Guideline for the Control of Measles Incidents and Outbreaks in Scotland

Health Protection Network
Scottish Guidance

January 2014
The Health Protection Network (HPN) is a network of existing professional organisations and networks in the health protection community across Scotland. It aims to promote, sustain, and coordinate good practice. The HPN supports a systematic approach to development, appraisal and adaptation of guidelines, seeking excellence in health protection practice.

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Professionals involved in the implementation of recommendations proposed in this document are expected to take them fully into account when exercising their professional judgment. The document does not, however, override the individual responsibility of professionals to make decisions appropriate to the circumstances of the individual cases, in consultation with partner agencies and stakeholders. Professionals are also reminded that it is their responsibility to interpret and implement these recommendations in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity. Nothing in this document should be interpreted in a way which would be inconsistent with compliance with those duties.

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<tr>
<td>CD/EH</td>
<td>Communicable Disease/Environmental Health</td>
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<td>ECDC</td>
<td>European Centre for Disease Prevention and Control</td>
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<tr>
<td>GDG</td>
<td>Guidance Development Group</td>
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<td>GRG</td>
<td>Guidance Review Group</td>
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<tr>
<td>HNIG</td>
<td>Human normal immunoglobulin</td>
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<td>HPA</td>
<td>Health Protection Agency</td>
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<td>HPN</td>
<td>Health Protection Network</td>
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<td>HPS</td>
<td>Health Protection Scotland</td>
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<tr>
<td>HPT</td>
<td>Health Protection Team</td>
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<tr>
<td>IgG</td>
<td>Immunoglobulin G</td>
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<tr>
<td>IgM</td>
<td>Immunoglobulin M</td>
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<tr>
<td>IMT</td>
<td>Incident Management Team</td>
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<tr>
<td>MMR</td>
<td>Measles, Mumps and Rubella</td>
</tr>
<tr>
<td>NHS</td>
<td>National Health Service</td>
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<tr>
<td>NICE</td>
<td>National Institute for Health and Clinical Excellence</td>
</tr>
<tr>
<td>OHSAS</td>
<td>Occupational Health &amp; Safety Advisory Services</td>
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<tr>
<td>PCR</td>
<td>Polymerase Chain Reaction</td>
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<tr>
<td>PHE</td>
<td>Public Health England</td>
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<tr>
<td>RCPCH</td>
<td>Royal College of Paediatrics &amp; Child Health</td>
</tr>
<tr>
<td>SICP</td>
<td>Standard Infection Control Precautions</td>
</tr>
<tr>
<td>SIGN</td>
<td>Scottish Intercollegiate Guidelines Network</td>
</tr>
<tr>
<td>SIRS</td>
<td>Scottish Immunisation call - Recall System</td>
</tr>
<tr>
<td>TEG</td>
<td>Technical and Editorial Group</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
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1. About this document and the guidance development process

This guidance is the outcome of the review process undertaken throughout 2012 to update the Health Protection Network (HPN) 2010 Guideline for the control of measles incidents and outbreaks in Scotland. Some recommendations have changed since 2010, in the light of new evidence and expert consensus.

This guidance represents the view of a multidisciplinary group, a Guideline Review Group (GRG) convened by the HPN in Scotland for this purpose in 2012.

Aim and scope of the guidance

This document aims to provide updated evidence-based, user-friendly recommendations that:

- are based on best published evidence and expert consensus;
- offer best practice advice for measles incidents and outbreaks;
- define the major components of care provision for measles cases and contacts in measles incidents/outbreaks and measures for their prevention and control; and
- detail areas of uncertainty that may be important for research purposes.

Who is the guidance intended for?

This guidance is relevant to all healthcare professionals who come into contact with patients with measles or suspected of having measles, as well as with contacts of infected patients. It is also expected that the guidance will be of value to those involved in clinical governance in primary, secondary care and public health to help ensure that arrangements are in place to deliver appropriate care for the population covered by this guidance.

Development Process

The development of this guidance was based upon the method outlined by the HPN\(^1\) - in the light of current reviews of the SIGN 50\(^2\), NICE Guidelines manual\(^3\) and the ECDC methodologies\(^4\). A team of health professionals and technical experts known as the Guidance Review Group (GRG) – membership in Appendix 1 on page 41 – followed the systematic framework referred to above\(^1\).

Recommendations given in this guidance are as a result of careful review and consideration of the evidence available, existing guidance and principles of best practice. The evidence base for this guidance was synthesised from that collated using an explicit search strategy devised by the guidance technical and editorial group (TEG) and members of the GRG. The search covered MEDLINE, EMBASE, CINAHL and various meta-search engines from 2008 to Dec 2011. The scope of the search strategy did not include recommendations covering every detail of the recognition and initial management of measles infections. Instead this review tried to focus on those areas of clinical and public health practice that were identified as relevant.
Professional judgement and compliance to the guidance

Professionals involved in the investigation and management of measles incidents and outbreaks in Scotland are expected to take this guidance fully into account when exercising their professional judgment. The guidance does not, however, override the individual responsibility of professionals to make decisions appropriate to the circumstances of the individual incidents and cases, in consultation with partner agencies and stakeholders. Implementation of this guidance is the responsibility of the health protection community across Scotland. Professionals are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity. Nothing in this guidance should therefore be interpreted in a way which would be inconsistent with compliance with those duties.

Changes in this edition

This guidance, while revised in 2012-13, updates the laboratory testing arrangements for measles and clarifies the use of immunoglobulin in post-exposure prophylaxis.

Comments on the published guidance

Comments on this guidance should be sent to the HPN Steering Group via its national coordinator or administration, submitting the form available at http://www.hps.scot.nhs.uk/about/guidancedevelopment.aspx, to the following email address NSS.HPN@nhs.net. A copy of this form is also available in Appendix 9 on page 54.

Sometimes a comment after publication may highlight a potential error in a clinical guidance. This might be in either the interpretation or the presentation of the evidence considered by the GDG/TEG. In these cases the Chair of the Health Protection Network and the advisors they approach will consider whether the potential error:

- may result in harm to patients / the population;
- undermines the conclusions on which the recommendations were based;
- indicates serious problems with our quality-assurance procedures.

