HSE AMRIC

Infection prevention and control (IPC) precautions for measles in healthcare settings

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Contents

Background

This is a stand-alone guidance infection prevention and control (IPC) precautions for measles in healthcare settings, and it should be used in association with the "National Clinical Guideline No. 30 – Infection Prevention and Control (IPC)" available at https://www.gov.ie/en/publication/a057e-infection-prevention-and-control-ipc/

and

Guidelines and advice for the public health management of Measles in Ireland, available at https://www.hpsc.ie/a-z/vaccinepreventable/measles/guidance/

The term patient is used throughout this guidance document, and it is intended to mean a patient, service user, client, resident, person or supported individual.

Introduction

Measles is a highly transmissible viral infection. Measles is highly infectious, the most infectious of all diseases transmitted through the respiratory route. Measles can be severe, particularly in immunosuppressed individuals, very young infants and adults who are more likely to develop complications and require hospitalisation. It is also more severe in pregnancy, and increases the risk of miscarriage, stillbirth, or preterm delivery. Measles causes considerable morbidity, 1 in 5 measles cases will require hospitalisation. Measles is a significant risk to patients and staff that do not have immunity. It is estimated that 90% of susceptible people exposed to an infectious individual will contract the disease.

Measles is a vaccine-preventable disease, therefore, immunisation is the only effective preventive measure against acquiring measles. Good population immunity can be achieved with high uptake of 2 doses of measles, mumps, and rubella (MMR) vaccine. High, sustained vaccination coverage is key to achieving elimination of endemic measles, defined by the World Health Organization (WHO).

Routes of transmission

Measles is transmitted through the respiratory route (airborne via droplet spread) or by direct contact with nasal or throat secretions of infected persons; much less commonly, measles may be transmitted by articles freshly soiled with nose and throat secretions (fomite spread), or through airborne transmission with no known face-to-face contact.

The degree of transmission risk depends on the number of non-immune patients or staff exposed, and on the appropriateness of infection prevention and control (IPC) practices in place. The virus remains active and contagious in the air or on infected surfaces for up to two hours. Transmission, therefore, can occur through airborne transmission via aerosolised droplet nuclei without known face-to-face contact; for example, transmission may occur to any susceptible person breathing the same air as the infectious patient while the patient is present and for up to two hours after a person with measles last occupied the area. The infection also has the potential for indirect contact transmission if liquid respiratory particles settle onto surfaces, for example could occur from direct contact with nasal or throat secretions of infected persons.

Measles is extremely transmissible and is one of the world's most contagious diseases; one case of measles can infect 12-18 unvaccinated people (National Immunisation Advisory Committee (NIAC), Chapter 12, 2024) https://www.hiqa.ie/reports-and-publications/niac-immunisation-guideline/chapter-12-measles

Incubation period

The incubation period averages 10-12 days.

Time from exposure to rash onset averages 14 days (range 7-21 days).

Infectious period

The infectious period is from four days prior to the onset of the rash to four days after the rash erupts.

Clinical presentation of primary measles infection

The prodrome (before rash onset) usually lasts 2-4 days (range 1-8 days). The prodrome phase is characterised by fever, significant malaise, anorexia, coryza, conjunctivitis and cough. Conjunctivitis may be accompanied by photophobia. Conjunctivitis is a more specific symptom that differentiates measles from many other causes of influenza-like illness. Respiratory symptoms are as a result of inflammation of the mucosal due to viral infection of epithelial cells.

Fever is typically present and may be as high as 40ºC. These prodromal symptoms typically intensify a few days before the rash appears. Time from exposure to rash onset averages 14 days (range 7-21 days). In the absence of a rash the period of infectiousness should be taken from 24 hours before reported prodromal symptom onset.

The erythematous, maculopapular rash first appears behind the ears and spreads to the face, trunk and limbs over 3-4 days. The rash may become confluent in places. After 3-4 days, the rash begins to fade leaving a temporary brownish discolouration.

