Prince Edward Island
CANADA

Health and Wellness

Prince Edward Island Guidelines for the Management and Control of Measles

March, 2024

Department of Health and Wellness

Chief Public Health Office

Contents

Case Definition (1)

Confirmed Case

In the absence of recent immunization[1] with measles-containing vaccine:

- Detection of measles virus by nucleic acid tests (e.g.PCR) or by culture;
  OR
- Positive serological test for measles IgM antibody[2] in a person who is either epidemiologically linked to a laboratory-confirmed case or has recently travelled to an area of known measles activity;
  OR
- Seroconversion or a significant rise (e.g., fourfold or greater) in measles IgG titre by any standard serological essay between acute and convalescent sera;
  OR
- Clinical illness[3] in a person who is epidemiologically linked to a laboratory-confirmed case.

OR

Detection of wild-type measles virus through genotyping, regardless of recent immunization[1] with measles-containing vaccine.

Probable Case

In the absence of both recent immunization[1] with a measles-containing vaccine and laboratory confirmation of disease;
Clinical illness[3] in a person with either epidemiological link to a non-laboratory confirmed case or recent travel to an area of known measles activity.

Suspect Case[4] (Outbreak Only)

Regardless of recent immunization, clinical illness in a person with rash of any duration, who does not meet the probable or confirmed case definition, and where the clinician has a high index of suspicion of measles.

Reporting Requirements (2) (3)

1. **Laboratories**
   The Provincial Laboratory shall, in accordance with the Prince Edward Island (PEI)*Public Health Act*(2), report all positive molecular tests and all serological evidence of infection by phone, and fax, or electronic transfer, as soon as the result is known, to the Chief Public Health Officer

[1] Immunization within 28 days prior to onset of rash or illness.
[2] See Appendix A Specimen Collection
[3] Clinical illness, evaluated by a health care professional includes all of the following:

- Fever 38.3^{o} c or greater
- Cough, coryza, or conjunctivitis
- Generalized maculopapular rash for at least 3 days

Atypical cases in immunocompromised or partially immune persons may lack hallmark symptoms.
[4] A measles outbreak is two or more confirmed cases linked either epidemiologically or virologically or both.

(CPHO) or designate as required by the PEI Reporting of Notifiable Diseases, Conditions, and Events Regulations(3).

2. **Health Practitioners**
   Health practitioners shall, in accordance with the PEI Notifiable Diseases and Conditions and Communicable Diseases Regulations of the (PEI) *Public Health Act* (2), report all probable and confirmed cases by phone, fax or electronic transfer, as soon as suspected or the result is known, to the CPHO (or designate).

Table 1. Additional Reporting Requirements

Timeline for initiation of response by CPHO	Timeline to initiate Follow-up by PHN re: case/contacts	Timeline for Completion of Follow-up by PHN
Immediately following report of clinical/probable/lab-confirmed case	Immediately following receipt of case/contact name Within 12 hours	~5 days

Etiology (4)

Disease is caused by the measles virus, a member of the Paramyxoviridae family, genus *Morbillivirus.*

Clinical Presentation (4) (5)

Measles is an acute, highly contagious viral disease that is characterized by prodromal fever, conjunctivitis, coryza, cough, and Koplik spots (clustered white or bluish-white lesions buccal mucosa). A characteristic red, blotchy rash appears on the face/head on the third to seventh day, becomes generalized, lasts 4-7 days, and sometimes ends in brawny desquamation.
The prodromal stage begins 8-12 days after exposure in susceptible persons and may resemble a severe upper respiratory tract infection. This phase is characterized by malaise, fever, anorexia, conjunctivitis, and respiratory symptoms such as cough and coryza. Other symptoms may include diarrhea, especially in infants. Older children may complain of photophobia and occasionally arthralgia. Koplik spots may appear toward the end of the prodrome, just before the appearance of the rash.
The macropapular rash of measles begins on the face, then progresses down the body to the extremities, including the palms and soles and lasts approximately 5 days. The rash fades in the same sequence it appears, from head to extremities.
Uncomplicated illness, from late prodrome to resolution of fever and rash, lasts 7 to 10 days. The disease is more severe in immunocompromised individuals. Complications are most often seen in children less than 5 years of age and adults 20 years of age and older. Complications of measles may include pneumonia, otitis media, febrile seizures, croup, diarrhea, and encephalitis. In developed countries the case fatality rate is estimated to be less than 1%.

Measles infection during pregnancy results in a higher risk of spontaneous abortion, premature labour and infants with low birth weight.
Disease in the immunocompromised may be severe and have a prolonged course, present without typical rash, and the person may shed virus for several weeks after the acute illness.

Diagnosis (4)

Diagnosis of measles is made on the basis of clinical presentation, exposure history, and laboratory testing (see Appendix A: Specimen Collection).

If an epidemiological link to an already laboratory-confirmed case has been established, laboratory testing is not necessary to meet the confirmed case definition.

Key Investigation

- Obtain a history of illness, including date of onset, signs and symptoms.
- Determine measles immunization history including;
    - Number of doses
    - Date administered
    - Type of vaccine
    - Where the person was immunized (out of country)
- Facilitate collection of all appropriate specimens (see Appendix A)
    - Serology; Measles IgM, IgG
        - IgM is used for diagnostic testing and IgG is for immune status
        - IgM antibodies specimen collected within 3 to 7 days after rash onset. If a specimen taken ≤3 days after rash onset is negative for measles IgM, a second specimen should be obtained three days later.
    - Nasopharyngeal (NP) swab for Measles (PCR)
    - Urine for Measles (PCR)

Epidemiology (4)

1. Reservoir

The reservoir is humans.

2. Transmission

Measles is airborne and is also spread by direct contact with respiratory secretions of an infected person.

3. Incubation Period

From exposure to onset of rash; average of 14 days (range 7-21 days).

4. Period of Communicability

Measles is one of the most highly communicable infectious diseases. The period of communicability extends from 4 days before rash onset to 4 days after rash appearance.

5. Host Susceptibility

All individuals who have not had measles disease or been successfully immunized are susceptible. Acquired immunity after illness is permanent. Those receiving the first dose of vaccine before 12 months of age without a second dose, and those receiving only one dose at any time may still be susceptible.

Infants born to mothers who have had measles are protected against the disease for the first 6 to 9 months or more, depending on maternal antibodies. Children born to mothers with vaccine-induced immunity receive less passive antibody and may become susceptible to measles at an earlier age.

Occurrence (6)

1. General

Prior to widespread immunization, measles was common in childhood, with more than 90% of people infected by age 20 and an estimated 100 million cases and 6 million measles deaths occurring each year. With effective childhood immunization programs, measles cases in many industrialized countries have dropped by 99% and generally occur in young unimmunized children or older children, adolescents, or young adults who received only 1 dose of vaccine and have a median age between 20 and 30 years.

2. Canada (6)

Canada has been free of endemic measles since 1998. However, cases continue to occur due to travel between Canada and countries with disease activity.

