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Guidance for control of parvovirus B19 infection in healthcare settings and the community

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Summary

Interventions for parvovirus B19 infection need to balance the low risk of infection at a population level with the potential for serious adverse outcome for particular groups, notably the fetus, people with haemoglobinopathies and the immunocompromised. This guidance aims to assist the local decision-making process to be as evidence-based as the available evidence allows.

Keywords: human parvovirus B19, infectious pregnancy complications, erythema infectiosum, infection control

Context

Parvovirus B19 is the cause of a common childhood illness, erythema infectiosum (fifth disease), characterized by fever and a rash with erythematous cheeks – hence the common name 'slapped cheek'. Further manifestations of parvovirus B19 infection have become evident since the virus was identified, including transient aplastic crisis in people with haemoglobinopathies, chronic infection in the immunocompromised, acute arthritis and, in the unborn child, hydrops fetalis, abortion and stillbirth.

This guidance aims to provide practicable help for the control of parvovirus B19 infection in healthcare settings and in the community, directed at Regional Epidemiologists and Consultants in Communicable Disease Control. The guidance is also relevant to the practice of occupational health professionals, virologists, infection control specialists, general practitioners and obstetricians. It covers the management of infected healthcare workers (HCWs), employees who are at risk of adverse outcome of parvovirus infection both in healthcare settings and in the community, and protection of patients at risk.

The issues raised by the problem of parvovirus B19 infection are often complex and it is not possible to be prescriptive in guidance. Whatever the setting, the problem should always be placed in the broadest context, which includes the community. First, the absolute risk of any individual becoming infected with parvovirus and having an adverse outcome is low. Second, the number of infections attributable to exposure at work or in any other setting is usually no greater than that in the community in general. For these reasons, the importance of communication and reassurance needs to be emphasized. Information sheets have been produced to assist this process (see Appendix).

Definitions

Defining the groups at risk, the type of contact carrying a significant risk of infection, and the period of maximum infectivity for parvovirus B19 is essential to assess the nature of any infection control problem (Table 1). The definition given of contact is based on the definition used for varicella zoster[1] and is therefore rather cautious, as parvovirus is much less infectious than varicella. The definition of contact will probably need to be modified as new evidence becomes available.

The issue of infection control exclusively arises in relation to the three groups at risk of adverse outcome of infection with parvovirus. The three groups at risk of severe adverse outcome of parvovirus B19 infection are the fetus up to 20 weeks of gestation, those with haemoglobinopathies and the immunocompromised (Table 1 and Appendix). Diagnosis of infection is based on serology, as salivary methods are not yet suitable for routine diagnostic use.

Attack rates

The transmissibility of the virus to adults is relatively low. In elementary school employees annual seroconversion rates have been reported at around 5 per cent, although this includes epidemic years.[5] Even in household settings where level of contact is intense, attack rates are only around 50 per cent

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Table 1 Definitions

At-risk groups

(1) Women up to and including 20 weeks of pregnancy

Fetal loss has been estimated as occurring in 9 per cent of pregnancies in which infection occurs during the first 20 weeks and hydrops fetalis in 3 per cent of pregnancies in which infection occurred between 9 and 20 weeks.[2] There is no evidence of B19-associated teratogenicity, or of developmental abnormalities appearing later in childhood. As there may be uncertainties both about the gestation of the fetus and about the date of onset of infection (such as during epidemic periods when multiple exposures may occur), some flexibility may be required in the application of this definition. Extremely rarely, infections after 20 weeks of gestation can be associated with transient anaemia in the mother or the newborn without sequelae (B. Cohen, personal communication).

(2) Haemoglobinopathies

Parvovirus B19 infection can cause transient aplastic crises (TAC) in non-immune patients with chronic haemolytic anaemias, e.g. sickle cell disease, beta-thalassaemia and hereditary spherocytosis.

(3) Immunocompromised

Persistent viral replication leading to red cell aplasia and chronic anaemia has been reported in immunodeficient patients.