Koplik spots (small red spots with white centres) may appear on the buccal mucosa near the exit of the parotid duct, from 1-2 days before to 1-2 days after the rash appears. Koplik spots are strongly associated with measles but they are difficult to identify and should not be relied upon for diagnosis. For images of a measles rash and Koplik spots, please see https://www2.hse.ie/conditions/measles/

Several other common rash illnesses have a similar clinical presentation, although the combination of rash, fever, coryzal symptoms with conjunctivitis is almost unique to primary measles infection. A summary of the clinical features of other conditions and

differential diagnoses is provided in Guidelines for the public health management of Measles in Ireland, see Appendix 2.

Clinical improvement usually begins within 48 hours of the appearance of the rash. The cough may persist for 1-2 weeks. Fever lasting longer than 3-4 days after rash onset suggests the presence of a measles-associated complication.

Complications

The most frequent complications of primary measles infection include viral pneumonitis and otitis media, as well as diarrhoea. Measles infection often leads to a temporary reduction in immune responses in the few weeks following infection, which may increase the risk of severe secondary bacterial and viral infections

Young infants are at high risk of complications such as pneumonia, otitis media, Sub-acute sclerosing panencephalitis (SSPE) and of a fatal outcome. Tracheobronchitis ('measles croup') and pneumonia due to secondary bacterial infection are frequent early complications of measles. Also see other complications mentioned regarding pregnant women and young infants in the introduction section.

Infection prevention and control precautions (IPC)

Standard Infection Prevention and Control (IPC) precautions should be implemented by all healthcare and operational staff at all times for all patients.

Measles prevention in healthcare settings requires a multi-faceted approach.

All healthcare facilities should be prepared and review up-to-date processes to ensure that patients, service users or staff presenting or reporting with clinical signs and symptoms suggestive of measles are rapidly identified and managed appropriately (refer to the following link for measles guidance and resources:

https://www.hpsc.ie/a-z/vaccinepreventable/measles/guidance/

Management of known or suspected cases

Rapid identification and isolation of patients are key preventive measures, along with the appropriate choice of personal protective equipment (PPE) following a point of care risk assessment (PCRA); this is available in the poster section on the HPSC website: https://www.hpsc.ie/a-z/microbiologyantimicrobialresistance/infectioncontrolandhai/posters/

Refer to Table 1 below, for advice on the use of personal protective equipment for standard and transmission-based precautions.

Further detail to support and advice on use of PPE, as appropriate is available in the NCEC guidance, see Table 42 Volume 2 page 250: Use of personal protective equipment for standard and transmission-based precautions, available at:

http://health.gov.ie/national-patient-safety-office/ncec/

Table 1 Use of personal protective equipment for standard and transmission-based precautions (NCEC no. 30, 2023)

Type of precautions	Examples of infectious agents	Single room or cohort	Gloves	Apron/ Gown	Mask	Eye protection	Handling of equipment
Standard	Standard precautions apply for all work practices to prevent the likelihood of transmission of infection						
Contact	Multidrug resistant organisms, *C. difficile*, norovirus	✓	✓	✓	If infectious agent in respiratory secretion	If splash risk	Single use or reprocess
Droplet	norovirus, pertussis, meningoc-occus, Influenza	✓	✓	✓	✓ Surgical mask (unless AGP)	If splash risk	Single use or reprocess
Airborne	Pulmonary TB, measles, chickenpox	Controlled ventilation when possible	✓	✓	✓ FFP2 respirator	✓	Single use or reprocess

Additional AMRIC poster resources are available (see link to resources below)

- "How to put on personal protective equipment PPE"
- "How to take off personal protective equipment PPE"
- "Safe use of FFP2 respirator masks"

https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/infectionpreventionandcontrolguidance/ppe/

A suite of eLearning resources on standard and transmission-based precautions and Personal Protective Equipment is accessible through the AMRIC hub on www.hseland.ie

1. Where known or suspected cases are advised to attend a healthcare facility by a healthcare professional; advance communication is essential, for example controlled transfer procedures, phone ahead procedures, specific entrances to attend, wait in car park (as appropriate) to be collected etc. in order to minimise potential exposures

Healthcare facilities should have a priority access pathway to an appropriate isolation room as part of standard procedures for managing known or suspected cases of measles to limit exposure risks. Refer to local admission pathways.