3. Prince Edward Island

The last lab-confirmed case of measles in PEI was reported in 2013 and was related to travel outside of Canada.

Control (7) (8) (9)

Immunization with measles-containing vaccine is approximately 93% effective at preventing measles and after two doses is 97% effective. Measles, mumps, rubella and varicella vaccines[5] (MMRV) is administered in a two-dose schedule to children 12 and 18 months of age in Prince Edward Island (see Appendix B: Measles, Mumps, Rubella and Varicella Vaccine Fact Sheet). Adults born in 1970 or later who have not had measles disease or received two doses of measles vaccine should receive two doses of vaccine (measles, mumps, rubella [MMR[6]]) (see Appendix C: Measles, Mumps and Rubella Vaccine Fact Sheet).

[5] Measles, mumps, rubella and varicella (MMRV) vaccine is indicated for children 12 months of age to 12 years.
[6] Measles, mumps, and rubella (MMR) vaccine is indicated for adolescents >13 years and older and adults.

Adults born before 1970 are considered to have acquired natural immunity to measles and are generally considered immune. However, immunization may still be recommended for some individuals born before 1970 if those individuals are at high risk of exposure and/or high risk of transmitting disease to others. Individuals born before 1970 traveling outside of Canada should receive one lifetime dose of MMR vaccine.

Infants whose mothers have had measles are protected against disease for approximately 6-9 months or more. Children born to mothers with vaccine-induced immunity receive lower levels of maternal antibodies and may be susceptible at an earlier age (4).

Management of a Case (7)

- Probable cases should be managed as confirmed cases until laboratory results are reported.
- All confirmed and/or probable cases are to be reported to the CPHO as soon as the cases are known (See Reporting Requirements).
- The CPHO will inform Public Health Nursing (PHN) or First Nations Health (Abegweit, Lennox Island) of cases for follow-up contact tracing and education (see Appendix D: Measles Fact Sheet).
- Airborne Precautions in addition to Routine Practices should be followed when individuals with probable measles present to a health care setting.
- All cases are advised to:
    - Stay home (self-isolate) from public places, including school, post-secondary educational institutions, child care, workplaces and other group settings for 4 days after rash onset;
    - Perform hand hygiene frequently;
    - Avoid sharing drinking glasses, eating utensils, or any object used on the nose or mouth; and
    - Cover coughs and sneezes with a tissue and/or forearm.
- Cases should be offered supportive therapy as indicated. There is no specific treatment for measles. There are four components for the management of a measles case;
    - Relieve common symptoms such as fever, cough, blocked nose, conjunctivitis and sore mouth.
    - Provide nutritional support and promote breastfeeding, if applicable.
    - Provide vitamin A to children (10). (Refer to Appendix E: Supportive Treatment of Measles with Vitamin A for Children).
        - The World Health Organization[7] (WHO) currently recommends all children diagnosed with measles should receive two doses of vitamin A supplements, given 24 hours apart. This treatment restores low vitamin A levels during measles that occur even in well-nourished children and can help prevent eye damage and blindness. Vitamin A supplements have been shown to reduce the number of deaths from measles by 50%.
    - Inform the client/patient/caregiver about the illness and what to expect in the next few days.

[7] https://www.who.int/news-room/fact-sheets/detail/measles

Management of Contacts (7) (8)

Prince Edward Island Public Health Nursing (PHN) or First Nations Health (Abegweit, Lennox Island) will obtain the names of exposed contacts during the initial interview with the case and create a list of those who would be susceptible to infection. Examples of exposure situations include home, school, child care facility, school bus, workplace, physician's office, and emergency department. Airline passengers who have been exposed to a confirmed measles case on the same flight should be considered for notification (see Appendix F: Measles on a Flight- Contact Tracing Algorithm).

Contacts should be counselled regarding the signs and symptoms of measles and the need to report to their health care provider should they occur.

Health care workers should be advised to notify Occupational Health & Safety and/or Employee Health to determine immunization status (see Appendix G: Assessing Health Care Worker Susceptibility to Measles Pre-Exposure) and susceptibility to disease following exposure (see Appendix H: Post-Exposure Management of Susceptible Health Care Workers).

Definitions:

Contact: Someone who shared the same airspace (no minimum length of time) during the infectious period[8].

Susceptible Contact: A contact (defined above) born during or after 1970 and **not** meeting one of the following criteria:

- Documented evidence of vaccination with two doses of measles-containing vaccine after their first birthday;
- Laboratory evidence of immunity;
- History of laboratory-confirmed measles.

High-Risk Susceptible Contact: A susceptible contact (as defined above) meeting one or more of the following criteria;

- Immunocompromised;
- Pregnant;
- Infant < 12 months of age; or
- Other valid contraindication to the receipt of measles vaccine (e.g. allergy to a vaccine component).

Modified Measles (11); Modified measles is an attenuated infection that occurs in patients with pre-existing measles immunity (either via wild-type disease or vaccination). It is similar to classic measles except the clinical manifestations are generally milder and the incubation period is longer (17 to 21 days). Individuals with modified measles are not highly contagious.

[8] The infectious period is 4 days prior to and 4 days after rash appears.

Management of Susceptible Contacts (see Appendix I and J)

- Susceptible contacts (see Appendix I: Post-Exposure Management of Susceptible Members of the Public) of a measles case should receive either MMR vaccine or Immune Globulin (Ig) depending on the time lapse from exposure, age, and health status (see Appendix J: Summary of Measles Post-Exposure Prophylaxis Recommendations for Susceptible Contacts).
- Susceptible contacts who are ≥ 6 months of age AND do not have any contraindications to measles-containing vaccine should be immunized with MMR as soon as possible. Immunization within 72 hours of exposure may prevent disease. Two additional doses of measles-containing vaccine must be administered after the child is 12 months old (and at least 28 days from the previous dose) to ensure long lasting immunity to measles.
- A second dose of MMR should be administered 28 days following the first dose to contacts >12 months of age who have received no doses of measles-containing vaccine prior to exposure.
- Immune Globulin (Ig) should be considered for susceptible contacts presenting more than 72 hours but within 6 days of exposure (see Appendix J: Summary of Measles Post-Exposure Prophylaxis Recommendations for Susceptible Contacts).

Management of High Risk Susceptible Contacts

Immune Globulin (Ig) should be administered as soon as possible to high-risk susceptible contacts as defined above, preferably within three days but as long as six days after exposure (see Appendix J: Summary of Measles Post-Exposure Prophylaxis Recommendations for Susceptible Contacts).

