Recommendations of Measles Sub-Committee of the Scientific Advisory Committee NDSC

Guidelines for Control of Measles in Ireland

National Disease Surveillance Centre

October 2002

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1. Disease description

Measles is an acute viral illness caused by a virus in the family paramyxovirus, genus *Morbillivirus*. Measles is characterized by a **prodrome** (2-4 days) of fever and malaise, cough, coryza, and conjunctivitis, followed by an erythematous maculopapular rash. The rash begins at the hairline, and then involves the face and upper neck. Over the next 3 days, the rash gradually proceeds downwards and outward reaching the hands and feet. Koplik's spots, an enanthem present on mucous membranes, is considered to be pathognomic for measles. It occurs 1-2 days before the rash to 1-2 days after the rash, and appears as punctate blue-white spots on the bright red background of the buccal mucosa.

Though usually a mild or moderately severe illness of childhood, measles can result in residual impairment from encephalitis in approximately 5-10 cases per 10,000 and in death in approximately 1-3 cases per 1000.[1] Complications such as otitis media, bronchopneumonia, laryngotracheobronchitis (croup), and diarrhoea occur more commonly in young children under the age of 5 years. **Pneumonia** (6% of reported cases) may be viral or superimposed bacterial and is the most common cause of death. Complications such as pneumonia and acute encephalitis are increased in adults over the age of 20 years.

Acute **encephalitis** is reported in approximately 0.1% of reported cases.[2] Onset generally occurs 6 days after rash onset (range 1-15 days), and is characterized by fever, headache, vomiting, stiff neck, meningeal irritation, drowsiness, convulsions and coma. Case fatality can approximate 15%. Some form of residual neurological damage occurs in as many as 25%. Seizures (with or without fever) are reported in 0.6% to 0.7% of reported cases.

The most common causes of death are pneumonia in children and acute encephalitis in adults. **Subacute sclerosing panencephalitis (SSPE**) is a rare degenerative central nervous system disease believed to be due to persistent measles virus infection of the brain.[2] Average onset occurs 7 years after measles (range 1 month – 27 years) and occurs in 5-10 cases per million reported measles cases. The onset is insidious, with progressive deterioration of behaviour and intellect, followed by ataxia (awkwardness), myoclonic seizures, and eventually death.

Measles illness during pregnancy results in a higher risk of premature labour, spontaneous abortion and low birth weight infants.

The **incubation period** of measles, from exposure to prodrome averages 10-12 days, and from exposure to rash averages 14 days (range 7-18 days). Measles transmission is primarily person-to-person via large respiratory droplets. Airborne transmission via aerosolised droplet nuclei has been documented in closed areas (e.g. examination room) for up to 2 hours after a person with measles occupied the area.[2] Measles is highly communicable, with >90% secondary attack rates among susceptible persons. Measles may be transmitted from 4 days prior to 4 days after rash onset.[3] Maximum communicability occurs from onset of prodrome through the first 3-4 days of rash.

2. Background

The incidence of Measles has declined dramatically since the introduction of measles vaccine in 1985. The MMR vaccine was incorporated into the programme in October 1988. In July 1992 a second MMR for both boys and girls aged 10-14 years was introduced replacing the previous selective rubella vaccination programme for prepubertal girls. The number of reported cases fell from a peak of almost 10,000 cases in 1985 to 135 cases in 1991. However outbreaks continued to occur with 4328 cases in 1993 and more recently 1603 cases in 2000 (see figure 1,2 and 3) where the outbreak was predominantly centred in North County Dublin[4,5].