Incubation period

The incubation period is defined by the appearance of the rash, which occurs at the end of the period of infectivity. It has been quoted at 4–20 days[3] but a better estimate is 13–18 days.[4]

Infectious period

Seven days before the appearance of the rash. In asymptomatic cases the infectious period lasts one week and is likely to be over by 15 days from the date of exposure, but exceptionally it can end 21 days from the date of exposure.

Contact

Contact in the same room (e.g. in a house or classroom or a 2–4 bed hospital bay) for a significant period of time (15 minutes or more), or face-to-face contact with a laboratory-confirmed case of parvovirus B19 infection during the period of maximum infectivity, from seven days before the appearance of a rash to the date of appearance of the rash, in the absence of respiratory isolation precautions.

School outbreak

An outbreak in a school is defined as two or more cases in the same class or year group and with dates of onset within three weeks, or three or more cases within three weeks in the school or nursery.

Table 2 Attack rates in different settings

Ref.	Setting	Attack rate (%)	Community comparison group	Epidemic year
6	Pregnant women referred to a Maternal–Fetal Medicine Division after exposure to parvovirus B19	Exposed to own child 30/102 (29.4%) Related child 3/46 (6.5%) Unrelated child 5/38 (13.2%) School pupil 9/49 (18.4%) Adults 2/42 (7.1%) Brief exposure 3/44 (6.7%)	No	Unknown (1990–1996)
7	Adult surgical ward	Patients: 3/6 (50%) Ward staff: 14/30 (47%)	No	Yes
8	Paediatric ward	Staff: 10/30 (33%) Children: 2/9 (22%)	No	Not given
9	Maternity wards	Maternity ward staff 8/35 (23%) Other HCW 12/48 (25%) Maternity ward staff at another hospital 9/32 (28%) Blood donors 30/101 (30%)	Yes – blood donors	Yes
10	Children's hospital	Nursing staff 12/40 (30%)	No	
11	Primary school	Staff 46/558 (19%)	No	
12	Primary school	Children 3–5 years 6/65 (9%) Children 6–11 years (13–50%) Staff 7/15 (47%) Household contacts 5/11 (45%)	Yes – households	Yes

amongst susceptible household members. In the healthcare setting, the estimates of attack rates come from in-patient settings during outbreaks amongst staff who may have had prolonged, frequent and close contact with cases (Table 2). From the four hospital studies in Table 2, the mean attack rate in hospital staff is 31 per cent. However, these rates may reflect what is happening in the community, as the studies did not exclude cases acquired outside the hospital, and there was no evidence that the rates amongst staff working on a ward where there was an outbreak were higher than that elsewhere in the hospital or community. In a study of women referred to a maternal–fetal medicine unit following exposure to clinically diagnosed cases of parvovirus B19 infection, 52 infections were detected in 311 susceptible women who were exposed during pregnancy, an overall attack rate of 16.7 per cent. Of these, 47/52 (90.4 per cent) confirmed maternal infections followed exposure to an infected child. Only 3/52 women were infected after a brief exposure and only two after contact with an infected adult.[6] The attack rate after brief exposure was 3/44 (6.8 per cent) and after exposure to an infected adult, 2/28 (7.1 per cent). As the infection in the contact was not confirmed virologically, the attack rates may have been higher, as some of the exposures will not actually have been to parvovirus B19. The attack rate in susceptible outpatients who come into contact with someone who is infected could be estimated to be lower than 10 per cent.

A study of school and hospital employees found that the most important single risk factor for seroconversion of susceptible employees during an endemic period was daily contact with school-age children, either at home or in primary school settings.[5] Daily occupational contact with school-age children was associated with a five times increased likelihood of seroconverting. In contrast, the rate of seroconversion among hospital staff was very low. The annual seroconversion rate for susceptible primary-school employees was 5.2 per cent compared with 2.4 per cent amongst other school employees and 0–0.5 per cent amongst hospital employees. Having school children at home was almost as important, with seroconversion rates of 3.3–5.6 per cent. Consequently, school employees may be just as much at risk of becoming infected at home as at their workplace.