Human immune globulin (Ig) (see Appendix J)

Prophylactic use of Human Immune Globulin (Ig)[9] [10] has been shown to be effective in modifying or preventing disease if administered within 6 days after exposure to measles; however, when indicated, it should be given as soon as possible after exposure. Immune Globulin should be considered for the following groups of individuals if they are contacts of measles:

- Susceptible pregnant women
- Susceptible individuals who are immunocompromised
- Susceptible infants < 6 months of age
- Susceptible immunocompetent infants 6-11 months old who present between 72 hours and 6 days after exposure

[9] Intramuscular Immune Globulin (IMIg) (GamaSTAN®) should be provided to susceptible infants at a concentration of 0.5mL/kg, to a maximum dose of 15mL. For susceptible individuals who are pregnant or immunocompromised, IMIg can be provided at a concentration of 0.5mL/kg understanding that those weighing 30 kg or more will not receive the measles antibody concentrations that are considered to be fully protective.

[10] Intravenous Immune Globulin (IVIg) can be considered in susceptible individuals who are pregnant or immunocompromised and weigh 30 kg or more. IVIg can be considered for infants for whom Ig is indicated when IMIg injection volume is a concern. IVIg requires in-hospital administration and active patient monitoring over several hours of infusion, performed by appropriately trained staff.

Individuals receiving replacement IVIg (400 mg/kg of body weight or higher) are considered protected and do not require Ig if the last dose of IVIg was received within the three weeks prior to measles exposure.

Follow-up after Immune Globulin Administration [11]

If clinical measles does not develop in a person administered Ig, measles-containing vaccine should be given 6 to 8 months later depending on the Ig dose used provided the individual is greater than one year of age and there are no contraindications to the vaccine[11].

Exclusions (7)

All susceptible contacts shall be excluded from the 5th day after the first exposure (Day 0) to the 21st day after the last exposure. Most exclusions apply to all public settings including but not limited to schools, childcare facilities, post-secondary institutions, and employment.

People without evidence of immunity who have been exempted from measles vaccination for medical, religious, or other reasons and who do not receive appropriate post-exposure prophylaxis within the appropriate timeframe should be excluded from affected institutions in the outbreak area until 21 days after the onset of rash in the last case of measles.

Outbreak Management

Two or more confirmed cases of measles in a one month period, linked either epidemiologically or virologically, or both, constitute an outbreak. During a measles outbreak, the Chief Public Health Officer or designate may recommend either or both of the following:

- Immunize children 6-11 months of age inclusive, with MMR vaccine. Two additional doses of measles-containing vaccine must be administered after the child is 12 months old to ensure long lasting immunity.
- Offering an early second dose of measles-containing vaccine, respecting the minimum interval between doses.

Preventative Measures

- Public education about the risks of measles disease and the importance of immunization.
- Immunization of all eligible residents according to the PEI schedule for children and adults.
- To ensure long-term immunity, all adult residents born in 1970 or later should receive a second dose of measles-containing vaccine (see Appendix B: MMRV Fact Sheet; Appendix C: MMR Fact Sheet), even if post-immunization serology following the first dose showed protection

[11] The recommended interval between administration of Ig preparation or blood product and subsequent vaccination varies, depending on the Ig preparation or blood product. Refer to the Canadian Immunization Guide Part 1, Blood Products, Human Immune Globulin and Timing of Immunization.

References

1. **Public Health Agency of Canada**. *Case Definitions for Communicable Diseases under National Surveillance.* [Online]. Public Health Agency of Canada, 2009. [Cited March 1, 2018.] Retrieved from; https://www.canada.ca/content/dam/phac-aspc/migration/phac-aspc/publicat/ccdr-rmtc/09pdf/35s2-eng.pdf

2. **Prince Edward Island Legislative Council Office.** Prince Edward Island Public Health Act December 16, 2016. [Online]. Retrieved from https://www.princeedwardisland.ca/sites/default/files/legislation/P-30-1-Public%20Health%20Act.pdf

3. **PEI Department of Health and Wellness**. It's the Law: Reporting Notifiable Diseases, Conditions, and Events. [Online]. PEI Department of Health and Wellness. Retrieved from; www.princeedwardisland.ca

4. Heymann, David. Measles. Control of Communicable Diseases Manual (20th Ed). Washington, D.C.: American Public Health Association Press, 2015.

5. Centers for Disease Control and Prevention (CDC). Epidemiology and Prevention of Vaccine-Preventable Diseases [Internet]. 13th ed. Hamborsky J., Kroger A., Wolfe A, editors. Washington, D.C.: Public Health Foundation; 2015. Available from: www.cdc.gov/vaccines/pubs/pinkbook/meas.html

6. Public Health Agency of Canada. Measles Surveillance in Canada 2016 [Online]. October 2016. Retrieved from https://www.canada.ca/content/dam/phac-aspc/documents/services/publications/diseases-conditions/measles-surveillance-canada-2016/measles-surveillance-canada-2016.pdf

7. **Public Health Agency of Canada**. *Guidelines for the Prevention and Control of Measles Outbreaks in Canada* [Online] Canada Communicable Disease Report, 2013. Retrieved from; http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/13vol39/acs-dcc-3/assets/pdf/meas-roug-eng.pdf

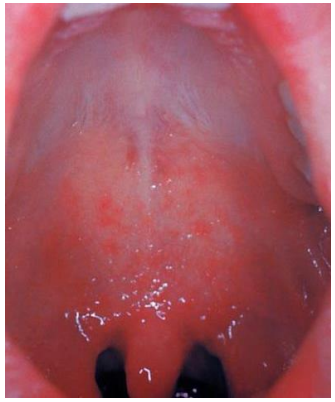
8. Public Health Agency of Canada. Canadian Immunization Guide [Online]. November 2016. Retrieved from; https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-3-vaccination-specific-populations/page-11-immunization-workers.html#p3c10a2

9. PEI Department of Health and Wellness. Prince Edward Island Adult Immunization Detailed Schedule (2018). Retrieved from; https://www.princeedwardisland.ca/sites/default/files/publications/ai_detailed_sch_jan2018.pdf

10. World Health Organization [Online]. May 2019. Retrieved from; https://www.who.int/news-room/fact-sheets/detail/measles

11. Hickman, C. J., Hyde, T. B., Sowers, S. B., Mercader, S., McGrew, M., Williams, N. J., Bellini, W. J. (2011). Laboratory characterization of measles virus infection in previously vaccinated and unvaccinated individuals. *Journal of Infectious Disease, 1*(s549). doi:10.1093/infdis/jir106

Appendix A: Specimen Collection



White spots inside the mouth are common with measles (Koplik's spots). Source: CDC

Measles Testing
Specimen Collection Algorithm

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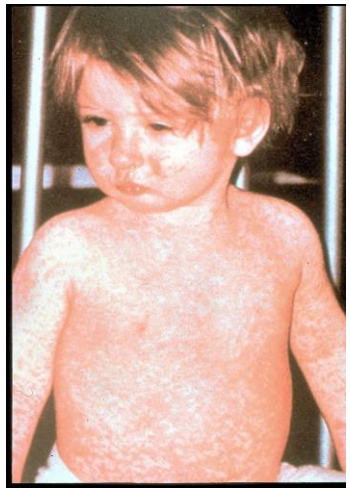

