



Maternal Health Task Force



# An Overview of Maternal Infections

## Introduction

Infections during pregnancy can be associated with adverse pregnancy outcomes such as stillbirth, preterm birth, low birth weight and spontaneous abortion.

Infections during pregnancy, post partum haemorrhage, hypertensive disorders, and abortion related complications are the main preventable causes of maternal and neonatal morbidity and mortality.

With appropriate prevention, diagnosis and treatment of infections during pregnancy, we can reduce the maternal and neonatal morbidity and mortality and mitigate the adverse effects of maternal infections to both mothers and new born.

## Epidemiology

Although there has been improvement on prevention, diagnosis and treatment of maternal infections, the limited epidemiology and aetiology data is a barrier to implementing effective public health measures (Velu 2011).

Most of the useful information comes from the individual studies on specific infectious diseases during pregnancy, which are limited to the time, population group from which they originated. (Galask 2008)

Maternal infection incidence depends on many determinants such as socioeconomic, access to health services, poverty, education, etc. There is a direct correlation between poverty and high incidence of maternal and neonatal infections. (Velu 2011)

With the diversity of causative agents and the diversity of transmission and pathogenesis of maternal and neonatal infections, it is difficult to propose a general approach for the management of maternal infections. Each pathology requires a specific measure for prevention, diagnosis, screening and treatment. (Galask 2008)

## Epidemiology

A systematic review addressing the epidemiology and aetiology of maternal infections determined the following median prevalence rates of infections in low- and middle-income countries (noting large variations between regions and countries):

### Bacterial infections:

- Syphilis (2.6%)
- Gonorrhoea (1.5%)
- Chlamydia Trachomatis (5.8%)
- Group B Streptococcus (8.6%)
- Bacterial Vaginosis (20.9%).

### Viral infections:

- Hepatitis B (4.3%)
- Hepatitis C (1.4%)
- Rubella (8.9%)
- Cytomegalovirus (95.7% Previous Infection)
- Herpes simplex (20.7%).

In this systematic review, studies providing information on the epidemiology of parasitic infections in pregnant women and studies reporting the prevalence of maternal HIV infection were identified but not included for analysis, as this information is available through other sources.

## Epidemiology

Another systematic review addressing the comorbidity of STI/RTIs and malaria in pregnancy determined the following infection prevalence rates. The study group included women attending antenatal visits in sub-Saharan Africa

Syphilis (4.5 %), Gonorrhoea (3.7%), Trachomatis (6.9%), trichomonas vaginalis (29.1%), bacterial vaginosis (50.8%), peripheral malaria (32.0%) and placental malaria (25.8%).

The prevalence rates in this review may represent an underestimation as antenatal care resources may not account for asymptomatic infections (such as N. gonorrhoea or C. Trachomatis). Moreover not all women in developing countries receive antenatal care.

In this systematic review, studies providing information on the epidemiology on the prevalence of maternal HIV infection were not included for analysis, as this information is available through other sources.

## Maternal to child transmission of infections

Mother to baby transmission of infections can occur :

- In Utero (congenital)
- During Delivery (perinatal)
- During Breastfeeding (postnatal)

### Route of transmission

Maternal infections can spread to the embryo and foetus by:

- Infections ascending from the upper vagina via the uterine cervix to the amniotic fluid.
- Hematogenous spread as a result of maternal viremia, bacteremia or parasitemia.

## Organisms which may cause intrauterine infection and most common routes to infection

### Hematogenously Acquired

Cytomegalovirus

Rubella virus

Varicella-herpes zoster virus

Variola virus

Vaccinia virus

*Listeria monocytogenes*

*Treponema pallidum*

*Toxoplasma gondii*

Enteric bacteria

Mumps virus

Rubeola virus

*Vibrio fetus*

Coxsackievirus B

Poliomyelitis virus

### Acquired by Ascending Infection

*Escherichia coli*

*Streptococcus faecalis*

Staphylococci

$\beta$ -Hemolytic streptococci

groups A and B

Anaerobic cocci

*Bacteroides fragilis*

*Candida albicans*

Herpes simplex virus

*Clostridium perfringens*

*Listeria monocytogenes*

*Proteus, klebsiella, and*

*Pseudomonas*

## Effects of maternal infections

- Infection transmission in utero is often variable as it depends on the type of infection, gestational age and immunity of the mother.
- In general, if the infection is primary or is acquired at an early gestational age the effects of the infection are more serious.
- Ascending route infections can cause funisitis and chorioamnionitis as well as lead to premature rupture of membranes and preterm delivery.
- Hematogenous or viral infections can infect the placenta leading to deciduitis and villitis.
- Maternal infections can also affect the fetus indirectly causing preterm birth or fetal growth restriction (IUGR).