If one of these criteria is met, the comment will be referred to the HPN Guidance Executive, which decides what action to take. If the Guidance Executive does not accept that an error has been made, the individual or organisation that made the comment will be notified. If the Guidance Executive accepts that an error has been made, a note will be put on our website, and the versions of the document on the website will be amended. Depending on the nature and significance of the error and the time since publication, registered stakeholders may also be notified in writing.

Comments or new evidence that are not an error but should be considered at the time when review of the document is due, will be collated and taken into consideration in due course.

Review and update

This guidance should be reviewed in 3 years or sooner if new evidence becomes available. It is envisaged that the HPN will oversee this process.
2. Introduction

Prior to the introduction of measles vaccination in 1968, measles was a common illness in Scotland and most children were exposed to the virus. Since the introduction of measles vaccination into the childhood immunisation programme the number of measles cases seen in the UK has fallen dramatically\(^1\).

There is now a low incidence of measles in Scotland. It is rare for people to catch measles in this country. Cases are seen among people who have travelled here from other countries where measles is endemic or where there are outbreaks.

In 2010 and 2011 a large increase in cases of measles occurred in many European countries including Bulgaria, France, Germany, Italy, Ireland, Romania and Spain\(^2\). There have also been localised outbreaks on parts of England: such as in Merseyside\(^3\) and Sussex in 2012 and the North of England and South of Wales in 2013.

The potential for measles outbreaks in Scotland is therefore real. The 2010 guideline, and now this review, have been produced in response to concerns raised by the public health professionals managing clusters of measles cases. Containing even one or two cases of measles infection can demand considerable efforts from public health professionals\(^4,5\).
3. Background

3.1. Epidemiology in Scotland

Measles is a notifiable disease under the Public Health Scotland (2008) Act\(^1\). Registered medical practitioners should inform their local public Health Protection Team (HPT) of any suspected cases on clinical grounds alone. In addition, clinicians are requested to submit a sample (see section 5 on page 13) from the notified case to establish whether this is a true case of measles.

Figure 1 shows the trend in measles notifications in Scotland between 1976 and 2012, with a marked reduction in the number of measles notifications in Scotland since the late 1980s.

**FIGURE 1:** Notified cases of measles in Scotland, 1976-2012

![Notified cases of measles in Scotland, 1976-2012](image)

Source: Information & Statistics Division (ISD) and Health Protection Scotland. In 2013, to 1st December, there have been 168 notified cases of measles in Scotland.

In recent years, the number of laboratory confirmed measles cases in Scotland has been small (Figure 2). A number of clusters have been identified in at risk populations, but which have not spread into the wider community. The majority of laboratory confirmed cases have been in under-vaccinated individuals (individuals who are unvaccinated or those who have only received one dose of MMR vaccine).
In 2008 there was an extensive outbreak in the Traveller Community which affected the whole of the UK and Ireland. Scotland saw 40 laboratory confirmed cases and an additional 15 probable cases in this outbreak (‘probable cases’ are clinically suspected cases which have an epidemiological link to a laboratory confirmed case, but for which no laboratory testing result is available – see section section 4.3 on page 9). Cases in this outbreak presented across four NHS boards. Cases were aged between less than one year and 32 years (median six years). In addition in 2008, there were small outbreaks in three NHS boards, as well as sporadic cases in six NHS boards.

In 2009 and 2010, fewer cases were seen, with seven NHS boards affected. Cases were linked with overseas travel, were from the Traveller Community or were sporadic with no known exposure in the community. Cases ages ranged between 0-29 years, median age 11 years.

In 2011 there was a change in the age characteristics of cases, with the median age of the 24 confirmed cases seen being 20 years. These cases included small clusters in three NHS boards and sporadic cases in four NHS boards.

In 2012, there were 28 laboratory confirmed cases, with an additional 23 probable cases. Cases’ age ranged between 0-48 years, median age 17 years. These cases were predominantly in the Traveller and Roma Communities but also included travel associated and sporadic cases with no known community exposure. There was a widespread outbreak in the Traveller Community throughout England in 2012 and Traveller cases in Scotland all had epidemiological links to Northern England. Five NHS boards were affected by these cases.
In 2010 and 2011 there was an extensive European outbreak of measles which also affected England (Figure 3). Following risk assessment by HPS in the summer of 2011, the Chief Medical Officer for Scotland recommended that MMR vaccination history should be reviewed for all children at their teenage booster appointment and MMR vaccine offered if a child was not fully vaccinated with two doses of MMR vaccine\(^2\). This was implemented in each NHS board during the 2011-12 school year.

The number of laboratory confirmed measles cases in England and Wales between 2001 and 2012 are shown in Figure 3. In 2007 to 2009, high numbers of confirmed cases were received by the Health Protection Agency in England & Wales. In 2011 and 2012 the number of measles cases reflects a number of localised outbreaks. High numbers of cases have been seen in the first six months of 2013\(^3\). Following large local outbreaks in England and Wales in 2013, the Chief Medical Officer for Scotland recommended a short MMR catch-up campaign for 10-17 year olds (the age group most affected by the outbreaks in England and Wales at this time)\(^4\).

**FIGURE 3:** Laboratory confirmed measles cases in England and Wales, 2001-2012.

![Graph showing laboratory confirmed measles cases in England and Wales, 2001-2012.](image)

Source: Health Protection Agency / Public Health England

### 3.2. The disease

**Measles virus**

Measles virus is a single stranded, enveloped RNA virus of the genus *Morbillivirus*, family *Paramyxoviridae*. Humans are the natural host for this virus, no animal reservoirs are known. There are eight measles virus clades and 23 genotypes currently recognised. Genotypes differ between countries.
Clinical Presentation
The clinical symptoms of measles begin with a prodromal fever that can be accompanied by conjunctivitis, coryza, cough and Koplik spots (which are found in the mouth and have a whitish centre and red coloured base). Typically, the measles rash develops after about three or four days. It is a blotchy red rash that begins on the face, and then spreads downwards over the rest of the body. The rash usually lasts for 4-7 days and may end with the skin peeling, as the rash fades.

Complications
Complications can occur. These include otitis media, pneumonia and encephalitis. In the developing world, where children are more likely to be malnourished, measles is more likely to cause severe complications or even death. Death occurs in one in 5000 cases in the UK. A rare, late complication of measles is subacute sclerosing panencephalitis (SSPE). This occurs in one in every 25,000 cases of measles, with a higher rate of around one case in every 8,000 in children aged less than two years.