Infection control

There are four situations that frequently arise where decisions have to be made about control of infection in relation to parvovirus B19 infections (Table 4 and Fig. 1). Each situation is expanded upon below.

The infected healthcare worker

If parvovirus B19 infection is confirmed in a healthcare worker (HCW) then the implications need to be considered for patients

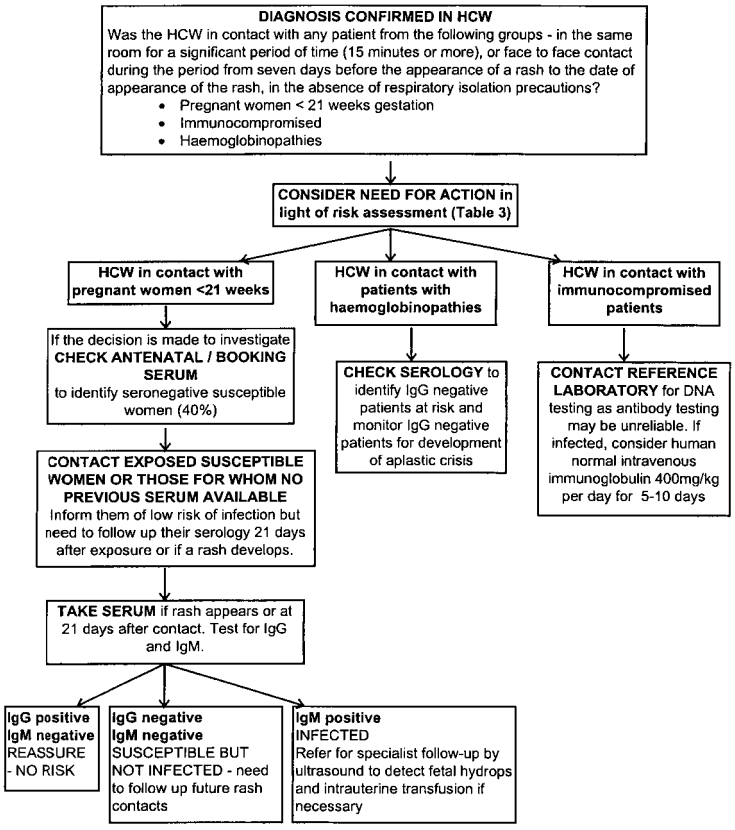

Figure 1 Response to parvovirus B19 infection in a healthcare worker (HCW): protection of those at risk (to be incorporated into advice for acute potentially infectious illness in HCWs including rash with fever).

Table 3 Risk assessment for women up to 20 weeks pregnant after brief contact with an infected adult such as a healthcare worker[2,13]

Nature of risk	Estimated probability (%)
Probability of being susceptible	40
Probability of becoming infected – in out-patients settings	< 10
Probability of fetal hydrops if infected (where benefit possible from intervention)	3
Probability of benefit from transfusion if fetal hydrops develops	38
Total probability of benefit from screening, follow-up and transfusion (product of the four previous probabilities)	< 0.05

at risk from parvovirus infection who were in contact with that HCW during the seven days before onset of the rash. The action taken will depend on local circumstances but should balance the duty of care to patients and the low risk of transmission in this setting (shown by the risk assessment Table 3 and Fig. 1).

A common scenario is the infected midwife who has been seeing pregnant women for antenatal care (Table 3). Overall, the risks of a pregnant woman becoming infected are greater outside the healthcare setting than within it, particularly if she has children or works with children. Women who were in contact with the HCW outside the infectious period (as defined in Table 1) or when they were more than 20 weeks pregnant can be reassured, with the proviso that their gestation may be incorrect and that other exposures to parvovirus B19 may have occurred without anyone's knowledge at an earlier stage in the

Table 4 Infection control scenarios

(1) Potentially infected HCW in contact with patients at risk (see Fig. 1)

(2) Protecting the at-risk seronegative HCW

Only seronegative HCWs who are pregnant < 21 weeks, immunocompromised or who have a haemoglobinopathy need any special consideration.