2. Any person self-presenting to a healthcare setting should be alerted to signs and symptoms of measles. Whenever possible, posters and signs should be placed in healthcare waiting areas including Emergency Departments advising patients with any rash illness to report to reception; this is to prompt self-presenting patients to highlight their symptoms early to avoid these patients waiting for prolonged periods in waiting areas, so as to reduce transmission risk to others
   Measles posters can be download from the HPSC website
   https://www.hpsc.ie/a-z/vaccinepreventable/measles/resources/

   If a person suspects that they may have any of these symptoms, they are advised to alert healthcare staff immediately

   Provide non-clinical staff (e.g. staff on patient registration desk) with information on early recognition of measles and instructions (for example any patients with fever and rash are potentially infectious) https://www.hpsc.ie/a-z/microbiologyantimicrobialresistance/infectioncontrolandhai/posters/PCRAResistPoster.pdf

   Non-clinical staff should also be provided with information on how to alert clinical staff to suspected cases to avoid these patients waiting for prolonged periods in waiting areas and minimise the risk of transmission

3. All clinical staff should be alerted to the need for heightened vigilance during times when there is known increased measles transmission or activity.
4. Persons with signs or symptoms of measles should be identified, in line with standard triage/ assessment procedures, provided with a surgical facemask if appropriate to wear, and separated from other patients, prior to, or as soon as possible after entry into a facility
   The patient's facemask could be removed, as appropriate, while they remain in the isolation room

5. All known or suspected cases of measles should be immediately placed in an airborne isolation room with controlled ventilation, where possible. In situations where this is not possible, use a single room with en-suite facilities and ensure that the doors to remain closed at all times except when necessary for entry/exit of patient/staff
6. In all healthcare settings, general advice is to perform the consultation with suspected cases in a room which can remain vacant for two hours post consultation. Where a mechanically ventilated room is used for example with 10-12 air changes per hour, in this situation, a risk assessment may be undertaken to reduce this to a shorter period of time
7. Clinically suspected and confirmed cases should be notified to the Medical Officer of Health (MOH) promptly at the regional Public Health Department https://www.hpsc.ie/notifiablediseases/whotonotify/ and that out of hours services are aware of how to contact Public Health out of hours, as measles is a notifiable disease in Ireland. Prompt notification is necessary also, as measles is a highly infectious disease which requires Public Health actions and requires prompt actions by Public Health to investigate and assess contacts in several settings including advising regarding post exposure immunoglobulin. This work is very time sensitive

   Further details on reporting notifiable diseases is available on the following link: https://www.hpsc.ie/notifiablediseases/whotonotify/ for more details
8. Provide persons with signs or symptoms of measles with information on all infection prevention and control precautions:

   https://www.hpsc.ie/a-z/vaccinepreventable/measles/resources/
9. Support the patient with adherence to respiratory hygiene, cough etiquette and hand hygiene.

General recommendations for healthcare workers

1. All healthcare staff (clinical and non-clinical) are advised to check if they are immune to measles. Healthcare professionals should have evidence of immunity to measles. Non-immune healthcare professionals should not care for patients with known or suspected measles, see below section for more detail.
2. Ensure clinical staff are aware of signs and symptoms of measles https://www2.hse.ie/conditions/measles/

Ensure all staff have been trained or receive refresher training (as appropriate) in IPC including the use of appropriate PPE and standard and transmission-based precautions. See section on available resources below.