Diagnosis and differential diagnosis
As measles has become a rare infection in Scotland, it is important to acknowledge that it can be misdiagnosed. Other rash illnesses mistaken for measles include rubella, erythrovirus B19 (formerly parvovirus), adenovirus, enteroviruses, Kawasaki Disease or drug rashes. An archive of pictures is available on the HPS website to aid diagnosis. Available at: http://www.hps.scot.nhs.uk/immvax/publicationsdetail.aspx?id=46136.

Communicability
Cases are infectious from five days before the onset of rash until four days after the rash develops. However, immunosuppressed patients may have prolonged excretion of the virus in respiratory tract secretions and can be contagious for the duration of the illness. Patients who are immunosuppressed may present with an atypical rash or no rash at all. They may also present directly with pneumonia or encephalitis and this can make diagnosis difficult. After a susceptible person is exposed to the virus the normal incubation period (to onset of fever) is ten days (range 7-18 days). The typical measles rash usually appears 14 days after exposure. However, in some cases it may take as long as 21 days before the rash develops.

Transmission
Measles is one of the most highly communicable viral illnesses. It can be transmitted through airborne spread as well as through direct contact with nasal or throat secretions of those infected. Natural infection results in lifelong immunity. Anyone who has not been fully immunised nor had the illness previously is susceptible. Although infants of naturally immune mothers are likely to have protective levels of antibody until at least six months of age, a proportion of infants born to vaccinated mothers may not have protective titres even from birth (see section 8.1 on page 27).
4. Definitions

4.1. Outbreaks and incidents
In line with the definitions given at the Management of the Public Health Incidents Scottish Guidance (2011)\(^1\), it is accepted that a public health incident may arise in the following situations:

- a single case of a serious illness with major public health implications where action is necessary to investigate and prevent ongoing exposure to the hazardous agent;
- two or more linked cases of unexplained illness that could indicate the possibility that they may both be caused by the same exposure i.e. an outbreak;
- higher than expected number of apparently unlinked cases or geographic clustering of a serious pathogen;
- a high likelihood of a population being exposed to a chemical or infectious agent at levels sufficient to cause illness, even though no cases have yet occurred.

4.2. Notification of measles
Measles is a notifiable disease under the Public Health Scotland (2008) Act\(^2\). All suspected cases of measles should be notified to the local Health Protection Team. Notifications should be made on the basis of clinical suspicion only. All suspected cases should undergo testing to ascertain if they are a true case of measles (see section 5 on page 13).

Suspected measles should be notified by a phone call to the local Health Protection Team on the same working day, with written notification following within three days. Method of written notification varies between NHS boards; this may be done electronically or may involve returning a standard paper form.

4.3. Measles case definitions
Since the introduction of measles vaccination into the childhood immunisation programme, measles has become a rare infection in Scotland. Health Protection Teams are often advised of clinically suspect cases, most of whom will turn out to have illnesses other than measles. **If a patient has already received two doses of MMR vaccine, at least one month apart, it is very unlikely that they have measles even in an outbreak situation.**

The case definitions below are taken from ECDC\(^3\), who provide case definitions for infectious diseases for all countries within Europe to use. The definitions below should be used during investigation of a suspected measles related incident or outbreak in Scotland. These definitions may be adapted for outbreaks, by including time and place descriptions.
In circumstances where no outbreaks are ongoing, measles should be considered if the patient has a fever (temperature 38°C or higher) and a generalised maculopapular rash lasting three days or longer and either cough, coryza or conjunctivitis. Clinically suspected cases should be investigated using either PCR or serology (see section 8 on page 27).

During an outbreak, it is more likely that clinically suspect cases will turn out to be true cases of measles. In this situation, the following case definitions should be used.

**Possible case:** fever and a generalised maculopapular rash and either cough, coryza or conjunctivitis.

**Probable case:** fever and a generalised maculopapular rash and either cough, coryza or conjunctivitis and an epidemiological link to a laboratory confirmed case.

**Confirmed case:** a laboratory confirmed case and fever and a generalised maculopapular rash and either cough, coryza or conjunctivitis, and who has not been recently vaccinated (most commonly rash occurs about a week after immunisation). Care should be taken to investigate a laboratory confirmed case that does not meet the clinical case criteria.

**Discarded case (not measles):** A suspected measles case that has been completely investigated, including negative laboratory testing, can be classified as discarded. A case of vaccine-associated measles is a discarded case.

### 4.4. Sporadic measles

A sporadic case of measles is one for which there is no known exposure and for which no onwards transmission is identified.

### 4.5. Epidemiological linkage

A measles case is epidemiologically linked if:

- there was exposure to a laboratory-confirmed case during their infectious period (five days before to four days after rash onset); and
- this exposure occurred within the expected 7-21 days incubation period of the case under investigation before rash onset.

Epidemiological linkage can provide additional evidence for measles infection in instances where laboratory confirmation is unavailable, or is equivocal (e.g. following vaccination).
4.6. Imported measles
An imported case has its source outside the UK, rash onset within 21 days after entering the UK, and illness not linked to prior local transmission.

4.7. Endemic measles
An endemic case is any case that cannot be proven to be imported.

4.8. Vaccine-associated measles
Vaccine-associated measles is any case of measles that has received vaccine close to onset of illness, typically around one week before illness, and has no known measles exposure. Vaccine-associated illness is more likely to occur after the first dose of MMR vaccine. Measles virus typing should be used to distinguish between vaccine-associated and wild-type measles (see section 5 on page 13). A case of vaccine-associated measles is a discarded case.

4.9. Preventable case of measles
A preventable case of measles is confirmed measles in a person who was eligible for vaccination at the appropriate age. Those who were eligible for vaccination are:

- born during or after 1968 (year in which measles vaccine was introduced into the UK); and
- lacks documented evidence of age-appropriate vaccination against measles; and
- has no medical contraindication to receiving the vaccine; and
- has not had confirmed measles previously.

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

4.10. Contact of measles
A contact of measles is a person who has been exposed to a person with measles, from five days before the onset, until four days after the onset of the rash or has been in contact with an immunosuppressed person with measles at any point during their illness (see section 7.2.2 on page 20 for explanation of significant contact).
4.11. Person susceptible to measles

A person susceptible to measles cannot provide presumptive evidence of immunity to measles. A person can be considered to have presumptive evidence of immunity if any of the following criteria are met.