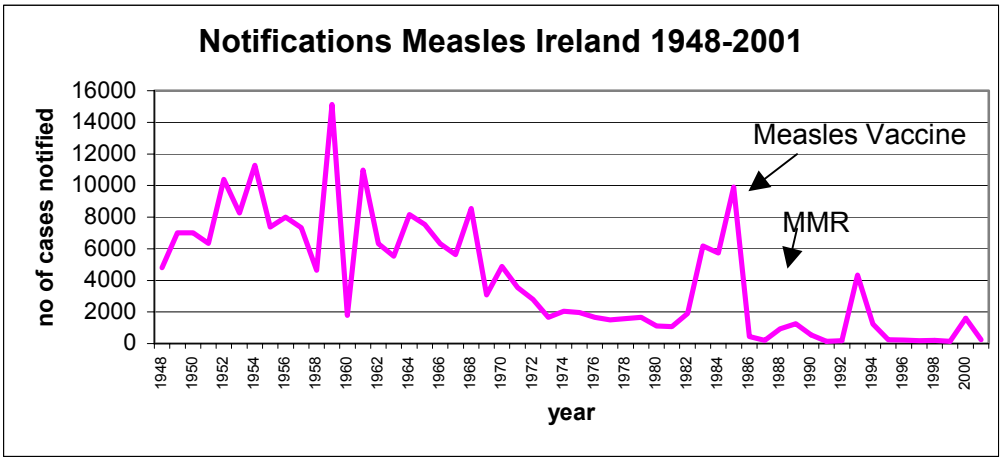

Figure 1 Notification of Measles 1948-2000

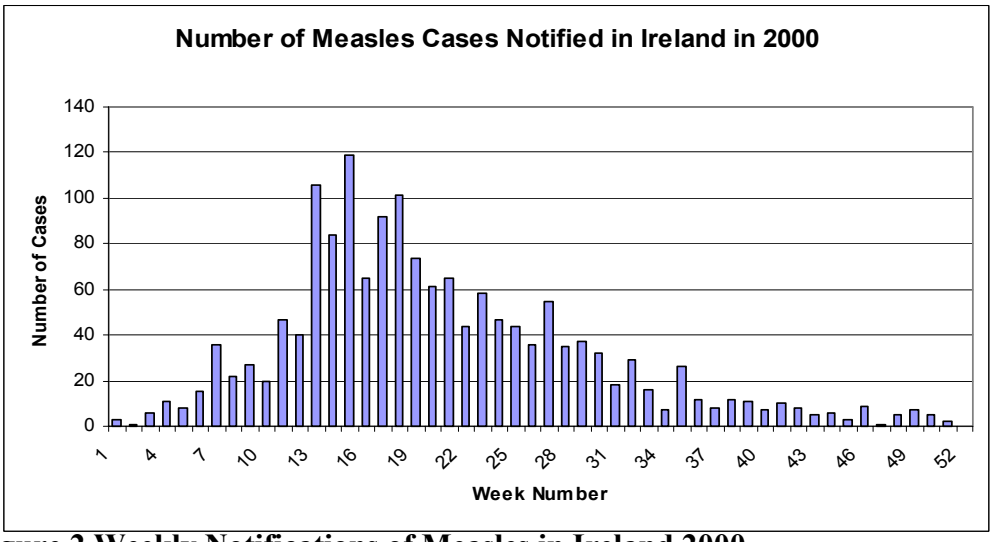

Figure 2 Weekly Notifications of Measles in Ireland 2000

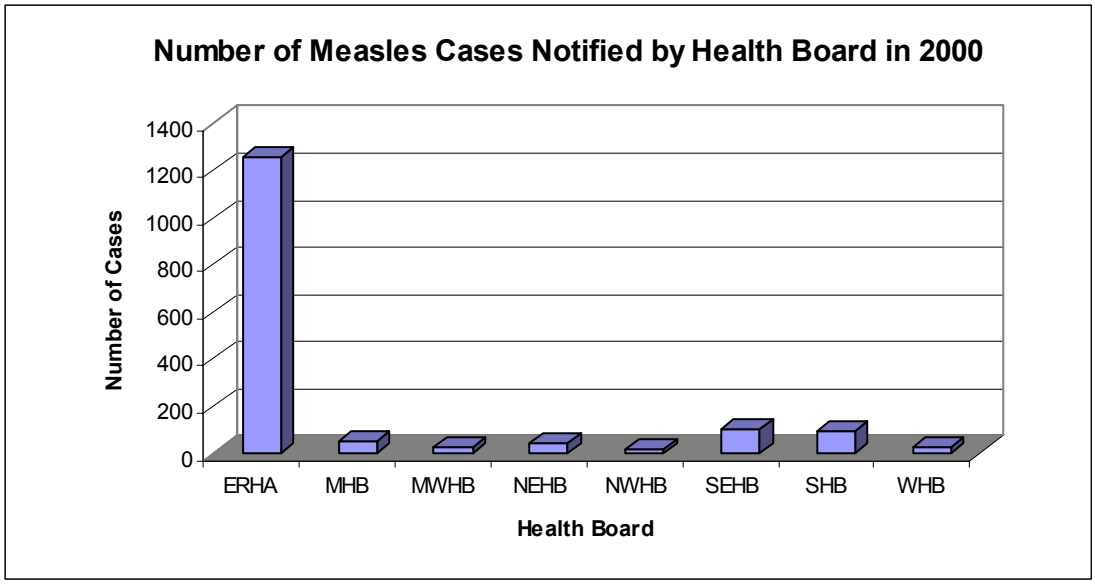

Figure 3 Measles Notifications by Health Board 2000

3. Immunisation

Primary prevention is the most effective way to prevent and control measles outbreaks. For successful measles control immunisation of at least 95% of susceptible individuals with a two-dose schedule is required. The first dose should be given at 12-15 months, and the second dose at 4-5 years of age.