- *Seronegative HCW, pregnant and < 21 weeks*

Only exclude from work in exceptional circumstances, as risk at workplace is generally the same as or less than that in the community. Advise use of respiratory precautions when caring for potentially infectious cases. In exceptional cases, may consider excluding an HCW from clinical contact with infectious cases or from the workplace if the workplace risk is considered high (e.g. continuing nosocomial outbreak with two or more nosocomial cases in staff and/or patients during three weeks) until they are past 20 weeks of pregnancy.

- *Immunocompromised HCW*

The risk of acquiring infection in the workplace may be similar to or less than that in the community. HCW should be aware of the issues and of the availability of Ig for treatment (see Fig. 1 for dosage). Management of infection should be discussed with a specialist.

- *Seronegative HCW with haemoglobinopathy*

The risk of acquiring infection in the workplace may be similar to or less than that in the community. HCW should be aware of the issues and should know their serological status. They should be aware that if they become infected they may be highly infectious and may pose a risk to others with haemoglobinopathies – such as family members. They can be reassured that after infection, they will develop long-lasting immunity and be protected from further infection.

(3) At-risk employee in occupational settings outside the health service

If an employee such as a teacher is less than 21 weeks pregnant and has been in contact with a confirmed case of parvovirus infection they may be offered serological testing to determine their susceptibility and referred for further medical follow-up if they are seronegative, to detect infection and allow monitoring of the pregnancy where necessary.

Employees should be aware that the risk of acquiring infection in the workplace may be similar to or less than that in the community or at home. For this reason, routine exclusion from the classroom of susceptible teachers who are less than 21 weeks pregnant should not be adopted as policy, as it probably would not reduce the risk of infection. However, if there is an outbreak in the school (two or more cases in the same class with onset date within three weeks, or three or more cases in the school or nursery with onset dates within three weeks) then consideration may be given to excluding susceptible (seronegative) pregnant employees from the classroom until they are more than 20 weeks pregnant.

(4) Protecting at-risk patients

In general, there are no special requirements other than the usual recommendation not to work with an influenza-like illness, fever and/or rash of likely infectious aetiology. In exceptional circumstances, seronegative HCWs who have been in contact with a case may be advised to avoid contact with at-risk patients or take respiratory precautions for 15 days or until a rash appears. Serology can be carried out when the rash appears or 21 days from the last contact.

Some specialized units may consider screening HCWs in contact with immunocompromised patients and those with haemoglobinopathies to identify HCWs who are seropositive and able to nurse infectious patients such as those with aplastic crises without becoming infected. This infection control measure may reduce transmission of parvovirus to other vulnerable patients.

pregnancy. Women who are less than 21 weeks pregnant may have their susceptibility determined by testing booking sera for antibodies to parvovirus B19. About 60 per cent of pregnant women will be immune to parvovirus B19 because of previous infection and can be reassured that they are at no risk. The 40 per cent of women who are susceptible will not necessarily become infected after contact with another infected person as this depends on the nature of the contact (Refs 9 and 13; Table 2). Serological follow-up would be necessary, to identify any that become infected, who then would require referral to a specialist obstetric unit (Fig. 1). The decision has to be made whether the resources required to follow up all contacts at risk, identify any that become infected and provide specialist follow-up for those that are infected are justified in comparison with the small benefit that may be gained. For these reasons, a risk assessment needs to be carried out (Table 3).

From the probabilities in Table 3, the number expected to benefit can be calculated. One thousand women less than 21 weeks pregnant would need to be screened to reassure 600 that they are not susceptible. Four hundred would require further testing to determine whether or not they were infected. Of these 400, fewer than 40 might become infected, and four of these might lose their baby through spontaneous abortion (nothing can be done to prevent this yet). The fetus of one woman may develop fetal hydrops that may not have otherwise been detected and that may benefit from intervention. The intervention may reduce mortality by around 38 per cent assuming a mortality of around 50 per cent in untreated fetal hydrops and an odds of death in fetuses receiving intrauterine transfusion compared with untreated fetuses of 0.14.[13] This risk assessment does not take into account the possible benefit of reassurance that testing may bring.