- Infants under 3 months if the mother was born before 1970 (high incidence of measles in childhood before 1970, so assume mother had natural infection as a child) or mother was born after 1970 and has had natural measles infection (see section 8.1 on page 27).

- People aged over three years and four months who have documented evidence of receiving two doses of measles-containing vaccine at least one month apart (for children under ten, particularly those under the age of 18 months, a gap of three months between first and second doses of MMR are recommended).

- Persons with documented evidence of laboratory confirmed measles in the past.
5. Laboratory diagnosis and confirmation of measles (see Appendices 2 and 3)

5.1. Background

Laboratory confirmation of suspected measles cases is essential because measles is a rare disease in Scotland and clinical diagnosis can be unreliable. Most sporadic or index cases are identified after the appearance of the rash, but during an outbreak, cases may be diagnosed during the prodromal phase. The timing of sampling must be taken into account when making a diagnosis. Where suspected cases occur in small children and there is understandable reluctance to obtain a blood sample, particularly at the beginning of an outbreak, diagnosis using non-invasive samples is advisable.

There are two basic laboratory techniques for measles diagnosis in general use in Scotland:

- polymerase chain reaction (PCR); and
- serology.

Other methods such as virus isolation and immunofluorescence are rarely performed. Although PCR and serology can both be performed on a variety of specimens, the timing of sampling with respect to the appearance of the rash affects their predictive values (see Appendix 2 on page 42), as does the prevalence of the infection (i.e. within or out with an outbreak).

5.1.1. Detection of virus by PCR

Direct detection of the virus using PCR on throat swabs is the preferred method of confirming measles by virologists in Scotland. It offers the advantage of confirming the infection earlier on in the illness and the sample is relatively non-invasive making it a suitable choice for children. PCR tests used within Scottish virology laboratories are the same as those developed and used at PHE Colindale. Quoted sensitivity and specificity for this test are both greater than 95%. Alternative specimen types include blood, oral fluid and urine, however measles PCR on urine has been shown to be less sensitive than on throat swabs.

All PCR positive samples should be referred to PHE Colindale for genotyping to provide additional information about the source of the virus.

5.1.2. Detection of IgM in blood or oral fluid

The presence of measles specific IgM indicates acute infection, but its reliability only approaches 100% three days after appearance of rash and levels may decline as early as day fifteen after onset of rash. False positives with other infections such as erythrovirus B19 and rubella may also occur.
Oral fluid is a non-invasive alternative to blood, with a quoted sensitivity and specificity approaching that of serum (100% and 96% respectively). The optimum time for collection is between three days and eight weeks after onset of rash. In the UK this test has been used for surveillance for many years at the PHE Colindale, Centre for Infections, Virus Reference Department. This laboratory is the reference laboratory for measles for the whole of the UK and is recognised by WHO as the European Reference Centre. Samples should be taken using a specific kit which is held by each NHS board Health Protection Team and returned by post to Colindale. Results are usually available within three weeks.

IgM testing can also be performed on blood and has similar sensitivity to oral fluid. However, when compared with oral fluid, IgM test on blood are less dependant on the quality of the sample.

Serology testing is the WHO approved criteria for diagnoses of measles infection, not PCR. This is why it is recommended that all notified cases also undergo serological testing – usually testing on an oral fluid sample.

5.1.3. Detection of IgG in oral fluid or blood

IgG seroconversion may also be used to make a retrospective diagnosis. Oral fluid and blood are suitable samples for detection of IgG. For oral fluid quoted sensitivity and specificity are 93% and 98% respectively.

IgG detection or immunity testing, is also used for susceptible contacts of a suspected or confirmed case of measles, when determining if immunoglobulin should be administered (see section 8.2 on page 29 and section 8.3 on page 29).

5.1.4. Genotyping

It is important for public health to identify the dynamics of any outbreak. In order to fully investigate the epidemiology of an outbreak, genotyping of measles virus is required from epidemiologically linked cases. This test is only carried out in PHE Colindale. The laboratory can use any PCR positive samples to carry out genotyping, a further sample may be requested by PHE Colindale if there is insufficient material. It is the responsibility of the laboratory performing the initial tests to store the samples appropriately and refer them onto PHE Colindale.

5.2. Laboratory testing

The availability of measles testing in Scottish virology laboratories is shown in Table 1. Those microbiology laboratories without access to measles testing should be able to refer samples onto their local virology service as soon as possible. With prior warning, test results should be available within one working day of receipt of sample. If samples are urgent, clinicians should telephone their local virology laboratory to advise of the sample.
TABLE 1: Availability of measles testing in Scottish virology laboratories (as at June 2013)

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Molecular detection (PCR)</th>
<th>Serology (IgM and IgG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aberdeen</td>
<td>available</td>
<td>IgM and IgG available</td>
</tr>
<tr>
<td>Dundee</td>
<td>available</td>
<td>IgM and IgG available</td>
</tr>
<tr>
<td>Edinburgh</td>
<td>available</td>
<td>IgG only</td>
</tr>
<tr>
<td>Glasgow</td>
<td>available</td>
<td>IgG only</td>
</tr>
<tr>
<td>Inverness</td>
<td>Not available (samples sent to Glasgow)</td>
<td>IgM and IgG available</td>
</tr>
</tbody>
</table>

During an outbreak, local laboratories should be the first point of contact when arranging to have samples analysed. A standard throat swab in either viral transport medium or lysis buffer should be sufficient. For further advice please contact your local laboratory.

Oral fluid kits are available from your local Health Protection Team. It is recommended that all notified cases of measles are tested in this way. Oral fluid samples are returned directly to PHE Colindale for testing, using the packaging supplied with the kit.

5.3. Recommended tests and interpretation of tests results

A throat swab for PCR testing is the preferred sample for diagnosis of all suspected measles cases (both sporadic and in an outbreak situation), as this offers the greatest sensitivity overall. Other samples can be used depending on the stage of the infection. A diagram summarising which measles tests are most suitable during different stages of the illness is available in Appendix 2 on page 42.

- From prodromal phase to around seven days after appearance of rash – send a throat swab to the local virology laboratory for PCR testing.
- From four days after onset of rash – send oral fluid or blood sample for IgM and IgG testing (samples taken within 3-4 days after onset or rash may be negative and a repeat sample may be required after 10-14 days).
- Contact local Health Protection Team for an oral fluid kit (for IgM and IgG testing) for all notified cases.
- Always discuss the interpretation of results with laboratory staff if the patient has received MMR vaccination within the last three months.

