

PARVOVIRUS SURVEILLANCE PROTOCOL FOR ONTARIO HOSPITALS

Developed by the Ontario Hospital Association and the
Ontario Medical Association
Joint Communicable Diseases Surveillance Protocols Committee
in collaboration with the Ministry of Health and Long Term Care

Approved by:
The OHA and The OMA Board of Directors
The Ministry of Health and Long-Term Care –
The Minister of Health and Long-Term Care

Published and Distributed by the Ontario Hospital Association
Published May 2011

Publication # 299

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This protocol was developed jointly by the Ontario Hospital Association and the Ontario Medical Association to meet the requirements of the *Public Hospitals Act 1990*, Revised Statutes of Ontario, Regulation 965.

This protocol is based on current scientific and medical knowledge and a desire to ensure maximum cost effectiveness of programs while protecting health care workers. It is intended as a minimum practical standard for Ontario hospitals. However, hospitals may adopt additional strategies when indicated by local conditions.

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Rationale for Parvovirus Surveillance Protocol

This rationale briefly summarizes current medical knowledge about parvovirus B19 to address the need for information and reassure health care workers that parvovirus B19 is not a significant occupational health and safety risk if Routine Practices are followed. For more detailed information, refer to the bibliography.

The Virus

Parvovirus B19 is a member of the family Parvoviridae. Humans are the only known hosts. Parvovirus B19 is widespread throughout the world. In temperate climates, infection peaks during the late winter, spring, and early summer. Infection is asymptomatic in 25% of cases. Symptomatic infection most commonly affects children, in whom erythema infectiosum (EI), characterized by fever followed by an intensely erythematous facial rash (“slapped cheek” appearance), is typical. Other clinical manifestations of parvovirus B19 infection are much less common and include papulopurpuric gloves and socks syndrome, polyarthropathy syndrome, and transient aplastic crisis (the latter particularly in those with underlying hematologic disorders). In pregnant women, parvovirus B19 has been associated with fetal hydrops and fetal death related to suppression of fetal bone marrow and severe anemia.

The incubation period for human parvovirus B19 varies from 4 to 20 days, until the development of a rash or symptoms of aplastic crisis.

Parvovirus B19 infects the majority of persons at some time during their lives. Acute infection will result in the development of parvovirus B19 IgM antibodies, followed by development of IgG antibodies. Parvovirus B19 IgG antibody indicates prior infection, and persists for life.¹ Individuals with parvovirus IgG antibody are considered to have lifelong immunity. Parvovirus B19 IgG is detectable in 5 to 10% of young children, 50% of 15-year olds, and 80 to 90% of elderly adults. **Among women of child-bearing age in North America, approximately 70% are IgG positive.**^{2,3}

Transmission

Parvovirus B19 infection is spread mainly by large respiratory droplets and the virus is shed in nasal and oral secretions during periods of viremia, which occur prior to the development of rash. Close contact with an infected individual increases the risk of transmission. Up to 50% of susceptible household contacts of an individual with symptomatic aplastic anemia or EI will become infected.⁴ Among susceptible school and daycare personnel, up to 20% of contacts will become infected.¹

Transmission in healthcare settings has been reported, but the overall risk of infection for healthcare workers (HCWs), including pregnant HCWs, is very low;⁵⁻⁸ the risk of infection may be higher in outbreaks.⁹⁻¹¹ Susceptible HCWs are at a much higher risk of acquiring parvovirus B19 infection from children living in their same household than from an occupational exposure.^{6,8,12}

Infrequently, transmission can occur by percutaneous exposure to blood or blood products. During pregnancy, infection can be transmitted transplacentally from mother to fetus.

The period of communicability varies depending on the clinical illness. **Transmission occurs prior to the onset of symptoms in EI; patients are not infectious after appearance of the rash.** Patients with transient aplastic anemia may be viremic and infectious for up to 7 days after the onset of symptoms, and those with severe immunosuppression or chronic infection may be infectious for prolonged durations.¹³

The Risks

Most pregnant HCWs who acquire parvovirus B19 infection acquire it from their own children.¹² The most significant risks of parvovirus B19 infection result from transplacental infection of the fetus. Approximately 1 to 2% of susceptible pregnant women will seroconvert annually, but this may be as high as 13% in epidemic periods.⁸ Transplacental transmission occurs in 33 to 51% of these infections,^{12,14,15} but the vast majority of fetal infections do not lead to adverse fetal outcomes.

Fetal infection, when it develops, usually occurs 6 to 7 weeks after maternal exposure.² Adverse fetal outcomes associated with parvovirus B19 infection include intrauterine growth retardation, fetal anemia / hemolysis, fetal hydrops, and fetal death. Spontaneous abortion occurs no more frequently in women infected with parvovirus B19 compared with the rate of overall first trimester loss.¹⁶ Most infected fetuses recover spontaneously, with no adverse fetal or pediatric outcomes. However, severe adverse outcomes have been reported in 3 to 10% of fetal infections.¹⁷⁻¹⁹ Hydrops fetalis and fetal loss occur in up to 10 and 14% (respectively) of pregnancies in which infection occurs before 20 to 22 weeks of gestation.^{2,14,16,19} Adverse outcomes are rare with infection during the last trimester, in particular the last two months of pregnancy. Limited evidence suggests that adverse fetal outcomes may be more likely when infection in the pregnant woman is clinically apparent (e.g. fever, rash, arthralgias).¹⁷

A pregnant HCW who seroconverts during pregnancy should be referred to an obstetrician or maternal-fetal medicine specialist for surveillance of the pregnancy due to the risk of fetal anemia.