The action to be taken to protect patients in other at-risk groups when an HCW is found to be infected is shown in Fig. 1.

Protecting the at-risk HCW

Only seronegative HCWs who are also in one of the at-risk groups require consideration. Transmission of infection from patients to HCWs is well documented,[8] but it is an unusual source of infection. The risk to either HCWs or patients in hospitals is probably not higher than the risk in the community at any given time. Respiratory infection control precautions are probably adequate. Draft infection control guidelines from the US Centers for Disease Control propose that no restrictions are required for personnel exposed to parvovirus B19 even when they are pregnant.[14]

Where possible, an HCW with haemoglobinopathies, immunodeficiency or who is in the first 20 weeks of pregnancy should avoid contact with infectious patients, particularly where the viral load is likely to be high, such as when a patient is in aplastic crisis.[15] In immunocompromised patients with chronic parvovirus infections the viral load can be low and nosocomial exposure of a susceptible HCW to such patients does not necessarily carry much risk of infection.[16,17] Screening of HCWs to identify those who are susceptible to infection is not justified in general, but may be felt to be important in certain specific circumstances. Specifically, laboratory workers who are to work with infectious materials known to contain parvovirus B19 virus should be screened to determine whether they are susceptible.[18]

Susceptible at-risk employee in occupational settings outside the health service

As general advice, any woman who is less than 21 weeks pregnant and has been in contact with a confirmed or suspected case of parvovirus infection during the seven days before the rash appeared should seek medical advice. A blood test to find out whether they are susceptible to infection should be considered and further follow-up if necessary. This advice applies equally to employees working in settings such as primary schools where the rates of parvovirus infection may be higher than in other settings. If there is an outbreak in a school (as defined in Table 1), employees such as teachers who are in contact with affected children and who are less than 21 weeks pregnant should also seek medical advice.

Only during an outbreak should exclusion of employees who are less than 21 weeks pregnant and in close contact with children (as defined in Table 1) be considered, and then it should be the exception rather than usual practice. The employee should first find out whether or not she is susceptible to parvovirus B19. The employee should be informed that the outbreak probably reflects the situation in the community at large and that avoiding contact with children at school will not necessarily significantly reduce her overall risk of infection if she is in regular contact with children in other settings.

Protecting patients in at-risk groups

HCWs should be aware of the risk they may present to the three at-risk groups in transmitting parvovirus B19 infection.[19] Hand washing and respiratory precautions probably reduce transmission. HCWs should not be caring for patients when they may have an infectious disease indicated by influenza-like symptoms, a fever or rash. The exclusion of a symptomatic parvovirus B19-infected HCW may offer small practical benefit, as the peak infective period will have passed by the time the rash and associated symptoms appear. However, in most cases serological confirmation of parvovirus B19 infection will not be immediately available, and the difficulty of making an accurate diagnosis on clinical grounds means that it will not be possible to differentiate between parvovirus and other infections such as rubella or measles. Therefore, an HCW who may have a parvovirus infection should be advised to stay

off work until they no longer present a potential risk to patients or colleagues.

If an HCW has been in contact with a confirmed case of parvovirus B19 infection and is found to be seronegative they present a potential risk to patients in at-risk groups as they may be incubating the disease. However, both the risk that they have been infected and the risk that if infected they will infect others are low, so exclusion should be exceptional. If the HCW develops signs of infection such as a fever, they should not work. If more action is felt to be necessary during what might be the infectious period, the exposed HCW could take respiratory precautions with at-risk patients. If exclusion of a potentially infected HCW is considered necessary, this should be until a rash appears or for 15 days from the last contact with an infectious case (covering the viraemic period when infectivity is maximal). Serology to determine whether an infection had taken place can be performed either when a rash appears or at 21 days if the HCW remains asymptomatic.

There is a theoretical risk of immunocompromised patients becoming infected through contact with an infected HCW although there is little evidence of this happening in practice. Some specialized units may consider staff screening to identify staff who are seropositive and hence able to care for infectious patients without presenting an infection control hazard. This might avoid having to treat each case of contact between HCW and someone with a rash as an incident of potential transmission, should such incidents be causing excessive 'fire-fighting' activity in a particular unit.