Repeat samples should be taken if the clinical suspicion of measles remains high and previous results have been negative. Oral fluid testing is recommended for all suspected measles cases that are PCR negative (and where no serum sample is taken).
An algorithm summarising measles tests, test results and interpretation for suspected cases is given in Appendix 3 on page 43.

In the presence of clinical symptoms and the absence of recent vaccination (usually within two weeks, but may be up to three months), any of the following laboratory test results provide confirmation of measles infection:

- Detection of measles virus nucleic acid in a clinical specimen;
- Measles virus specific antibody response in serum or saliva.
6. Roles and responsibilities

Guidance on the statutory responsibilities of health boards and their relationship with the Scottish Government can be found in the document ‘Management of Public Health Incidents – Guidance on the Roles and Responsibilities of NHS Led Incident Management Teams’.

Measles outbreaks and incidents are likely to impact on occupational health and infection control as well as the wider public health workforce. Each of these groups should communicate clearly with each other at an early stage to instigate control measures.

Diagnosing clinicians (primary and secondary care)
- Clinical management of suspected case
- Risk reduction for staff and other patients
- Notification to local Health Protection Team
- Taking suitable samples for virological testing

Health Protection Teams
- Assessment of exposure history of case
- Contacts risk assessment (including liaison with occupational health colleagues)
- Assess the need for a PAG / IMT
- Advising on control measures
- Liaison with laboratory staff
- Liaison with immunisers (primary care or occupational health) for follow up doses of vaccine
- Communications to healthcare staff, affected communities, Health Protection Scotland, Scottish Government and media

Role of Occupational Health
- Ensure up to date immunisation of healthcare workers, especially those in high risk settings (including paediatrics, maternity, neonatal, oncology wards and accident & emergency)
- Review evidence of immunity for healthcare workers
- Follow up of healthcare workers exposed to measles including vaccination and exclusion
- Provide regular reports and updates to the IMT on above
Health Protection Scotland
• Expert advice on risk assessment
• Expert advice on control measures
• Scotland-wide, national and international communications
• Scottish guidance (together with the Health Protection Network)
7. Case investigation and control measures (see Appendices 4, 5 and 6)

7.1. Actions in the event of notification of suspected measles

Due to the highly contagious nature of measles and the potential poor outcomes associated with disease, especially in those who are vulnerable, every notified case of suspected measles requires assessment. The algorithm below (Figure 4) highlights initial actions in response to notification of suspected measles. Further details are found throughout this chapter.

FIGURE 4: Algorithm describing initial actions for health protection teams in response to notification of suspected measles

- Receive report of suspected measles:
  - Notification from primary or secondary care (Erythematous Rash ≥ 3 days; temperature ≥ 38°C, cough, conjunctivitis or coryza), or
  - Local diagnostic laboratory result

- Obtain history from the case including:
  - Contact with a case of measles?
  - Travel to endemic areas or areas with ongoing outbreaks?
  - Living in close community?
  - Part of Travelling Community?
  - Date of onset and clinical condition of case / hospitalised
  - Significant contacts

- Risk assessment
  - Check linked cases in past 4 weeks
  - Check SIRS for immunisation status
  - Vulnerable contacts? (eg HCW, high risk groups) – check immunisation status or previous clinical history
  - Is prophylaxis indicated? – organise vaccination or HNIG
  - Advise on exclusion (inform school/nursery/work)

- Is this case part of a cluster or outbreak?
  Call a PAG / IMT

- Complete measles surveillance form (standard or enhanced) and send to HPS

See Appendices 2 and 3 for advice on testing

See Appendix 4 for enhanced surveillance form

See Appendices 6-9 for advice on management of high risk / vulnerable groups

See Appendix 5 outbreak line listing
7.2. Case investigation

7.2.1. Data collection (see Appendices 4 and 5)

It is important to collect information about the case and those who may have been exposed in order to determine the period of infectivity, as well as offer appropriate post exposure prophylaxis to contacts. Most existing measles guidelines include information recording forms developed from expert opinion. The following information should be collected for suspected cases during a measles incident or outbreak:

- demographic details of case, including GP and workplace/school/childcare of case;
- type of laboratory testing;
- clinical details, including rash onset and any complications or hospitalisation;
- vaccination history;
- contact with known measles case(s);
- travel history;
- details of household and other contacts.

The enhanced measles surveillance form in Appendix 4 on page 44 should be used to collect this information.

The measles summary outbreak form in Appendix 5 on page 49 should be used during outbreaks.

Epidemiological information should be collected in order to allow descriptive and analytical epidemiology of measles outbreaks to be carried out. Public health professionals are encouraged to complete outbreak reports for all measles outbreaks (see section 10 on page 34).

7.2.2. Risk assessment

All individuals who have had significant contact with a confirmed or probable case of measles should undergo risk assessment. They should be asked to provide presumptive evidence of immunity. For example, either a history of receiving two doses of measles-containing vaccine, a history of laboratory confirmed measles or probable measles with epidemiological link to a confirmed case (see section 4.3).

It is not possible to definitively describe what constitutes ‘significant contact’ with a measles case, as there is currently insufficient evidence to answer this question. The guidance development group agreed, however, that any contact lasting less than 15 minutes is unlikely to pose a risk to an individual, unless the contact was particularly close (e.g. face to face contact) or the contact is immunosuppressed. If it is difficult to establish whether a significant contact has occurred or if the person exposed is thought to be at particularly high risk (e.g. immunosuppressed) the case should be discussed with the local Health Protection Team (see section 8.3 on page 29).
In the situation where a case of measles has travelled on an aircraft whilst infectious, please contact HPS with details of the flight. HPS will undertake risk assessment and will contact carriers as required.

### 7.3. Control measures

#### 7.3.1. Standard infection control precautions and respiratory protection

Standard Infection Control Precautions (SICP) must be used by all healthcare workers at all times and in all care settings.

When caring for cases of laboratory confirmed or suspected cases of measles, respiratory protective equipment (RPE) should be worn. This should be a filtering face piece level 3 respirator (FFP3 respirator). RPE is essential for those healthcare workers who have no documented evidence of immunity to measles (see 7.4.1. Prevention on page 26).