Measles rash covering child's arms and stomach. Source: CDC

Days Since Rash Onset

No rash yet	0 to 7 days since rash onset	8 to 14 days since rash onset	2 weeks to 4 weeks since rash onset	> 4 weeks since rash onset
Contact CPHO or the Medical Microbiologist before collecting specimens	• NP Swab[1] • Urine[2] • Serology (IgM)[3] • Serology (IgG)[4] • Parvovirus IgG/IgM • Rubella IgG/IgM • Other tests as directed by CPHO/ Micro Lab	• Urine[2] • Serology (IgM)[3] • Serology (IgG)[4]	• Serology (IgM)[3] • Serology (IgG)[4] • If patient was tested earlier in infection, please indicate on the request form that this sample is a "convalescent sample" and add the date of the previous test	Contact CPHO or the Medical Microbiologist before collecting specimens

1 NP swab for measles is tested by PCR. Optimal test time is 0-4 days post-rash onset. Viral load declines between 5 and 7 days post-rash onset. Testing occurs at QEII each week.
2 Urine samples for measles are tested by PCR. Optimal test time is 0-7 days post-rash onset.
3 Serology testing (IgM) for measles is optimal between 4 and 28 days post-rash onset. False negatives are likely between 0-3 days and 29-42 days post-rash onset. Testing occurs every 2nd Tuesday at the QEII.*Note: If the clinical presentation is inconsistent with measles or in the absence of recent travel/exposure history, positive IgM antibody results must be confirmed by either paired IgG serology or virus detection (NP swab or urine testing).
4 Serology testing (IgG) for measles is optimal at 0-7 days post-rash onset (acute case) and 10-27 days post-rash onset (convalescent case). IgG can also be used to determine measles vaccine immune status. Testing occurs each Thursday at the QEH.

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Appendix B - Fact Sheet

Measles, Mumps, Rubella (German Measles) and Varicella (Chickenpox) Vaccine (MMRV)

1. **What are Measles, Mumps, Rubella and Varicella and what are the complications of these diseases?** These four diseases are caused by viruses. Measles, mumps and rubella are spread by contact with nose and throat secretions such as by coughing and sneezing. Varicella can be spread this way or by direct contact with fluid from an infected skin lesion.

Measles (red measles or rubeola) is a very contagious disease which causes a red blotchy rash beginning on the face and spreading down the body, high fever, cough, runny nose and watery eyes. It can cause swelling of the brain leading to permanent brain damage and seizures, hearing loss, pneumonia, and death. Measles is highly communicable spreading from person to person in households, classrooms, and areas of large gatherings of people. Measles is the leading cause of vaccine preventable death in children.

Mumps continues to occur worldwide with epidemics every two to five years. Mumps is an acute infectious illness with about 40% of cases developing parotitis or painful swelling below the cheek in the neck area. Complications can include hearing loss, sterility and viral meningitis (infection of the lining around the spinal cord and brain). Pregnancy associated concerns include spontaneous abortion or congenital malformations in the fetus.

Rubella infection is contagious and its symptoms of fever, lymph swelling, rash, aches and joint discomfort may be mistaken for other viral infections. Rubella is of particular concern in pregnancy as it can result in miscarriage, stillbirth and/or malformations in the newborn including heart defects, cataracts, hearing loss, and brain damage. It is important for women to receive the vaccine at least one month before becoming pregnant if they do not have immunity to rubella virus.

Varicella is a common and highly infectious disease which causes an irritating blister-like rash. The rash or fluid filled lesions break out in stages on all areas of the body including the scalp and mucous membranes of the mouth and throat. Following initial varicella illness, the varicella virus becomes inactive and establishes itself in the body's nerve endings, allowing it to reactivate later in life as shingles.

The complications of varicella infection include viral infections in the heart, lungs, joints, brain and blood, as well as secondary bacterial infection such as invasive group A streptococcal infection. A

serious complication is the development of Reye's Syndrome, a brain disease which can occur when a child who has varicella is given a medication containing **salicylates** (acetylsalicylic acid, ASA). Varicella in pregnancy can result in birth defects in the baby and if a woman develops varicella just before or after delivery, the newborn is at increased risk of developing severe varicella disease.

2. What are the contents of the MMRV vaccine?

The vaccine contains live but weakened particles from Measles, Mumps, Rubella, and Varicella viruses from which the body develops protection. Traces of non-medicinal ingredients that keep the vaccine stable, sterile and help it to be more effective are also present. All vaccine contents are licensed for use by the Biologics and Genetics Therapies Directorate within Health Canada. A complete listing of contents is included in the product insert which is available from the nurse.

3. What are the possible reactions after receiving the vaccine and how should they be managed?

The most serious but rare side effect is a severe allergic reaction (anaphylaxis) which can be life-threatening and which usually occurs within 15 to 20 minutes of receiving the vaccine. Procedures are in place for the nurse to quickly respond to anaphylaxis by administering adrenaline.

Pain and redness at the injection site and/or low-grade fever and rash may occur. These reactions are generally mild and tend to be delayed. The rash may be red, blotchy or blister-like and may appear up to a few weeks after the immunization is given.

It is not necessary to give acetaminophen after immunization. If discomfort or fever occurs acetaminophen can relieve these symptoms. **Salicylates (such as aspirin) should not be given to a person who has received MMRV vaccine for at least 6 weeks after vaccination** due to the increased risk of Reye's Syndrome.

Please remain in the waiting room for 15 minutes after immunization. See a doctor or seek medical attention if any serious side effect occurs. Report any serious reaction to the public health nurse.

4. What are the situations in which MMRV vaccine should not be given?

The vaccine should not be given to anyone who has had an anaphylactic (severe or life threatening) reaction to a previous dose of MMRV vaccine or to any component of the vaccine including neomycin. Those who have a reaction to eggs (including an anaphylactic reaction) can be immunized with MMRV vaccine.

Persons presenting with significant acute fever and illness should return later for the vaccine.

Precautions: Assessment of a person's health status is required by the Chief Public Health Office in the following situations:

- Persons with impaired immune function should not normally receive live vaccines without consultation from their attending physician and possibly an immunologist.
- Persons on chronic salicylate therapy may be able to receive this vaccine pending consultation with their attending physician.
- Passive immunization with human immune globulin or receipt of most blood products can interfere with the immune response to live vaccines. The administration of vaccine may have to be delayed for a period of time, usually between three to 11 months.

5. What are the alternatives to not receiving the MMRV vaccine?

Measles, Mumps & Rubella: A person who does not receive the Measles, Mumps, & Rubella vaccine is at increased risk for becoming sick if he/she is exposed to these diseases. At times of disease outbreaks, the non-immunized person should remain at home, avoiding day care or school, until advised to return.