The current uptake of MMR vaccine is insufficient with approximately 68% of children receiving the first dose of MMR by 2 years of age. Comprehensive uptake figures for the second dose of MMR are not yet available nationally.

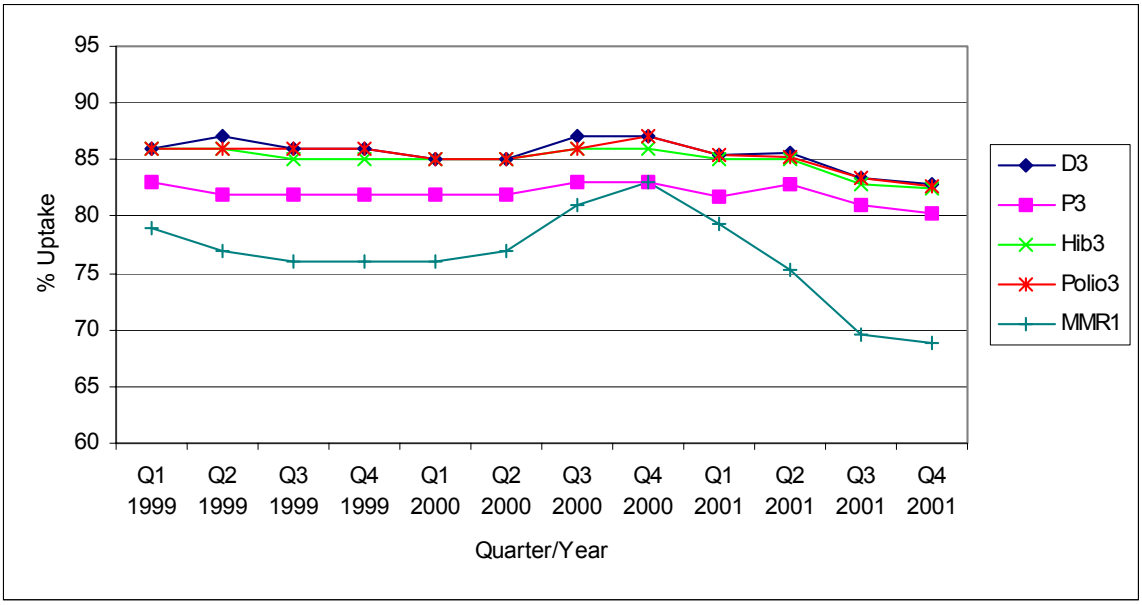

Figure 4 Uptake primary vaccines at 24 months by quarter 1999-2001 Ireland

4. National Surveillance

Measles is a notifiable disease. Measles is also one of the priority diseases selected by the European Network committee for European surveillance. (Decision 2119/98/EC and Decision 2000/96/EC). Surveillance depends on health care providers reporting all cases of measles to local health authorities. As the incidence of measles declines, aggressive surveillance becomes increasingly important. It is essential that every case be reported so that trends and risk factors can be documented to guide the development of control policy. Effective surveillance can detect inadequate levels of protection, define groups needing special attention and is important in evaluating the effectiveness of control activities. All cases and outbreaks should be reported to the National Disease Surveillance Centre (NDSC) (enhanced surveillance form Appendix 1 + general outbreak surveillance form). NDSC should publish a measles update describing details of recent measles activity (sporadic cases and outbreaks by region).

For effective surveillance and control it is necessary that each suspect case of measles be thoroughly investigated to confirm the diagnosis. Clinicians should be asked to promptly notify the medical officer of health of all suspect cases so that it may be determined if control measures are warranted. Efforts should be made to find additional cases and identify their contacts.