The HAI National Advisory Group has requested that HPS Infection Control Team convene a short life working group in early 2014, to develop a risk assessment for RPE use by front line staff. This group will consider issues including HSE advise that all healthcare workers should wear RPE irrespective of immunological status. This group is expected to finalise a risk assessment by mid-2014.

#### 7.3.2. Vaccination

Vaccination against measles is part of the routine childhood schedule against infectious diseases in the UK. Measles vaccination was introduced to the country in 1968 and in 1988 the single vaccine was replaced with the combined MMR vaccine. Since 1996, it has been recommended that all children should routinely receive two doses of MMR, the first dose at around 12 months of age and a second dose is recommended from three years four months of age. Further details about the administration of MMR vaccine, its contraindications and the routine immunisation schedule in the UK can be obtained from the Department of Health’s Immunisation against Infectious Disease - The Green Book.

**Vaccination of contacts following exposure to measles**

As vaccine-induced measles antibody develops more rapidly than antibody following natural infection, MMR should be given to eligible susceptible contacts as soon as possible after exposure, ideally within three days. This is post-exposure prophylaxis. Even where it is too late to provide effective post-exposure prophylaxis, the vaccine can provide protection against future exposure to all three infections. If an individual is already incubating measles, MMR will not exacerbate the symptoms. People who are immunised following exposure to a probable case of measles should be told that any symptoms they develop are likely to be due to natural infection. If there is doubt about an individual’s vaccination status, MMR should still be given as there are no ill effects from vaccinating those who are already immune.
Clear guidance about the use of vaccination to protect contacts following exposure is available in the Department of Health’s Green Book\(^1\). This is summarised in Table 2.

**TABLE 2: Recommendations for use of MMR for post-exposure prophylaxis for eligible susceptible contacts**

<table>
<thead>
<tr>
<th>Age of proposed recipient</th>
<th>Unvaccinated (or unknown vaccination status)</th>
<th>Having already received one documented dose of MMR</th>
<th>Having already received two documented doses of MMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 6 months</td>
<td>Do not offer MMR</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>See also section 8.1 on page 27.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 – 11 months</td>
<td>Offer MMR* ; two further doses required; offer at scheduled appointments * HNIG may be indicated in some cases, section 8.1 on page 27.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1 year to 18 months</td>
<td>Offer MMR1. Receive MMR2 as per routine schedule. No need for third dose.</td>
<td>Offer MMR2. If offer is less than three months after MMR1 received, offer a third dose of MMR at the scheduled MMR2 appointment.</td>
<td>-</td>
</tr>
<tr>
<td>18 months to 3 years 4 months</td>
<td>Offer MMR1. Offer MMR2 as scheduled or if within one month of scheduled MMR1, delay until one month gap between doses. No need for third dose.</td>
<td>Offer MMR2, ensuring at least 1 month interval between MMR1 and MMR2. No need for third dose.</td>
<td>No action</td>
</tr>
<tr>
<td>3 years 4 months to adults</td>
<td>Offer MMR1 and MMR2, ensure one month gap between doses. No need for third dose.</td>
<td>Offer MMR2, ensuring at least 1 month interval between MMR1 and MMR2. No need for third dose.</td>
<td>No action</td>
</tr>
<tr>
<td>Adults over 45 years</td>
<td>Adults of this age are highly likely to have been exposed to measles as children and be naturally immune. MMR can still be offered based on risk assessment.</td>
<td>Adults of this age are highly likely to have been exposed to measles as children and be naturally immune. MMR can still be offered based on risk assessment.</td>
<td>Adults of this age are highly likely to have been exposed to measles as children and be naturally immune. MMR can still be offered based on risk assessment.</td>
</tr>
</tbody>
</table>
**Contraindications to vaccination**

Most people can receive MMR vaccination without any difficulties. However, the vaccine should not be given to some groups of patients.

The Green Book\(^1\) states that the following groups should not receive MMR vaccination:

- those who are immunosuppressed (see section 8.3 on page 29);
- those who have had a confirmed anaphylactic reaction to a previous dose of a measles, mumps or rubella containing vaccine;
- those who have had a confirmed anaphylactic reaction to neomycin or gelatin;
- pregnant women.

The Green Book\(^1\) advises that all children with egg allergy should receive MMR vaccine. Further written information about contraindications to MMR vaccination is available in the Green Book\(^1\) and from the best practice statement Immunisation of the Immunocompromised Child\(^10\). If there is any doubt about whether a contact can safely receive MMR, further advice should be sought from either a consultant paediatrician or immunisation co-ordinator.

Contacts of measles cases who are unable to receive MMR can be given human normal immunoglobulin (HNIG) as post-exposure prophylaxis (see section 7.3.4 on page 23).

### 7.3.3. Vaccination campaigns

International guidelines differ in their advice about whether to carry out additional vaccination campaigns in an attempt to attenuate an outbreak\(^3,4,8,11,12\). Researchers suggest that more evidence should be collected following immunisation campaigns to assess their effectiveness.

**Routine MMR vaccination should continue during an outbreak. Outbreaks provide an opportunity to encourage vaccine uptake. Efforts should be focussed on the most vulnerable, including children, healthcare workers and young adults.**

Outbreaks in closed communities such as prisons may require targeted vaccination campaigns within the facility\(^4\).

### 7.3.4. Immunoglobulin

Immunoglobulin provides passive protection against measles infection\(^13\) for those who cannot receive MMR. Human normal immunoglobulin (HNIG) is a preparation of human plasma proteins, derived from blood donations. It contains antibodies to measles virus and by administering it to individuals who have been exposed to measles the disease can be prevented or modified. All HNIG used in the UK is now prepared from plasma acquired outside of the country\(^1\). This is because of a theoretical risk of transmitting vCJD from plasma products.
There is some uncertainty about the minimum required level of measles antibody required in immunoglobulin to provide effective prophylaxis\(^1\). As fewer people are now infected with measles virus the antibody content in existing pooled serum may be lower than in previous years. One small study from Japan demonstrated that children who were given immunoglobulin with lower measles antibody titres were more likely to develop clinical measles\(^1\). Unfortunately, it is not clear how much measles antibody is required in immunoglobulin to prevent infection.

**Indications for use of HNIG**

In Scotland, the following three documents provide guidance about when to use HNIG as post-exposure prophylaxis:

- the Green Book\(^1\);
- the Immunoglobulin Handbook\(^15\); and
- the best practice statement Immunisation of the Immunocompromised Child\(^10\).