Chickenpox: The chance of acquiring chickenpox is very high in the non-immunized person. The disease is more serious for persons with decreased immunity (including cancer, leukemia or lymphoma or an inherited disease of immunity), on high doses of steroids, or in pregnant women without immunity. In these cases, it is recommended that persons avoid exposure in times of known outbreaks. If exposure occurs, persons should see their doctor. A person who is non-immune to chickenpox and is exposed to a person with chickenpox disease may receive the vaccine up to five days after being exposed, and thus decrease the chance of acquiring the disease.

Since the use of these vaccines in routine immunization programs the incidence of these illnesses and their damaging effects has been significantly reduced.

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Appendix C - Fact Sheet

Measles, Mumps and Rubella (German Measles) Vaccine (MMR)

1. What are Measles, Mumps and Rubella and what are the complications of these diseases?

These three diseases are caused by viruses. Measles, mumps and rubella are spread by contact with nose and throat secretions such as by coughing and sneezing.

Measles (red measles or rubeola) is a very contagious disease which causes a red blotchy rash beginning on the face and spreading down the body, high fever, cough, runny nose and watery eyes. It can cause swelling of the brain leading to permanent brain damage and seizures, hearing loss, pneumonia, and death. Measles is highly communicable, spreading from person to person in households, classrooms, and areas of large gatherings of people. Measles is the leading cause of vaccine preventable death in children.

Mumps continues to occur worldwide with epidemics every two to five years. Mumps is an acute infectious illness with about 40% of cases developing parotitis or painful swelling below the cheek in the neck area. Complications can include hearing loss, sterility and viral meningitis (infection of the lining around the spinal cord and brain). Pregnancy-associated concerns include spontaneous abortion or congenital malformations in the fetus.

Rubella infection is contagious and its symptoms of fever, lymph swelling, rash, aches and joint discomfort may be mistaken for other viral infections. Rubella is of particular concern in pregnancy as it can result in miscarriage, stillbirth and/or malformations in the newborn including heart defects, cataracts, hearing loss, and brain damage. It is important for women to receive the vaccine at least four weeks before becoming pregnant if they do not have immunity to rubella virus.

2. What are the contents of the MMR vaccine?

The vaccine contains live but weakened particles from Measles, Mumps and Rubella viruses from which the body develops protection. Traces of non-medicinal ingredients that keep the vaccine stable, sterile and help it to be more effective are also present.

All vaccine contents are licensed for use by the Biologics and Genetics Therapies Directorate within Health Canada. A complete listing of contents is included in the product insert which is available from the public health nurse.

3. What are the possible reactions to the vaccine and how should they be managed?

The most serious but rare side effect is a severe allergic reaction (anaphylaxis) which can be life-threatening and which usually occurs within 15 to 20 minutes of receiving the vaccine. Procedures are in place for the nurse to quickly respond to anaphylaxis by administering adrenaline.

The most common reactions are pain, swelling and/or redness at the injection site, fever, irritability and rash. These reactions may occur up to 2 weeks after the immunization is given. The rash may be red and blotchy and it may appear between the fifth and twelfth day after immunization.

It is not necessary to give acetaminophen after immunization. If discomfort or fever does occur acetaminophen can relieve these symptoms.

Please remain in the waiting room for 15 minutes after immunization.
See a doctor or seek medical attention if any serious side effect occurs.
Report any serious reaction to the public health nurse.

4. What are the situations in which MMR vaccine should not be given?

The vaccine should not be given to anyone who has had an anaphylactic (severe or life threatening) reaction to a previous dose of MMR vaccine or to any component of the vaccine including neomycin. Those who have had a reaction to eggs (including an anaphylactic reaction) can be immunized with MMR vaccine.

Pregnant women should not receive this vaccine. Women who are contemplating pregnancy and who receive this vaccine should wait at least four weeks before becoming pregnant.

Persons presenting with significant acute fever and illness should return later for their vaccine.

Precautions: Assessment of a person's health status is required by the Chief Public Health Office in the following situations:

Persons with impaired immune function should not normally receive live vaccines without consultation from their attending physician and possibly an immunologist.

Passive immunization with human immune globulin or receipt of most blood products can interfere with the immune response to live vaccines. The administration of vaccine may have to be delayed for a period of time, usually between three to 11 months.

Post-partum women who receive Rh Immune Globulin and who are non-immune to measles, mumps and/or rubella should generally wait 3 months before receiving the vaccine, based on risk assessment.

5. What are the alternatives to not receiving the MMR vaccine?

A person who does not receive the Measles, Mumps and Rubella vaccine is at increased risk for becoming sick if he/she is exposed to these diseases. Measles, mumps and rubella illness can be more serious in persons with decreased immunity.

At times of disease outbreaks, the non-immunized person should remain at home, avoiding day care or school, until advised to return.

This vaccine is very effective in preventing measles, mumps and rubella illness and since the use of these vaccines in routine immunization programs; the incidence of these illnesses and their damaging effects has been significantly reduced.

Prince Edward Island
CANADA
Health and Wellness

Health PEI

Appendix D - Fact Sheet – Measles

1. What is Measles?

Measles is a serious and very contagious disease caused by a virus.
The **symptoms** include:

- Fever
- Runny nose
- Red watery eyes
- Cough
- Red blotchy rash that begins on the head and spreads down to the trunk, arms and legs.

Measles usually starts with illness for 3-4 days before the rash appears. The fever tends to be high (at least 104 degrees F).
The fever and rash usually disappear in 3-5 days.

2. Complications

Complications of measles include ear infection, viral meningitis or brain infection or pneumonia.
About 2 out of 1,000 people with measles will die.

3. Spread

Measles spreads through air by breathing in air in a room where someone with measles is coughing.

Period of Being Contagious

A person is contagious 4 days before and 4 days after the rash appears in a person with measles.

Incubation Period

The time between exposure to measles and coming down with the disease is 7 to 21 days.

4. Treatment

There is no treatment for a person who has measles. All children diagnosed with measles should receive two doses of vitamin A supplements, given 24 hours apart. This treatment restores low vitamin A levels during measles that occur even in well-nourished children and can help prevent eye damage and blindness. Vitamin A supplements have also been shown to reduce the number of measles deaths.

5. Prevention of Measles

Two doses of measles vaccine (MMRV or MMR) given at least 4 weeks apart after 12 months of age will prevent measles in almost all who get the vaccine.
Persons born before 1970 on PEI are considered to be immune because measles was very common before 1970 and it was very unusual for a person not to get measles.

6. Age of People with Measles

Both children and adults can catch measles if they have not had measles before 1970 or if born after 1970 and have not received 2 doses of measles vaccine (MMRV or MMR).

7. MMRV or MMR Safety

MMRV and MMR, which contains measles vaccine, has had an excellent safety record.
Common reactions to the vaccine are mild and include pain, tenderness or redness at the injection site.
Serious reactions are rare and include rare severe allergic reactions.
Some people who receive the vaccine are noted to have a fever and rash that looks like measles 7-12 days after immunization. This occurs in about 2 of 100 children immunized.

A seizure or fever seizure can occur after the vaccine and occurs in about 1 in every 200 children.