In addition to the above, surveillance is required in order to:

- Detect cases and the source of infection rapidly so that timely control measures can be implemented
- Detect resurgence of indigenous transmission
- Detect importations of measles and
- Monitor serious complications of measles infection (death, encephalitis, seizures, and pneumonia)

Case definition
A sensitive clinical definition is needed for the early detection of outbreaks and imported infection, and for timely interventions.

The European Network Committee has agreed the following case definition for measles:

Measles

Clinical description
Clinical picture compatible with measles i.e.
a generalised erythematous maculopapular rash lasting >3 days and
a temperature >38.0 C and
one or more of the following
cough, coryza (rhinitis), Koplik's spots or conjunctivitis

Laboratory criteria for diagnosis

- Detection of measles immunoglobulin M antibody in absence of recent vaccination, or
- 4 fold or higher rise in measles IgG antibody level in absence of recent vaccination, or
- Detection of measles virus (not vaccine strains) in a clinical specimen

Case classification

Possible: clinically compatible cases

Confirmed: a case that is laboratory confirmed or a clinically compatible case that is epidemiologically linked to a confirmed case. A laboratory confirmed case does not need to meet the clinical case definition.

A measles case is epidemiologically linked if:

- There was exposure to a laboratory confirmed case during the infectious period (four days before to four days after rash onset) and
- This exposure occurred within the expected incubation period of the case under investigation – 7-18 days (mean 14 days) before rash onset (Chin 2000) [3]

Indigenous infection

Measles cases are classified as indigenous if the person becomes infected in Ireland.

Indigenous cases are further categorised as either

- Epidemiologically linked to an internationally imported case; or
- Not linked epidemiologically to an internationally imported case

Preventable cases of Measles

A preventable case of measles is defined as infection in a person diagnosed with measles who fulfils all the following:

- Was born after 1978 and
- Lacks documented evidence of age appropriate vaccination against measles;
- Has no documented episode of confirmed measles previously
- Has no medical contraindication to receiving the vaccine. (See appendix 1 for contraindications to MMR vaccine)

A case is classified as non-preventable if the person does not meet these criteria.

Laboratory confirmation

Confirmation is required for 1) all sporadic cases and 2) the index case and enough cases to establish the existence of an outbreak.

Measles specific IgM antibody is present in about 80% of cases at the time of the rash onset and can still be detected up to 60 days later.[6] Although its presence confirms measles, a negative result does not outrule the diagnosis. If measles is

still suspected and the sample was collected within 72 hours of rash development, the IgM testing should be repeated.

Oral fluid samples collected using a foam swab provide a non-invasive method for the confirmation of measles infection. Specimens should be obtained between one and five weeks following the appearance of the rash.

Occasionally false positives can occur and as with any laboratory test, it is important to consider the epidemiological and clinical information together with the laboratory report.

Alternatively, measles infection can be confirmed serologically by demonstrating a significant rise in antibody titre (IgG), with the first (acute) sample taken within 7 days of rash onset and the second (convalescent) sample taken 10 days after the first.

Molecular epidemiological surveillance is important to determine 1) the origin of the virus, 2) which viral strains are circulating and 3) distinguish between vaccine virus and wild strains. The oral fluid samples described above can be used for molecular investigation. Alternatively, specimens (nasopharyngeal aspirates, throat swabs using viral transport media, maintained at a temperature of 4^{o}C) should be collected in the first 7 days (preferably within 3 days of rash onset) and sent to the Virus Reference Laboratory, UCD within 24 hours of collection. These samples can be used to culture the measles virus and for molecular investigation.

Case investigation

All reports of suspected measles cases should be investigated immediately by the public health department/community care area. The measles enhanced surveillance form may be used as a guideline for collecting demographic and epidemiological data during case investigation. Essential components of case investigation include:

Establish a diagnosis of measles. Necessary clinical information must be obtained to establish whether or not a reported case meets the clinical case definition. If the case was diagnosed within 3 days of onset of rash, there must be appropriate follow-up to establish rash of at least 3 days duration.

Laboratory confirmation is essential for all outbreaks and all sporadic cases. In an area of low incidence, most cases that meet the clinical case definition will not turn out to be measles. Even in outbreaks, laboratory confirmation should be obtained on as many cases as possible. Once community awareness is increased, many cases of febrile rash illness may be reported as suspected measles, and the magnitude of the outbreak may be exaggerated if these cases are included in the absence of laboratory confirmation. This is particularly important as the outbreak is ending; at that point, laboratory confirmation should be sought on all suspected cases.

