichealth/surveillance/docs/stim2014.pdf .

14. Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections Section 4 – Management and Treatment of Specific Syndromes: Pelvic Inflammatory Disease (PID), 2010. Available at: http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/section-4-4-eng.php .

15. Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections Supplementary Statement for recommendations related to the diagnosis, management, and follow-up of Pelvic Inflammatory Disease March 2014. Available at: http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/pid-aip-eng.php .