Inflammation of the brain (encephalitis) after measles vaccine is rare and occurs in about 1 in 1000 who receive the vaccine.

Protection from Measles if Immunized

One dose of measles vaccine gives 93% protection from measles and two doses 97% protection.

Appendix E - Supportive Treatment of Measles with Vitamin A for Children Diagnosed with Measles

Age	Dose PO	Clinical Comment
< 6 months	50,000 units/day x 2days	If clinical manifestation of Vitamin A deficiency present, repeat dose after 2-4 weeks.
6-11 Months	100,000 units/day x 2days	
>11 months	200,000 units/day x 2days	

World Health Organization[12]

[12] https://www.who.int/news-room/fact-sheets/detail/measles

Appendix F- Measles on a flight Contact tracing algorithm (November 2018)

Notification of a lab confirmed* case of measles who travelled on an airplane while infectious (infectious time frame: between **4 days before and 4 days after onset of rash**).

The flight arrival time was 48 hours ago or less	**The flight arrival time was between 48 hours ago and 5 days ago**	**The flight arrival time was 6 days ago or more (up to 1 month)**
Post-exposure prophylaxis is indicated for some contacts within 72 hours of exposure. For information, see Table 1 on the back of this document.	Post-exposure prophylaxis is indicated for some contacts within 6 days of exposure. For information, see Table 1 on the back of this document.	No post-exposure prophylaxis is indicated at this time.

Public Health Actions:
For all cases of measles exposure on flights, consider taking public health actions which may include:

- Post a CNPHI Public Health Alert.
- Post media release (and update website) asking susceptible contacts to self-identify for post-exposure prophylaxis.
- Request flight manifest and personal name record (PNR) information to identify contacts (see Box 1). Jurisdictions will directly reach out to passengers residing in their jurisdiction to identify susceptible contacts for post-exposure prophylaxis.

Public Health Actions:
For all cases of measles exposure on flights, consider taking public health actions which may include:

- Post a CNPHI Public Health Alert.
- Post media release (and update jurisdiction website) to alert passengers of the potential exposure.

Box 1:
Considerations for requesting flight manifest information:

- Flight manifests and PNRs often lack relevant contact information (e.g., phone numbers).
- A flight manifest and PNR is most reliably available within 48 hours of the flight, after which time some airlines start to remove personal information.
- The turnaround time required to secure and receive the manifest and PNR can be lengthy.
- Follow-up with individual contacts can be time and resource intensive.

Based on their risk assessment, the provincial or territorial jurisdiction can ask the Public Health Agency of Canada to request the flight manifest and PNR information.

A provincial or territorial jurisdiction may ask the Public Health Agency of Canada to request that the airline put the manifest and PNR on hold while they are awaiting laboratory confirmation of a case or completing their risk assessment to decide if they will use the information to conduct contact tracing.

The Public Health Agency of Canada will **only** request a flight manifest and PNR if requested by a provincial or territorial jurisdiction.

To request assistance obtaining a manifest and PNR, a province or territory can reach out to the Public Health Agency of Canada:

- During regular business hours (8am to 4pm Eastern on Monday to Friday except federal holidays), please email phac.vpc-mev.aspc@canada.ca
- Outside of regular business hours, please email phac-aspc.hpoc-cops@canada.ca

Measles on a flight - Contact tracing algorithm (November 2018)

Background:

Most measles cases in Canada are imported by people travelling to Canada from areas where measles is endemic. Travellers importing measles into Canada may travel during the infectious period (4 days before to 4 days after the onset of rash). Measles is highly communicable – there is risk of transmission to those who are susceptible to measles. However, due to immunization coverage and past infections, the majority of Canadian air travellers are not susceptible.

Contact tracing for measles is very time-sensitive due to the short timelines for offering post-exposure prophylaxis (PEP) - within 72 hours of exposure for MMR vaccine and within 6 days for immune globulin (Ig). The Public Health Agency of Canada can assist provincial and territorial jurisdictions in requesting flight manifest and personal name record (PNR) information to help identify passengers exposed to measles. However, flight manifest and PNR information is often incomplete and may not include contact details. It can also take time to request and receive the information. In many circumstances, jurisdictions may opt to post a CNPHI Public Health Alert and/or a media release to notify passengers and public health partners of the measles exposure.

Contact tracing algorithm tool:

This contact tracing algorithm supports the decision making process for measles contact follow-up after exposure on a flight. This algorithm is intended to help jurisdictions assess the situation when they are informed of an individual with laboratory-confirmed measles who travelled by air during the infectious period. The tool helps determine whether PEP can be offered to susceptible travellers and what type of PEP susceptible travellers would be eligible for. This will help decide whether it is appropriate to request flight manifest and PNR information, which can take time but has potential to identify travellers at risk of exposure. Timeliness is considered in the algorithm, which assumes that 24 hours is needed to receive the information, identify at-risk contacts, and arrange for them to receive PEP. Other considerations for determining whether to request manifest information are listed in Box 1.

Considerations for the range of seats to request manifest information for:

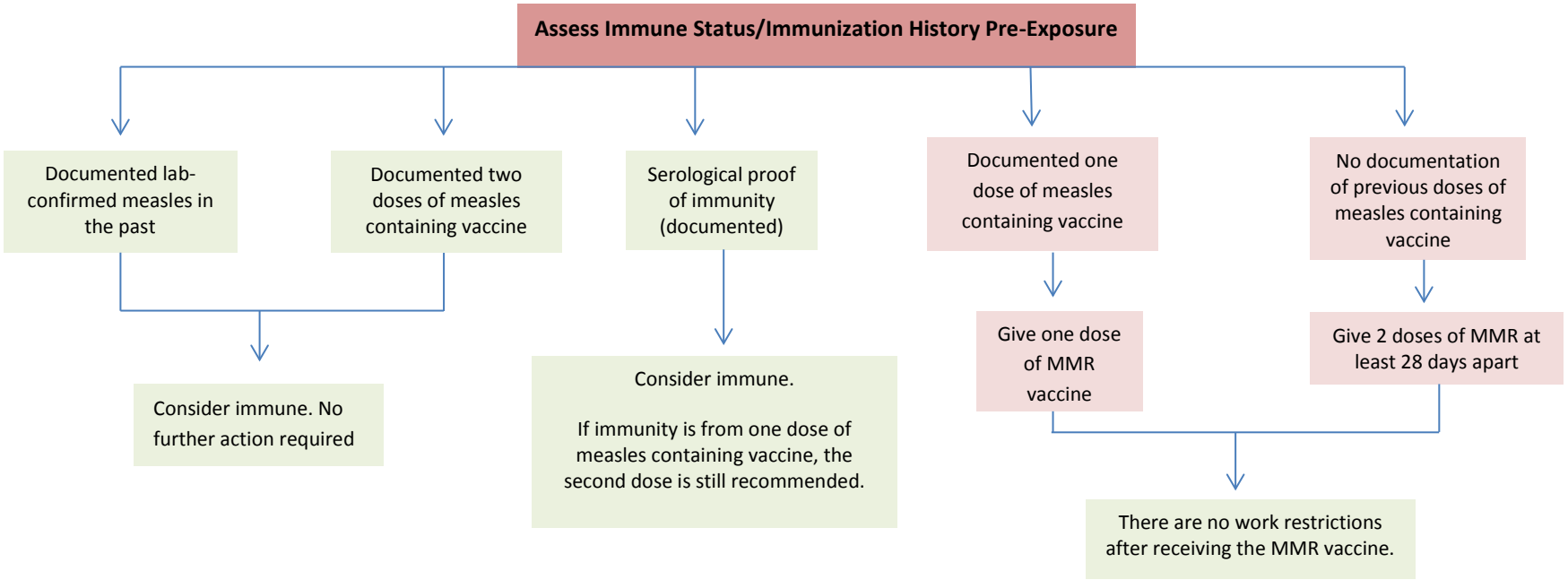
The Guidelines for the Prevention and Control of Measles Outbreak in Canada currently recommend conducting contact tracing for passengers seated 2 rows ahead and 2 rows behind the infectious individual based on aircraft airflow models[13]. However, analyses of reports of transmission on airplanes suggest that although transmission risk is higher for individuals sitting within 2 rows of the case, further analyses show that these recommendations may be inadequate as transmission beyond the two rows can occur[14,15]. Recent reviews also suggest that there is no evidence that measles transmission risk on a flight is related to the duration of the flight(3). When contact tracing for measles, consider following up on the whole plane giving priority to babies in arms given their greater infection risk.