The occurrence of measles-like illness in recently vaccinated persons can pose particular difficulties in the outbreak setting. Ten percent of recipients of measles-containing vaccine may develop fever and a rash approximately one week

after vaccination and vaccination of susceptible persons results in production of IgM antibody that cannot be distinguished from natural infection. A positive measles IgM test cannot be used to confirm the diagnosis of measles in persons with measles-like illness who received measles vaccine 6-45 days before onset of rash. A negative test would exclude the diagnosis. Persons with measles-like illness who received the vaccine 6-45 days before onset of rash should be classified as confirmed cases of measles only if 1) they meet the clinical case definition and 2) they are epidemiologically linked to a laboratory-confirmed case. For persons receiving vaccine 6-14 days prior to rash onset, specimens for viral isolation should be obtained in addition to serological testing (see "Laboratory testing"); isolation of wild measles virus would allow confirmation of the case.

Case investigation and vaccination of susceptible household contacts should not be delayed pending the return of laboratory results. Outbreak control measures should be initiated with the identification of a single case clinically compatible with measles. It is reasonable to delay major control activities such as vaccinating an entire school, pending the return of laboratory results, which should be obtained as quickly as possible (within 1 working day). Accurate and complete immunisation history should be obtained on all confirmed cases. Written records or immunisation registry/database information is required as acceptable evidence of immunisation status. Investigation and management of cases and contacts should be completed within 10 days of the onset of rash in the index case for at least 80% of cases.

History of cases

The following data are epidemiologically important and should be collected in the course of case investigation, using an enhanced surveillance form.

- Demographic information
    - Date of birth
    - Community care area/Health Board
    - Sex
    - Unique identifying code or initials
- Clinical details, including
    - Date of onset of all symptoms and date of rash onset
    - Rash duration and presentation
    - Underlying illness
    - Complications and hospitalisation
    - Outcome
- Laboratory information including
    - Serological results
    - Date of collection of specimen for virus isolation
- Case classification
- Vaccination status, including
    - Number of doses of measles vaccine
    - Date(s) of measles vaccinations
    - Manufacturer and lot number of vaccine(s)
- Risk factors for disease including
    - Import status (indigenous, import)
    - Contact with a probable or confirmed case
    - Contact with immigrants or those who have travelled abroad

    - Travel history (in 8-17 days before rash onset to determine if imported case)
    - Setting (i.e. sporadic case or outbreak related)
- Dates, including
    - Date reported to public health department
    - Date of case investigation

Outbreak investigation

A measles outbreak is defined as the occurrence of any number of measles cases including one or more locally acquired cases. Because investigating an outbreak requires many person-days of work, often personnel are transferred to the activity from other responsibilities in the health board or community care areas, and may only be involved in outbreak investigation for a few days before someone else replaces them. This turnover in personnel will cause problems unless activities are organized so that the status of the investigation is documented at all times. Some practical suggestions for organising this activity are as follows.

- Use a logbook (or spreadsheet) to record all suspected cases as they are received. The person who receives the initial call should attempt to obtain the information needed to fill in the line listing.
- Create a column in the logbook for actions required for each suspected case ("get specimens", "phone GP for vaccination history", "check contacts").
- Identify a team leader for case investigators so that at least one person knows about all the new cases called in that day and what still needs to be done. Daily briefings are a good way of keeping the whole staff informed of the status of the investigation.
- Keep the logbook in one well-defined location, preferably with folders with the case investigations of all the cases that have been reported. It is useful to have one group/stack of all the confirmed cases, one group of suspected or probable cases awaiting further investigation or lab results, and a separate group of discarded cases. The latter are very useful for reassuring people who call the health department concerned that they have been exposed to measles. Track the information on a line listing on a computer database or hand written form (see appendix 2).
- Establish protocols for control measures for all likely situations (e.g. exposure in a day care centre, school, surgery, workplace, etc.) and clearly define who will make the decision that might require major investment of health board resources (such as vaccinating a whole school).
- Identify the population affected by the outbreak. Every suspected case should be investigated thoroughly. In very large outbreaks (over 200 cases) it may not be possible to investigate each reported case thoroughly; in these situations a sample of cases should be thoroughly investigated to describe the epidemic. The population affected should be described in terms of person (who is contracting measles and how many have had zero, one or two doses of measles containing vaccine, place (where are the cases?) and time (when did it start and is it still going on?). These are the essential elements that allow public health specialists to determine the population at risk (unvaccinated pre-school children, secondary school children who receive one dose MMR etc), determine where transmission is occurring (day care centres, schools, health care settings) and identify persons who are at potential risk of infection.