HNIG should be offered to susceptible contacts who have been exposed to a confirmed case of measles and who fall into one of the groups listed below:

- anyone with a contraindication to MMR vaccine\(^1\);
- immunosuppressed adults or children\(^1,10\) (see section 8.3 on page 29);
- children less than 6 months of age (see section 8.1 on page 27);
- some children aged 6-8 months (see section 8.1 on page 27); and
- some Pregnant women\(^16\) (see section 8.2 on page 29).

People who are exposed to measles and who fall into one of the groups listed above should receive HNIG as soon as possible after exposure. **HNIG is most effective if given within 72 hours** but can be effective if given within 6 days of exposure.

HNIG can be administered in the upper outer quadrant of the buttock or the anterolateral thigh. If the volume of immunoglobulin to be given is large (>3ml in a young child, >5ml in an adult), then the dose should be divided into smaller amounts and given in different sites\(^15\).

Children aged 9 months or younger, who have been risk assessed and found to have a particular reason to avoid measles infection, can also be given HNIG (see section 8.1 on page 27). Following HNIG, MMR vaccination should be delayed until 3 months after administration\(^1\). When MMR is given within three months of receiving blood products such as HNIG, the response to the measles component may be reduced. This is because such blood products may contain significant levels of measles specific antibody, which could then prevent vaccine virus replication\(^1\).

To access HNIG, contact your local hospital pharmacy department.
7.3.5. Exclusion (see Appendix 6)

Confined Measles
People with confirmed measles should be excluded from their usual place of work or study or from shared childcare facilities until at least four days after the rash has developed.

Exposure to Measles
In some settings it may be best to exclude non-immune individuals exposed to measles or those with possible/probable measles before laboratory confirmation from their usual occupation or place of study. This is particularly important not only in healthcare settings, where patients are particularly vulnerable to infection, but also in other places such as prisons or schools where large numbers of people are resident together. The rationale behind exclusion is to prevent further spread of infection from exposed individuals who may be incubating measles. People who work in one of these settings and who have had significant contact with a confirmed measles case should be risk assessed (see section 7.2.2 on page 20). Those who have received two doses of a measles-containing vaccine or who have a laboratory confirmed history of measles infection, should be reassured and continue to work as normal.

When healthcare workers are exposed to suspected measles, they should be risk assessed using the algorithm in Appendix 6 on page 50.

Currently there is no standard available to indicate the level of IgG conferring immunity. If IgG is detected, this is likely to indicate a degree of immunity. Members of the Guidance Review Group leading the review of this document and accountable to the Health Protection Network, will continue to monitor and review the scientific evidence in order to understand the levels of IgG detectable in serum that confer immunity. This guidance will be updated with the results of this review if evidence becomes available.

For exposed non-immune healthcare workers, MMR should be given if there is no contraindication. They should be excluded from the fifth day following first measles exposure until day 21 after last exposure.

Exclusion may also be recommended in a school setting but this will depend on local risk assessment.

In a school setting, MMR should be recommended to all exposed children who have not received two doses of MMR if there is no contraindication. Non-immune contacts should be excluded until 21 days after the appearance of rash in the last case at the school. Local risk assessment will indicate whether exclusion is recommended.

In some instances restriction of duties or activities may be a suitable alternative for some staff and/or pupils. Public Health Teams (working with Occupational Health Services in healthcare settings) will advise on this.
7.4. Control measures in special settings

In settings where large numbers of people live and work together additional control measures should be considered. These settings include hospitals, prisons and schools.

Key infection control issues are identified in the National Infection Control and Prevention Manual, available on the HPS website.

7.4.1. Prevention

Healthcare workers have an increased risk of developing measles compared to the general population. One American study of an outbreak found that healthcare workers were up to 19 times more likely to catch measles than the wider population.

Healthcare workers should be asked to provide written evidence that they have received two doses of a measles-containing vaccine or written evidence of laboratory confirmed measles at pre-placement health screening (i.e. before they begin work). Those not meeting these criteria should receive two doses of MMR at least one month apart if there is no contraindication, prior to starting work. It is likely that those born before 1970 were exposed to the measles during childhood.

7.4.2. Risk assessment and exclusion

All individuals who are exposed to measles should be risk assessed, as described in section 7.2.2 on page 20. Any non-immune individuals should be excluded as outlined in section 7.3.5 on page 25 and offered appropriate post exposure prophylaxis. Management of hospitalised patients with measles should follow the local infection control policy. Normally, patients are considered infectious from five days before, until four days after the onset of rash. However, immunosuppressed individuals may remain infectious for longer periods. It is important to note that measles may have an atypical presentation when immunosuppressed individuals are infected. They may not have a rash and may present with pneumonia or encephalitis.
8. Management of high risk groups (see Appendices 7 and 8)

8.1. Protecting infants under 12 months of age

Infants under 12 months of age are too young to have routinely been offered MMR and are therefore at high risk of developing measles if they are exposed. The case-fatality ratio for measles is age-related and is high in children under one year of age.

A number of studies\(^1,2\) have shown that maternally derived antibody decays more rapidly in infants of vaccinated mothers than in infants of naturally immune mothers. The evidence indicates whilst infants of naturally immune mothers are likely to have protective antibody levels until 6 months of age, a significant proportion of those born to vaccinated mothers may not have protective titres from birth\(^3\). This suggests that infants of vaccinated mothers should be offered HNIG at an earlier age than in the previous version of this guidance.

If there is a particular concern with the level of protection, advice should be sought from the local CPHM. Additional information is also available from the HPA Post Exposure Prophylaxis for Measles: Revised Guidance\(^4\).

Contact with measles

Contact requires action regardless of antibody status. Children who have significant contact (see section 7.2.2 on page 20) with an individual with confirmed measles during the infectious period from up to five days prior to, to four days after the onset of the rash should be assessed using the table below, and offered passive immunisation (see section 7.3.4 on page 23)\(^5\) or MMR. Every effort should be made to confirm the diagnosis of measles in the index case, but this may not always be possible. Local availability will determine which investigations are used to confirm the diagnosis. In the event of contact with clinically diagnosed but virologically unproven measles, further action may be warranted if the clinical diagnosis seems plausible (see section 4.3 on page 9).