[13] Mangili A, Vindenes T, Gendreau M. Infectious Risks of Air Travel. Microbiol Spectr. 2015 Oct 1 [cited 2018 Nov 14];3(5)

[14] Nelson K, Marienau K, Schembri C, Redd S. Measles transmission during air travel, United States, December 1, 2008–December 31, 2011. Travel Med Infect Dis. 2013 Mar;11(2):81–9

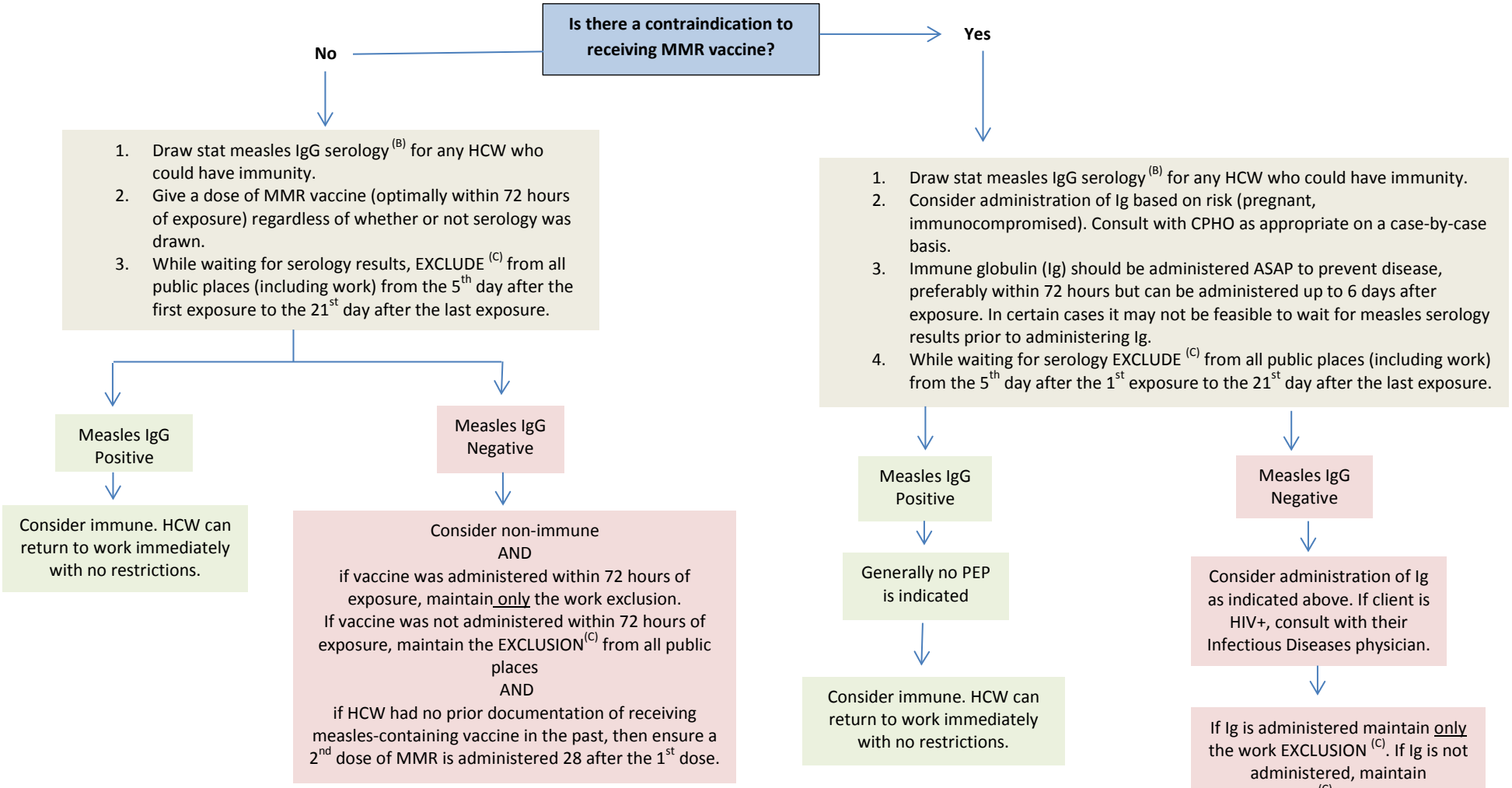
[15] Lim L, Ho SA, O'Reilly M. In-flight transmission of measles: Time to update the guidelines? American J Infect Control. 2016 Aug; 44(8):958–9.