Prevention: Routine Practices

To prevent transmission of parvovirus B19 in a health care setting, workers must practice hand hygiene especially after all patient and patient environment contact, and apply Routine Practices and Additional Precautions as indicated. Isolation of patients with EI is not indicated, since patients are no longer infectious once the diagnosis is clinically evident. Other patients suspected of having parvovirus B19 infection (e.g. those with transient aplastic crisis) should be cared for using Droplet Precautions. Kissing or cuddling infants and young children brings the mucous membranes of the mouth, nose and eyes into proximity with the oral and respiratory secretions of the infant / child, which may contain parvovirus B19; this practice by health care workers caring for infants and young children must therefore be prohibited.

Parvovirus B19 infection in a health care setting generally indicates circulation of parvovirus B19 in the community; exposure of health care workers is therefore more likely to occur outside of the health care setting. In addition, parvovirus B19 immunity is relatively high among women of childbearing age, and overall there is a relatively low risk of adverse fetal outcomes due to B19 infection during pregnancy. Therefore, no work exclusion is required for pregnant health care workers.

Parvovirus B19 Surveillance Protocol for Ontario Hospitals

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Published May 2011

I. Purpose

The purpose of the protocol is to assist Ontario hospitals in managing parvovirus B19 infections among employees and other workers, and preventing transmission of parvovirus B19 from patients to persons carrying on activities in the hospital.

II. Applicability

This protocol applies to all persons carrying on activities in the hospital, including employees, students, volunteers, undergraduate and postgraduate medical trainees, physicians and contract workers. The term health care worker (HCW) is used in this protocol to describe these individuals.

When hiring contract workers or training students, the hospital must inform the supplying agency/school that the agency/school is responsible for ensuring that their personnel are educated and managed according to this protocol.

This protocol is for the use of the Occupational Health Service (OHS) in hospitals.

III. Pre-placement

Screening for susceptibility or immunity to parvovirus B19 in persons carrying on activities in the hospital is not required and is not recommended. If screening has been done, results do not affect HCW placement.

IV. Continuing Surveillance

No routine continuing surveillance of any persons carrying on activities in the hospital is required for parvovirus B19. Contact tracing may be indicated for pregnant HCWs after exposure to infectious patients with acute parvovirus B19 infection.

Pregnant Health Care Workers

There is no evidence that seroconversion is more frequent in HCWs than in the general population. Thus, **pregnant HCWs need not be excluded from working with infants, young children, or immunocompromised patients.**

V. Exposure

Due to the fact that the period of communicability ends at the time of symptom presentation for patients with EI, there is no practical way to anticipate HCW exposure to parvovirus B19. All HCWs may be potentially exposed to parvovirus B19. The best prevention strategy is consistent application of Routine Practices, including careful hand hygiene before and after *all* patient contact. Contact with the secretions of *all* patients should be prevented by use of appropriate barriers as indicated by Routine Practices. HCWs should avoid kissing or cuddling hospitalized babies and young children.

Droplet Precautions are recommended for patients in aplastic crisis.

HCWs should only be considered exposed and regarded as close contacts if the source is a confirmed case of parvovirus B19 infection (compatible clinical illness in conjunction with positive IgM antibody) AND if the HCW's mucous membranes were exposed to infectious respiratory droplets. As the disease is generally benign, only those who are pregnant warrant any follow-up.

Pregnant HCWs Exposed to Parvovirus B19 in the Workplace

A pregnant HCW who is occupationally exposed to patients with parvovirus B19 infection, or who develops symptoms consistent with parvovirus B19 infection after an occupational exposure, should be assessed and serology ordered to determine if the HCW is immune or has acute infection (i.e. determine IgG and IgM status).

If parvovirus B19 IgG is present and IgM is negative:

- the HCW is immune and can be reassured that she will not develop infection and that the virus will not adversely affect her pregnancy.

If parvovirus B19 IgG is negative and IgM is negative:

- the HCW is either incubating disease or, if the incubation period has passed, the HCW remains susceptible.
- if incubating disease, the HCW should be referred to her personal physician, or to an obstetrician or maternal-fetal medicine physician, for assessment, counseling, and follow-up.
- work exclusion is not recommended for susceptible HCWs.¹⁶

If parvovirus B19 IgM is positive (suggesting recent infection):

- the HCW should be referred to her personal physician, or to an obstetrician or maternal-fetal medicine physician, for assessment, counseling, and follow up.

Guidelines for management and follow-up are available from the Society of Obstetricians and Gynecologists of Canada.¹⁶

VI. Acute Disease

Any HCW who develops illness thought to result from parvovirus B19 infection need not be restricted from work. Once symptoms have become clinically apparent, transmission of infection is unlikely to occur.

If parvovirus B19 infection results from an occupational exposure, it is reportable to the Ministry of Labour and the Workplace Safety and Insurance Board.

Glossary

Hydrops fetalis

A serious fetal condition caused by fetal anemia and defined as abnormal accumulation of fluid in two or more fetal compartments, including ascites, pleural effusion, pericardial effusion, and skin edema.

Aplastic crisis

Suppression, usually temporary, of erythropoiesis (the process in which red blood cells are formed), usually due to viral infection (e.g. parvovirus B19); may be particularly severe in people with hemolytic anemias (e.g. sickle cell disease, thalassemia, hereditary spherocytosis).

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