## Effects of infections on pregnant woman

Many symptoms such as nausea, fatigue, vague myalgia, and the physiologic leukocytosis are normally associated with pregnancy. A number of viral infections may manifest with the similar symptoms and are likely to be ignored.

Some infections may cause severe problems for the foetus but minimal symptoms in the mother, such as cytomegalovirus infection and toxoplasmosis that causes symptoms similar to the common cold in mother.

Due to pregnancy, a woman may be more frequently or more severely affected by certain disease processes.

Poliomyelitis, oculogenital infections by *Chlamydia trachomatis*, herpes simplex virus type 2 infections, disseminated gonorrhoea, vulvovaginal candidiasis, pyelonephritis, and septic shock apparently occur more frequently in the pregnant woman than in the nonpregnant woman.

## Effects of maternal infections on fetus and newborn

Maternal infections (depending on the causative agent) may have the following effects in fetus and newborn:

**Low birth weight**, is defined as birth weight of a live born infant of less than 2500 g (5 pounds 8 ounce) regardless of gestational age (ICD -10).

**Preterm birth**, defined as the birth of a live infant at less than 37 weeks' gestation, which may happen with several viral, bacterial and some protozoan infections.

**Abortion and stillbirth**, which may happen with infections crossing the placenta, such as rubella, mumps, smallpox, syphilis, malaria, toxoplasmosis, cytomegalovirus, herpes simplex virus.

**Development anomalies**, such as central nervous system CNS cardiovascular abnormalities, deafness, and mental retardation may happen with some infections such as rubella and cytomegalovirus.

**Congenital diseases** may occur with most infections that cross the placenta (CNS, cardiovascular, hepatic and etc) eg rubella and syphilis .

**Postnatal persistence of infections**, as some infections like Mycobacterium tuberculosis, trepanoma pallidum, malaria may survive for months and years in infants and may result in disease.

## Diagnosis

- Diagnosis of maternal infections is based on a careful history, physical examination and other diagnostic approaches (laboratory investigations, ultrasound, x-ray etc)
- The symptoms and signs of maternal infections may be vague, or may be attributed to the normal course of pregnancy. Therefore clinical signs, symptoms, and history alone are not sufficient to make diagnosis.
- Appropriate laboratory studies are required to make the diagnosis and differential diagnosis in many cases.

## Screening

### Goal:

To ensure the safety and health of mothers and their newborns by providing appropriate intervention of maternal infections. (Alberta Health 2007)

### Key messages: (PAHO 2008)

- The recommended screenings for maternal infections differs between countries due to prevalence rate and burden of the infection.
- The recommendations should take into consideration the availability of screening resources, the diagnostic accuracy of screening, and the availability and effectiveness of intervention and treatment resources.

Alberta Health. Alberta Prenatal Screening Program for Selected Communicable Diseases. Alberta Health Disease Control and Prevention Branch. 2007.

Pan American Health Organization, March of Dimes, Latin American Centre for Perinatology Women and Reproductive Health. Perinatal infections transmitted by the mother to her infant, education material for health personnel. Clap Scientific Publication. 2008.

## General considerations before screening

- It is important for the woman to be informed. It is her choice to have the tests performed.
- The benefits, risks, and confidentiality of testing and treatments should be discussed as well as any questions answered before informed consent is given by the woman.
- All discussions of informed consent should be appropriately documented by the healthcare professional.
- If testing is declined by the woman, additional counseling should be offered to answer any other questions or concerns without coercion.

## General considerations in case of positive results

### For blood-born Infections:

- Possible need for intravenous drug support.

### For sexually transmitted infections:

- Test sexual partners for infection.
- Women should be informed and given access to psychological support.
- Refer to specialist for certain infections (such as HIV or hepatitis C).

## Prevention

- Modifying the mother's behavior that may increase the likelihood of contacting a communicable disease can prevent maternal primary infection.
- Educating the mother on infection prevention strategies as well as preconception and antenatal screenings to ensure early infection detection.
- Immunization of the mother

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