3. Adhere to standard and transmission-based precautions (airborne) and contact with discharges from respiratory and mucous membranes with known or suspected measles
4. Put visual alerts (e.g., signs, posters) in appropriate languages highlighting signs and symptoms of measles prominently in healthcare departments and include Public Health messages on video screens in public areas where available. Other signs advising on respiratory hygiene, cough etiquette, and hand hygiene at the facility entrance and in common areas should be displayed (e.g., waiting areas, elevators, cafeterias).
5. Measles posters and resources for display can be found at the following links:

   https://www.hpsc.ie/a-z/vaccinepreventable/measles/resources/Think%20Measles%20poster%20March%202022.pdf

   www.hse.ie/eng/about/who/healthwellbeing/our-priority-programmes/child-health-and-wellbeing/hse-measles-a4-poster.pdf

   www.hpsc.ie/a-z/specificpopulations/migrants/publichealthresourcesformigrants/posters/

   www.hse.ie/eng/health/immunisation/hcpinfo/mmrcatchup24/measles-poster-crowded-spaces-version-aw-2-.pdf

   Adhere to environmental and equipment cleaning and disinfection in accordance with NCEC guidelines, see section 3.1.3 Routine management of the physical environment, Volume 1, NCEC National Clinical Guideline No. 30 Infection Prevention and Control. Manage and dispose of healthcare risk and non-risk waste as per local management policy.

Manage linen in accordance with section 3.1.8 Handling of linen, Volume 1, NCEC National Clinical Guideline No. 30 Infection Prevention and Control. and in accordance with local policies.

See https://www.gov.ie/en/publication/a057e-infection-prevention-and-control-ipc/

Duration of airborne precautions: Measles

- Patients with measles should be cared for using airborne precautions until 4 days after rash appears.
- Individuals who are immunocompromised may be infectious for longer and may not display typical symptoms. In this instance the timing of isolation should be adjusted as appropriate in consultation with clinicians managing the case.

Virus-containing respiratory particles can remain in the air for several hours and on contaminated surfaces for up to two hours. After the patient leaves the room, it should remain vacant for 2 hours, with windows open where possible to maximise natural ventilation. Where a mechanically ventilated room is used for example with 10-12 air changes per hour, in this situation, a risk assessment may be undertaken to reduce this to a shorter period of time. For further advice refer to Volume 2, Appendix 7.4, Type and duration of precautions for specific infections and conditions, Page 264, NCEC National Clinical Guideline No. 30 Infection Prevention, and Control, available at:

https://www.gov.ie/en/publication/a057e-infection-prevention-and-control-ipc/

Immunity & vaccination

Immunisation is the only effective preventive measure against acquiring measles. Measles vaccine is at least 95% effective and seroconversion rates are close to 100%. Experience and modelling shows that two doses of measles vaccine is required to interrupt indigenous transmission and achieve herd immunity. Measles vaccine in Ireland is given as part of the combined Measles, Mumps and Rubella (MMR) vaccine. Two doses of MMR vaccine are included in the childhood immunisation schedule:

- Dose 1, given at 12 month of age in general practice
- Dose 2, given at 4-5 years of age in junior infants in Primary Schools, by HSE school immunisation teams.

Vaccine effectiveness

Approximately 95-98% of recipients develop immunity to measles after one dose of MMR vaccine. Over 99% of those who receive two doses of measles vaccine ≥12 months of age and ≥4 weeks apart will develop measles immunity which is lifelong.

Breakthrough infections are uncommon and are generally milder than in unvaccinated persons. Lower rates of seroconversion occur in those under 12 months of age, because of trans-placental maternal antibodies.

As a continuation of point 1, “General recommendations for healthcare workers”: It is recommended that all healthcare workers check that they know their status of immunity against measles.

All healthcare workers, both clinical and non-clinical, who have direct patient contact should be immune to measles, mumps and rubella.

This applies to roles in which:

- their work requires face to face contact with patients, or
- their normal work location is in a clinical area such as a ward, emergency department or outpatient clinic, or

- their work frequently requires attendance in clinical areas

According to NIAC, acceptable presumptive evidence of immunity against measles includes at least one of the following:

- Written documentation of vaccination with two doses of MMR vaccine at least four weeks apart
- or serological evidence of measles immunity (i.e. detectable measles specific IgG from an INAB accredited laboratory or equivalent).
- or birth in Ireland before 1978 (not to be used as presumptive evidence of immunity for close contacts)
- Healthcare workers can obtain their immune status in the following way: http://www.hse.ie/eng/health/immunisation/whoweare/requestrecord.html https://www.hse.ie/eng/health/immunisation/hcpinfo/
- Please see the following link to the updated NIAC guidance on Measles including evidence of immunity: https://www.hiqa.ie/reports-and-publications/niac-immunisation-guideline/chapter-12-measles
- Non-immune healthcare workers can attend for vaccination at community catch up clinics, their local GP or Occupational Health Service vaccination clinics.
- Some Occupational Health Services may have availability for measles vaccinations in clinics – this will be communicated locally
- If in doubt, contact local Occupational Health Department https://assets.hse.ie/media/documents/Occupational_Health_Department_contacts_Feb_2023_v3_1.pdf
- Information for healthcare professionals about MMR catch up is available on the following links:

Appointments are available at MMR community catch clinics:

https://www2.hse.ie/services/mmr-vaccine/vaccination-clinics/

Other information is available on the following links:

- https://www.hse.ie/eng/health/immunisation/hcpinfo/
- Vaccine information for healthcare professionals: https://www.hiqa.ie/areas-we-work/national-immunisation-advisory-committee refer to NIAC Immunisation guidance chapter 12-Measles

Managing exposed patients and healthcare professionals

In the case of an outbreak or close contact with a measles case in a healthcare setting, either written documentation of vaccination with two doses of MMR vaccine at least four weeks apart or serological evidence of measles immunity (i.e. detectable measles specific

IgG from an INAB accredited laboratory or equivalent) are acceptable evidence of confirmed measles immunity. Presumptive immunity by birth before 1978, should not be used to confirm immunity in those identified as close contacts with a measles case (refer to https://www.hiqa.ie/areas-we-work/national-immunisation-advisory-committee section 12.5.4: Healthcare workers, NIAC 2024 for more detail).

Contact tracing should identify close contacts within the infectious period (from four days prior to the onset of the rash to four days after the rash erupts) in accordance with Public Health recommendations and in line with local governance arrangements. Identify any known high-risk patients (for example infants and unvaccinated children, immunocompromised patients).

Following the notification of a laboratory confirmed or clinically suspect case of measles, Public Health will undertake a risk assessment. Part of this risk assessment will be to identify contacts of the case. Contact tracing should identify close contacts within the infectious period in accordance with Public Health recommendations and in line with local governance arrangements.

For further advice, please refer to measles guidance: https://www.hpsc.ie/a-z/vaccinepreventable/measles/

and

www.hpsc.ie/a-z/vaccinepreventable/measles/guidance/Measles_Guideline.pdf

Vaccination during measles outbreaks

Outbreaks of measles may be controlled by immunising all susceptible individuals within 3 days of contact, as vaccine-induced immunity develops more rapidly than that following measles infection.

When measles outbreaks occur, susceptible persons should be offered MMR vaccine, unless contraindicated, within 72 hours of contact with a case.

If there is uncertainty about vaccination status, MMR vaccine should be given as MMR vaccine can be safely given to those who are immune. If vaccination within 72 hours of exposure is not achievable, MMR vaccine should still be offered to susceptible persons as this is a good opportunity to vaccinate previously unvaccinated individuals.

Note: Infants are protected from birth against measles by maternal antibodies if the mother is immune to measles. This passive immunity gradually disappears over the second half of the first year of life. Some susceptible persons may require Human Normal Immunoglobulin (HNIG).

For more detail, refer to NIAC Immunisation Guidelines,; https://www.hiqa.ie/areas-we-work/national-immunisation-advisory-committee Chapter 12. Measles, section 12.5.5 Vaccination during measles outbreaks.

Post exposure prophylaxis of measles

As per Chapter 12 NIAC https://www.hiqa.ie/areas-we-work/national-immunisation-advisory-committee section 12.6, Post exposure prophylaxis of measles:

Exposure to measles is considered significant if a susceptible individual is exposed to a confirmed or probable case of measles during the infectious period (four days before to four days after rash onset) in any of the following ways:

- Face-to-face contact of any duration
- An immunocompetent individual is in a room with the case for more than 15 minutes. This includes those who may have been exposed to measles in the setting of an emergency department or an outpatient clinic where the intensity of such exposure cannot accurately be judged
- An immunocompromised person is in a room with the case for any duration or enters a room vacated by a case within two hours of the case leaving the room.