Resources that are available for outbreak control are always limited and are most effectively targeted when based on epidemiological data. In large outbreaks investigations should be most thorough at the start and end of the outbreak (to guide initiation and cessation of control measures).

- Local general practitioners should have a protocol for dealing with suspect cases and contacts; health boards should consider providing a help line for concerned parents.
- Active surveillance should be maintained until at least one month after the last confirmed case is reported.

Outbreak control

The primary strategy for measles outbreak control is achieving a high level of immunity in the population in which the outbreak is occurring; this is achieved with high coverage with 2 doses of measles containing vaccine. Only vaccine histories with written evidence of the date of receipt of vaccine should be accepted as valid. Persons who have not been immunised should be offered immunisation. Persons who cannot be immunised for medical or other reasons should be advised that they are risk in affected institutions (e.g. schools, day care centres etc) until 21 days after the onset of rash in the last case of measles and they should consider staying away for this period.

If many cases are occurring in infants under 12 months, measles vaccination of infants as young as 6 months may be undertaken as an outbreak control measure. Children vaccinated before the first birthday should be revaccinated when they are 12-15 months old and again when they are 4-5 years of age.

Control of outbreaks in schools and other institutions

Recent experience in the US has shown that measles outbreaks do not occur in schools with a school requirement for 2 doses of vaccine. A catch up programme for implementation of the recent RCPI guidance of reduction of age of 2nd MMR to 4-5 years should take place as soon as possible with priority given to those schools where a case of measles has occurred. The vaccination status of all children in the affected school or institution should be assessed and all born after 1978 should complete the 2-dose schedule of MMR (the second dose given at least a month after MMR-1). Adults born before 1978 have a high probability of measles immunity due to exposure to wild virus. A study by Johnson et al in Dublin in 1991/1992 demonstrated 95% seroprevalence of measles antibodies in 11-14 year old children (born 1977-1980).[7]

Control of outbreaks in day care centres and other institutions

During an outbreak in a day care centre/crèche, revaccination with MMR is recommended for all those attending and their siblings who have not received 2 doses of measles containing vaccine on or after the first birthday and who do not have other evidence of measles immunity. Staff born after 1978 who cannot provide acceptable evidence of immunity (positive serology or evidence of MMR vaccination with 2 doses measles containing vaccine) also should be vaccinated with MMR. Revaccination should also be considered for unaffected childcare facilities in the community that may be at risk for measles exposure and transmission.

During outbreaks in schools and other educational facilities, revaccination with MMR is recommended in the involved schools. Revaccination of students and staff in

unaffected schools in the same geographic area who may be at risk for measles transmission may also be considered. For persons born after 1978 adequate vaccination consists of 2 doses of measles containing vaccine separated by at least 28 days with the first dose administered no earlier than the first birthday.

Control of outbreaks in health care settings
All health care workers born after 1978 should have proof of immunity or evidence of MMR vaccination with 2 doses of vaccine. If an outbreak occurs in an institution or in an area served by the institution all personnel should receive a dose of MMR if they cannot satisfy the above criteria. Serological testing of staff during an outbreak is not generally recommended because arresting measles transmission cannot await the time to test, wait for results and then contact and vaccinate the susceptible persons. Serological testing of staff may be considered for those staff that are unable to receive the vaccine due to pregnancy or other contraindications. Susceptible staff should be excluded from suspect cases. All elective admissions to an institution associated with an outbreak should be required to be immunised prior to admission – preferably with 2 doses of MMR. Unimmunised children who require urgent admission should be immunised if there are no contra-indications. All long-term patients born after 1978 attending the health care facility associated with an outbreak should have their immunisation status checked and vaccinated if necessary.

Susceptible personnel (i.e. those born after 1978 who do not have evidence of 2 doses of vaccine or who have serological evidence of lack of immunity) who have been exposed to measles should be removed from patient contact and excluded from the 5th to the 21st day after exposure, regardless of whether they received vaccine or immune globulin after the exposure. Personnel who become ill should be removed from all patient contact and excluded from work for 7 days after they develop the rash.