Conclusions

Assessing the balance of risk and benefit of intervention for parvovirus B19 infection is complex because the overall risks both of harm and benefit are small when taken at a population level, but the risk and benefit for the few individuals who suffer an adverse outcome of infection can be great. This guidance should assist the local decision-making process to be as evidence based as the available evidence allows.

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Appendix: information sheet on parovirus B19

The virus

Parvovirus B19 was discovered by chance in 1975 at the Central Public Health Laboratory during routine screening for hepatitis B of asymptomatic blood donors from the South London Blood Transfusion Centre. B19 happened to be the serial number of the parvovirus positive specimen. Parvovirus B19 is a single-stranded DNA virus belonging to the Parvoviridae family of viruses, which includes a number of animal parvoviruses such as the canine parvovirus and feline panleukopenia virus. Parvoviruses are species specific and B19 is the only known pathogenic human parvovirus. The virus is known to replicate in rapidly dividing erythroid progenitor cells. Other target cells are less well defined and may include myocardial tissue.

Clinical features of infection in healthy children and adults

The most common clinical presentation is erythema infectiosum (also called fifth disease and slapped cheek syndrome). It is characterized by a facial rash, which spreads to the trunk and limbs, usually preceded by a non-specific flu-like illness. Erythema infectiosum is clinically similar to rubella and the two diseases can be reliably distinguished only by laboratory tests. Parvovirus B19 is also associated with rheumatological manifestations, which mostly occur in adults, especially women, and are characterized by joint pains and swelling. The clinical picture is of an acute symmetrical polyarthropathy, often severe, which can last for months in a small proportion of patients. Rarely, neurological and cardiac manifestations have been described. There are no symptoms in about 20–30 per cent of infections.

Infection in pregnancy

Most women who are infected with parvovirus B19 infection during pregnancy have a satisfactory outcome. However, gestational parvovirus B19 infection has been associated with adverse consequences such as fetal death and occasionally hydrops fetalis resulting from viral replication in the bone marrow. Spontaneous recovery of hydropic fetuses may occur with subsequent delivery of a normal infant. A prospective study of pregnant women in the UK estimated that parvovirus B19 infection in pregnancy caused fetal loss in 9 per cent of pregnancies in which infection occurs during the first 20 weeks and hydrops fetalis in 3 per cent of pregnancies in which infection occurred between 9 and 20 weeks. The risk of fetal loss in women with asymptomatic infection appears to be similar to that in women with a rash. Fetal infection without fetal loss or hydrops is common. There is no evidence of B19-associated congenital abnormality in the newborn or developmental abnormalities appearing later in childhood.

Other groups at risk of serious sequelae

The replication of parvovirus B19 in red blood cell precursors in the bone marrow can lead to clinically significant red cell aplasia in certain patient groups. Thus, parvovirus B19 infection can cause transient aplastic crises (TAC) in patients with chronic haemolytic anaemias, e.g. sickle cell disease, beta-thalassaemia and hereditary spherocytosis. Persistent viral replication leading to red cell aplasia and chronic anaemia has been reported in immunodeficient patients. These have included patients on maintenance chemotherapy for acute lymphocytic leukaemia, patients with congenital immunodeficiencies, patients following organ transplantation, and those with HIV-related immunodeficiency.

Epidemiology and transmission

Parvovirus B19 infection is common and occurs world wide. The disease is not notifiable in the UK and surveillance relies on laboratory-confirmed cases. These show a 3–4 year epidemic cycle with a seasonal peak in the first half of each year. Recent epidemic years have been 1989–1990, 1993–1994 and 1997–1998.

Infection is most common in children aged 6–10 years, but can occur at any age. Antibody prevalence studies have shown that approximately 60 per cent of adults in the UK have serological evidence of past infection with parvovirus B19. One attack is thought to confer lifelong immunity.