Following the Public Health risk assessment, Public Health may advise that contacts from the following cohorts of contacts should be offered post exposure immunoglobulin:

- Infants aged < 6 months of age
- Non-immune pregnant women
- Immunocompromised individuals

Note that post exposure prophylaxis with immunoglobulin or MMR vaccine is not always fully effective in preventing measles infection. Therefore, exposed persons who receive post exposure prophylaxis remain an infection control risk. They should be managed in accordance with usual infection control procedures following a measles exposure.

For HNIG and MMR post-exposure prophylaxis of measles refer to the HSE Post-measles exposure Immunoglobulin Pathway guidance on the following link:

https://www.hpsc.ie/a-z/vaccinepreventable/measles/guidance/Pathway%20to%20administer%20post-exposure%20immunoglobulin.pdf

An information leaflet for Close Contacts of Measles Cases Who Require Human Normal Immunoglobulin (HNIG) is also available in the following link: https://www.hpsc.ie/a-z/vaccinepreventable/measles/guidance/FAQ%20Information%20for%20Close%20Contacts%20of%20Measles%20Cases%20Who%20Require%20Human%20Normal%20Immunoglobulin.pdf

Details on exposure types and immunocompromised individuals, refer to:

Appendix A – Immunocompromised individuals

and

Appendix B Patient Information Leaflet Information for Close Contacts of Measles Cases Who Require Human Normal Immunoglobulin (HNIG).

Refer to the section on Post-exposure Immunoglobulin Pathway and NIAC Immunisation Guidelines, Chapter 12, Subsection:12.7, Human normal immunoglobulin (HNIG)

preparations, dose and administration: https://www.hiqa.ie/areas-we-work/national-immunisation-advisory-committee

Also refer to local pathways for Human normal immunoglobulin (HNIG) administration (as appropriate).

Additional information on measles exposure in pregnancy is available at: https://www.hpsc.ie/a-z/vaccinepreventable/measles/guidance/

Incident management

An incident team should be convened in the event of a single confirmed (or highly suspect) measles case in a healthcare setting, as a large number of exposed individuals may be identified.

Outbreak

An outbreak is defined as 2 or more epidemiologically linked cases that occur within one incubation period of each other (that is the second case has symptom onset between 7 and 21 days of the first case).

When transmission has occurred in healthcare settings an outbreak control team (OCT) should be convened to investigate and control the outbreak.

This OCT will support, advice and manage situations where a large number of people have been exposed, including patients who may be more vulnerable, especially in hospital settings.

Further detail is available on the following link:

https://www.hpsc.ie/a-z/vaccinepreventable/measles/guidance/

Infection prevention and control guidance for clinical settings on the management of an outbreak can be found at https://www.gov.ie/en/department-of-health/publications/ncec-national-clinical-guideline-ncg-no-30-infection-prevention-and-control-ipc-updates/

refer to volume 1, section 2, 2.1.12 Case study: Measles virus outbreak.

Links to useful resources

For more information on measles see HSE website:

https://www2.hse.ie/conditions/measles/

HPSC website: https://www.hpsc.ie/a-z/vaccinepreventable/measles/

National Clinical Guidelines Infection Prevention and Control:

https://www.gov.ie/en/department-of-health/publications/ncec-national-clinical-guideline-ncg-no-30-infection-prevention-and-control-ipc-updates/

AMRIC PPE Guidance available at:
https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/infectionpreventionandcontrolguidance/ppe/

HSeLanD: AMRIC eLearning resources on www.hseland.ie all modules can be accessed via the AMRIC HUB

- Basics of IPC (Breaking the Chain of Infection)
- Standard and Transmission-based Precautions (includes a Measles scenario)
- PPE including the use of the Point of care risk assessment (PCRA).

Poster resources

- https://www.hse.ie/eng/health/immunisation/hcpinfo/mmrcatchup24/
- https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/infectionpreventionandcontrolguidance/ppe/

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