Post-exposure vaccination and use of immunoglobulin to prevent measles in susceptible exposed persons
If given within 72 hours of exposure to measles, measles vaccine may provide some protection. In most settings, post-exposure vaccination is preferable to the use of immunoglobulin (IG). However, immunoglobulin should be given to susceptible pregnant women and immunosuppressed persons within 6 days of exposure to measles. Immunoglobulin may be preferred for infants <1year who are household contacts because it is likely that they will have been exposed more than 72 hours prior to measles diagnosis in the household member, and they are at highest risk of complications from the disease. Infants younger than 5 months of age usually have partial or complete protection as a result of passively acquired measles antibodies. However, infants who are younger than 5 months of age whose mothers develop measles also should receive IG because they are not protected by passive immunity.

Human Normal Immunoglobulin (HNIG) for intramuscular use
HNIG is available in 2, 5 and 10ml. vials. It is given by deep intramuscular injection. It should be stored at 0-4°C and the expiry date on the package observed. Unused portions of an ampoule must be discarded. As recipients of intramuscular immunoglobulin can experience local pain and discomfort at the injection site, it should be administered deep into a large muscle mass, such as the gluteal region. Ordinarily, no more than 5ml should be administered at any one site. Intramuscular HNIG should not be administered to any patient with severe thrombocytopenia or

with a coagulation disorder. Caution should be exercised with any patient who has a history of adverse experience following HNIG administration.

The usual recommended dose of IG is 0.25mL/Kg of body weight (maximum dose = 15mls). However the recommended dose of IG for immunocompromised persons is 0.5mL/kg of body weight (maximum dose=15mls).

Any person exposed to measles who lacks evidence of measles immunity and to whom IG is administered should subsequently receive MMR vaccine, which should be administered no earlier than 5-6 months after IG administration, provided the person is then aged greater than or equal to 12 months and the vaccine is not otherwise contraindicated.

Maintaining a high vaccine uptake

For successful measles control, immunisation of at least 95% of susceptible targets is required with a 2-dose MMR schedule. Vaccine records should be accessible and allow timely identification and follow-up of non-immune children. Children who have successfully attained age appropriate vaccines by 2 years of age should be provided with a vaccine certificate/parent held child health record. All children in day care centres, nurseries and schools should have age appropriate proof of immunisation monitored annually. Health boards should give high priority to the development of electronic records in order to achieve this goal. Health boards should move towards a health board wide individual client immunisation record system that includes date of birth and age at receipt of vaccine, lot number and date of administration of all vaccines and all antigen combinations. The long-term goal whereby immunisation records are linked to a unique identifying number should be adopted. This will allow the development of standardised timing and methods for assessment of vaccine coverage and provide comparable national data for analysis. A parent held child health record should be implemented nationwide.

Resources and plan of implementation

Following consultation and agreement on methods of controlling outbreaks the implications for resource provision will need to be discussed at local, regional and national levels. WHO have set a target for measles elimination in Europe by 2007. This document is a preliminary step in that direction and will be followed by a more complete Measles Eradication Plan from the Department of Health and Children. Arrangements for logistical supply of measles testing kits and enhanced surveillance / communication between general practice and public health departments will be required. Resource implications include:

- Provision of salivary testing facilities, kits and assignment of appropriate personnel to undertake this task
- Community Care resources for follow–up
- Enhanced surveillance at regional and national levels
- Special arrangements for mobilising vaccine clinics or remunerating GPs who immunise school age children in an outbreak

Appendix 1: Measles enhanced surveillance form[8]

Reporting GP/Clinic/Laboratory/Hospital _____ Address _____ Phone _____

Patient Name _____ First Name _____

Address (No &Street) _____ Town/Suburb _____ Phone _____

(This section should not be sent to NDSC and is for health board use only)

DED ☐☐☐☐ County _____ Health Board _____ Notification date (DD/MM/YY) ☐☐ ☐☐ ☐☐ Health Board identification No. _____

Date of Birth (DD/MM/YY) ☐☐ ☐☐ ☐☐ Age(Unknown = 99) ☐☐☐ Units: Y=years, M= months(if under 2 years) ☐

☐ Sex M=Male F=Female U=unknown GP: _____

Clinical details

☐ Morbilliform rash? Y=yes N=No U=unknown

☐☐ Rash duration Days

☐☐ ☐☐ ☐☐ Date of rash onset

☐ Cough? ☐ Coryza? ☐ Conjunctivitis? ☐ Koplik Spots?