Appendix G - Assessing Health Care Worker (HCW) Susceptibility to Measles Pre-Exposure[A]



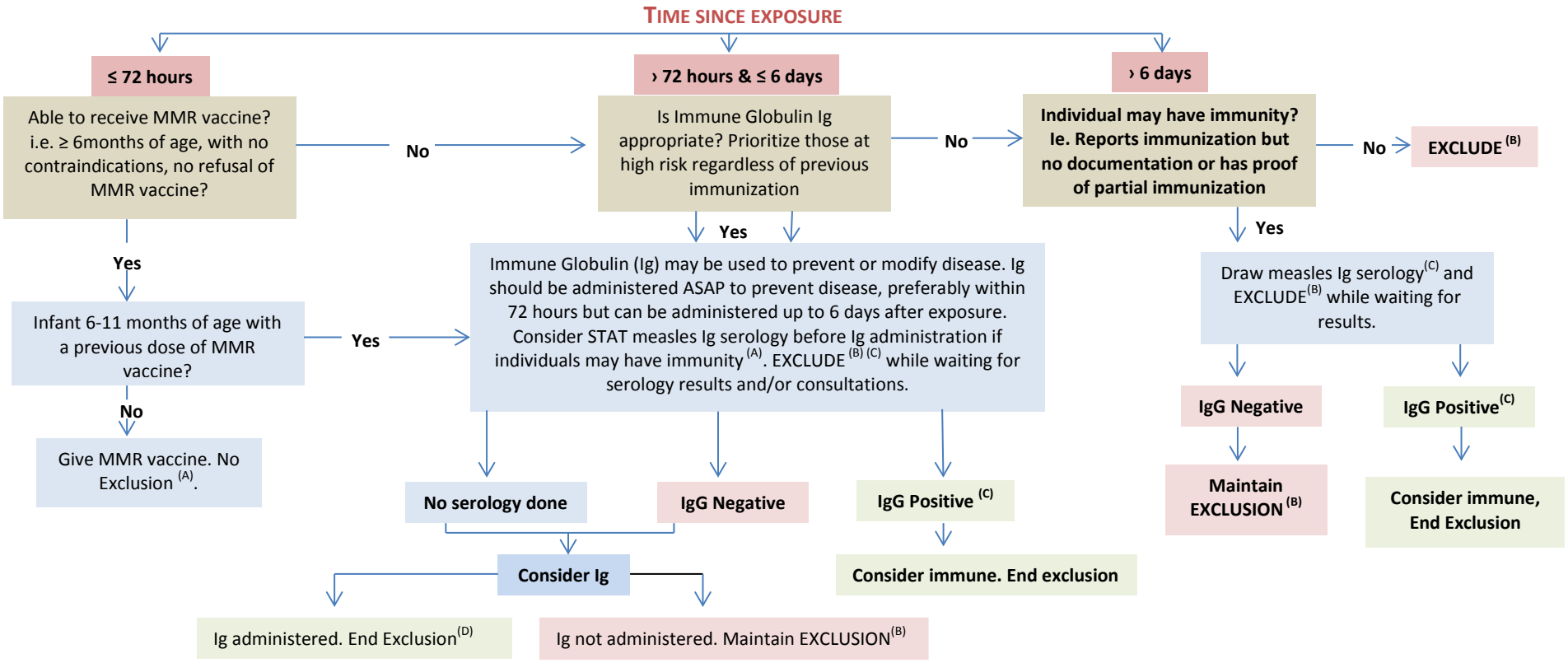
[A] *Pre-exposure is defined as the use of MMR vaccine to prevent disease in health care workers who have not yet been exposed*.

Appendix H - Post-Exposure Management of Susceptible Health Care Workers (HCW) [A]



[A] Health care workers are individuals who provide health care or health care support services that have been exposed to a case of confirmed measles e.g. nurses, physicians, dentists, allied HCPs, paramedics, students, etc. Refer to Appendix G to determine HCW susceptibility.
[B] A positive IgG result in any asymptomatic contact can be considered proof of immunity.
[C] EXCLUDE from all public places from the 5th day after the first exposure to the 21st day after the last exposure.

Appendix I - Post-Exposure Management of Susceptible Members of the Public



(A) Counselling regarding signs and symptoms of measles disease and self-reporting is recommended for all contacts, regardless of serology results and administration of post-exposure prophylaxis.
(B) EXCLUDE from all public places from the 5th day after the first exposure to the 21st day after the last exposure.
(C) Positive IgG serology in the following asymptomatic susceptible contacts can be considered proof of immunity:
≥ 1 year of age reporting a history of at least one measles immunization, or measles disease.
6-11 months of age and received a dose of measles containing vaccine ≥ 14 days before exposure.

Note: Do not draw measles IgG serology for infants under 6 months of age, or for infants 6-12 months of age whose only protection is from maternal antibodies (ie. unimmunized), because a positive result may not be reliable. (C) Exclude from all public places from the 5th day after the first exposure to the 21st day after the last exposure.

(D) Post-exposure prophylaxis is not 100% effective. Advise clients to avoid unnecessary contact with individuals at high risk for complications until 21 days after their last exposure

Appendix J - Measles Post Exposure Prophylaxis Recommendations for Susceptible Contacts

Population	Time Since Exposure to Measles	
	≤ 72 Hours	**73 Hours-6 days**
Susceptible infants 0-6 months of age	Intramuscular Immune Globulin (IMIg) (0.5 mL/kg)[16] [17] Maximum 15 mL[18]	
Susceptible immunocompetent infants 6-12 months of age	MMR Vaccine[19]	IMIg (0.5 mL/kg) [17] [20]
Susceptible immunocompetent older than 12 months of age	MMR Vaccine[21] [22] *A second dose of MMR is given >28 days after the first dose in susceptible contacts who received no doses prior to exposure.*	
Susceptible pregnant individuals	Intravenous Immune Globulin (IVIg) (400 mg/kg)[17] [23] Or IMIg (0.5ml/kg), limited protection [24]	
Immunocompromised individuals 6 months of age and older	IVIg (400 mg/kg) Or IMIg (0.5 mL/kg), limited protection if 30 kg or more	

Intramuscular Immune Globulin (IMIg) GamaSTAN® and IVIg are obtained through Blood Services at Prince County Hospital and Queen Elizabeth Hospital.

[16] If injection volume is not a major concern IM immunoglobulin (IMIg) should be provided at a dose of 0.5 mL/kg to a maximum dose of 15 mL over multiple injection sites.

[17] Ig should only be provided within 6 days of measles exposure; unless it is contraindicated, individuals who receive Ig should receive measles-containing vaccine after a specified interval, once the measles antibodies administered passively have degraded.

[18] Large volumes (greater than 2mL for children or 3-5 mL for adults) should be divided and injected at 2 or more sites

[19] When MMR vaccine is provided prior to 12 months of age, 2 additional doses of measles-containing vaccine must be administered after the child is 12 months old (and at least 4 weeks after the previous dose) to ensure long lasting immunity.

[20] Infants 6-12 months of age who are identified after 72 hours and within 6 days of measles exposure should receive IMIg (0.5 mL/kg) if injection volume if not a major concern.

[21] MMR vaccine will not provide PEP protection after 72 hours of exposure, however, starting and completing a two dose series should not be delayed to provide long term protection.

[22] National Advisory Committee on Immunization (NACI) does not recommend that susceptible immunocompetent individuals older than 12 months of age receive Ig PEP for measles exposure due to low risk of disease complications and the practical challenges of administration for case and contact management.

[23] In cases where injection volume is a concern and for recipients weighing 30 kg or more, IVIg can be considered

[24] For individuals weighing 30 kg or more, IMIg will not provide complete protection but may provide partial protection