Respiratory secretions are involved in transmission. In human volunteers, serum and respiratory secretions become positive for B19 DNA 5–10 days after intranasal inoculation. The virus is transmitted effectively after close contact. Patients

with TAC have an intense viraemia and are highly infectious. The virus can also be transmitted parenterally by some blood products (but not intramuscular immunoglobulins) and vertically from mother to fetus. Faecal–oral transmission has not been documented.

Studies of secondary illness in households suggest that the incubation period for clinical erythema infectiosum is 13–18 days, but can be as long as 20 days. Once the rash is present, the subject is no longer infectious.

Laboratory investigations

Until recently, tests for parvovirus B19 infection have been limited to a few reference laboratories. Commercial test kits for parvovirus B19 have now been developed, which should make testing more widely available in the near future.

Recent infection is usually diagnosed by demonstrating B19-specific IgM antibody, which can be detected reliably for up to two months after infection. In samples collected shortly after onset, or in immunocompromised patients with persistent viral replication, active infection is best demonstrated by the detection of B19 DNA. Rapid diagnosis can also be achieved by detecting the virus using electron microscopy. Virus detection methods are available only in specialist centres.

Past infection (immunity) is indicated by the presence of B19 IgG antibody.

Prevention and treatment

Immunization and control policies

There is no vaccine available for the prevention of parvovirus B19 infection, although a recombinant preparation is at an early stage of development. The value of post-exposure prophylaxis with normal immunoglobulin has not been assessed. There are no clear guidelines at present on the control of parvovirus B19 infection. For most individuals, parvovirus B19 infection causes a mild, self-limiting illness and no intervention is required. Some of the management approaches that have been adopted in other situations are described below.

Outbreaks in the home, school and the workplace

When outbreaks of parvovirus B19 infection occur in environments where close contact occurs (e.g. at home or in day care centres), options for preventing transmission are limited. This is because the greatest risk of transmission occurs before the rash appears. Identification and exclusion of those with symptoms cannot therefore prevent spread in parvovirus B19 outbreaks. The efficacy of decontaminating toys and environmental surfaces has not been studied. In the USA, the Centers for Disease Control (CDC) have recommended hand washing as a simple procedure that may reduce the risk of transmission.

When outbreaks occur in schools or in the workplace, parents and employees should be advised of the risks both of transmitting and acquiring infection, and about the groups of people at risk of serious complications. The decision to avoid a school environment or workplace should be made by the individual after discussion and advice from his or her family members, general practitioner, occupational or public health doctor and employer.

Hospital outbreaks

In hospital outbreaks, strategies for limiting spread have centred upon reducing the risk of infection in people in high-risk groups, such as susceptible persons with haematological diseases or immunodeficiency, and susceptible pregnant woman. Normal immunoglobulin has been given prophylactically to high-risk patients in one hospital outbreak but its efficacy was not assessed. Other control measures that have been used include respiratory isolation of patients with TAC or chronic infection, exclusion of susceptible pregnant staff, patients and visitors from affected wards, testing of healthcare workers and allowing only B19 IgG positive staff to care for high-risk patients. An investigation of a nosocomial outbreak of parvovirus B19 in 1992 by the PHLS suggested that rigorous hand-washing procedures could be effective in limiting the spread of infection.

Pregnancy

Pregnant women should be given information about parvovirus B19, and those who have had recent exposure should have access to advice and serological tests. Blanket decisions on exclusions from work or transfer to a lower-risk area are not appropriate.

Serial fetal ultrasound is used for the diagnosis of hydrops fetalis. Intrauterine fetal transfusion, which requires specialist clinical expertise, is used for the treatment of hydrops fetalis in some centres and has been shown to improve survival. The specific management of gestational parvovirus B19 infection in individual cases is arrived at after consultation between the mother and the obstetrician. There is no indication for therapeutic termination of pregnancy or routine antenatal screening for maternal parvovirus B19 infection.

Treatment

For most individuals, no specific treatment is required for parvovirus B19 infection. Severe symptoms and complications may require appropriate measures. Joint pain may require analgesia, and severe anaemia in immunodeficient or haematological patients may require blood transfusion. Intravenous normal immunoglobulin has been successfully used in the treatment of chronic infection in immunodeficient patients.