☐ Fever at time of rash onset? Underlying illness?_____

Hospitalised? ☐ Y = yes N = No U = unknown

If yes specify: _____ Pneumonia? ☐ Other? : ☐ Died? ☐

Date of hospitalisation? ☐☐ ☐☐ ☐☐ ☐ Encephalitis? ☐☐ ☐☐ ☐☐ Date of death?

Days hospitalised ☐☐☐ unknown =99 ☐ Seizures? Cause of death: _____

Was laboratory testing for measles done? ☐ Blood? ☐ Saliva? ☐ Y=yes N=No U=unknown

If laboratory confirmed, date of first positive test? ☐☐ ☐☐ ☐☐ Day Month Year

	Date specimen taken			Result
	Day	Month	Year	
Serum IgM	☐☐	☐☐	☐☐	☐
Serum IgG*	☐☐	☐☐	☐☐	☐
Culture/antigen	☐☐	☐☐	☐☐	☐

Note: positive diagnosis by IgG requires seroconversion or diagnostic rise in paired sera.
* For IgG specimen date, only provide the date the second serum was taken.

Date investigation started ☐☐ ☐☐ ☐☐ Day Month Year

☐ Epi-linked?

☐ If epi-linked, was this linked to an imported case?

☐ Outbreak related?

_____ Outbreak name/number

☐☐ Where did this case most likely acquire measles? (1-10)

If case originated from No. 7-8, indicate Patient's role (No. 11-15) ☐☐

Did case arrive from overseas <21 days before rash onset? ☐ Y = yes, N = no, U = unknown

If yes, country arriving from _____

1 = home
2 = day care/preschool
3 = primary school
4 = secondary school
5 = university/college
6 = workplace
7 = hospital
8 = other health-care facilities
9 = overseas
10 = other
11= health-care worker
12= patient
13 = visitor to hospital or health facility
14= other role case
99 = unknown

Vaccination

☐ Ever had measles-containing vaccine?

☐ Number of doses of measles-containing vaccine prior to illness onset?

Date given? Day Month Year	Manufacturer	Batch number
1st		
2nd		
3rd		

Information Source

☐ 1 = Parent recall/self report
☐ 2 = Parent record
☐ 3 = Provider record
☐ 4 = health board/authority register
☐ 5 = Other
☐ 6 = Unknown

Final Case Classification ☐

P = Possible C= lab confirmed or epi- linked to lab confirmed case
R =rejected X=lost to follow up

Indigenous? Y=Yes N=No ☐

Preventable? Y=Yes N=no ☐

Appendix 2

Example of line listing for recording data in a measles outbreak investigation										
Case ID	**Name (Last First)**	**Age**	**Date of Birth**	**Rash Onset date**	**Source of Exposure**	**Specimen taken date**	**IgM Result**	**MMR-1 Date**	**MMR-2 Date**	**Case status**

Appendix 3[9]

Contraindications to MMR vaccine

1. Untreated malignant disease and immunodeficiency states other than HIV infection.

2. Immunosuppressive therapy, high-dose x-ray therapy and current high-dose systemic corticosteroids.

3. A history of anaphylaxis to a previous dose of MMR or one of its constituents (e.g. Neomycin, Gelatin).

4. Pregnancy. Furthermore, pregnancy should be avoided for two months after MMR immunisation.

There is no evidence to recommend or support the use of single vaccines against measles, mumps and rubella in the place of the combination MMR vaccine.

Allergy to egg, even anaphylaxis, is NOT a contradiction to MMR vaccine**.** If there is a genuine concern regarding serious allergy, a paediatrician may be consulted and the vaccine given in hospital. Currently used measles and mumps vaccines do not contain significant amounts of egg cross-reacting proteins. Most immediate hypersensitivity reactions to MMR appear to be reactions to other vaccine components (Gelatin or Neomycin).

Precautions

1. Moderate/serious illness. Immunisation should be carried out as soon as possible after recovery.

2. Injection with another live vaccine within the previous three weeks.

3. Injection of immunoglobulin, whole blood or any antibody-containing blood product within the previous three months. If high doses of immunoglobulin have been administered, vaccine efficacy may be impaired for considerably longer.

4. Patients who developed thrombocytopenia within 6 weeks of their first dose of MMR should undergo serological testing to decide whether a second dose is necessary. The second dose is recommended where the patient is not fully immune.

Acknowledgements
Dr Jeff Connell National Virus Reference Laboratory UCD: section on laboratory diagnosis

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