The use of post-exposure prophylaxis in infancy should now depend on a range of maternal factors (see Table 3). The vast majority of expectant UK mothers have now been eligible for measles-containing vaccine (introduced in 1968); vaccine coverage has exceeded 75% in all cohorts born after 1985. Measles control has also improved since the late 1980s\(^6,7\), meaning that the opportunity for natural boosting of antibody levels\(^8\) is not present amongst younger UK born women.

Older women and those likely to have natural immunity may have higher levels of antibody. Their infants become susceptible to infection later (between three and six months), but the level of antibody may still be sufficient to interfere with response to vaccination until 9 months of age\(^9\). For infants in this category, a clinical decision to use either HNIG or MMR is required (see Table 3). HNIG is preferred where there may be particular reasons to avoid measles (such as underlying lung disease or recent severe illness) or those who are exposed in the household setting when disease may be more severe\(^10\). Outside of the household,
when ongoing exposure from further waves of infection are likely, MMR may be preferred as it should also provide longer lasting protection against subsequent exposures. This latter benefit is suggested by a study that investigated the effectiveness of a measles-containing vaccine during an outbreak, where the estimated vaccine effectiveness for infants aged 6-11 months was 73%.\textsuperscript{11}

**TABLE 3:** Post exposure prophylaxis in infants of UK born mothers, age of exposed infant (in completed months)

<table>
<thead>
<tr>
<th>Relevant infant history</th>
<th>0-2 months</th>
<th>3-5 months</th>
<th>6-8 months</th>
<th>9+ months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother is index case</td>
<td>HNIG</td>
<td>HNIG</td>
<td>MMR vaccine</td>
<td>MMR vaccine</td>
</tr>
<tr>
<td>Mother is known IgG negative or equivocal</td>
<td>HNIG</td>
<td>HNIG</td>
<td>MMR vaccine</td>
<td>MMR vaccine</td>
</tr>
<tr>
<td>Mother has had natural measles or born before 1970</td>
<td>nothing</td>
<td>HNIG</td>
<td>HNIG or MMR vaccine*</td>
<td>MMR vaccine</td>
</tr>
<tr>
<td>Mother has had measles-containing vaccine or born after 1984</td>
<td>HNIG</td>
<td>HNIG</td>
<td>MMR vaccine</td>
<td>MMR vaccine</td>
</tr>
<tr>
<td>Mother unsure of status and born 1970-1984</td>
<td>HNIG</td>
<td>HNIG</td>
<td>HNIG or MMR vaccine*</td>
<td>MMR vaccine</td>
</tr>
<tr>
<td>Infants born before 32 weeks gestation</td>
<td>HNIG</td>
<td>HNIG</td>
<td>MMR vaccine</td>
<td>MMR vaccine</td>
</tr>
</tbody>
</table>

* For those with less definite exposure, for example outside of the household setting, but likely to be at on-going risk, MMR is preferred to HNIG (see above). For infants exposed in the household or those where there may be particular reasons to avoid measles (such as underlying lung disease or recent severe illness) then HNIG is preferred.

Following HNIG, MMR vaccination should be delayed until 3 months after administration.\textsuperscript{15} When MMR is given within three months of receiving blood products such as HNIG, the response to the measles component may be reduced. This is because such blood products may contain significant levels of measles specific antibody, which could then prevent vaccine virus replication.\textsuperscript{15}

As the pattern of maternal antibody decay in infants shows significant geographical variation and as vaccination programmes were introduced at different times, this advice may not be applicable to infants of non-UK born mothers. In such cases an individual risk assessment is required. Information about disease incidence and immunisation rates from country of origin is available from WHO.\textsuperscript{16}

Please refer to the British National Formulary for up to date guidance on the necessary dose of HNIG for children. Additional information is also available from PHE.\textsuperscript{4,13}
8.2. Protecting pregnant women (see Appendix 7)

Measles illness during pregnancy results in a higher risk of premature labour, spontaneous abortion, and low-birth weight infants. It is not associated with congenital infection or damage\(^1\). HNIG may attenuate the infection in the mother, but there is no evidence that it prevents foetal loss\(^2\).

It is recommended that all pregnant women who are in contact with a non-vesicular rash illness should be investigated for asymptomatic erythrovirus B19 (previously parvovirus) and for asymptomatic rubella infection (unless there is satisfactory evidence of past rubella immunity due to vaccine or natural infection). Significant contact with a rash illness is defined as being in the same room (e.g. house, classroom or 2-4 bed hospital bay) for 15 minutes or more or face to face contact\(^3\).

A very high proportion of pregnant women will be immune and therefore HNIG is only offered to women who are likely to be susceptible based upon a combination of age, history and/or measles IgG antibody screening\(^4\). An algorithm detailing how to manage non-immunosuppressed pregnant women exposed to measles is detailed in Appendix 7 on page 51.

Further information about the investigation and management of rash in pregnancy is available from Guidance on the management of, and exposure to, rash illness in pregnancy\(^5\).

MMR vaccine is contraindicated in pregnancy.

8.3. Protecting the immunosuppressed (see Appendix 8)

Both children and adults who are immunosuppressed require a detailed epidemiological and clinical risk assessment to establish how likely it is they have been in contact with a case of measles\(^6\). In a non-outbreak situation the index case should be tested for measles infection, see section 5 on page 13. This may aid management of those who have been in contact with that individual\(^7\).

If any immunosuppressed person is exposed (e.g. patients with leukaemia or on high dose immunosuppressants) there is a very low threshold for follow-up: even a very short exposure (minutes) should trigger investigation. In a highly immunosuppressed child who is unlikely to be immune, it may be worth considering prophylaxis where the possibility of exposure has occurred by entering a room within a short period after a case has been present\(^8\).

An algorithm detailing management of immunosuppressed contacts of probable or laboratory confirmed cases of measles is detailed in Appendix 8 on page 52.

All immunosuppressed individuals should be considered for treatment with HNIG as soon as possible after the exposure occurred (preferably within 3 days, but treatment may be effective within 6 days)\(^9\). However, many adults and older children with immunosuppression will have immunity due to past infection or vaccination. A prophylactic dose of immunoglobulin is likely to offer little additional benefit to those who are positive for measles antibody using a commercial assay, as the latter group are likely to have antibody levels higher than those achievable with a prophylactic dose of immunoglobulin. For people with severe defects of
cell mediated immunity, however, passive immunoglobulin may be indicated even in the presence of measurable antibody. Such individuals should be under the management of specialists in immunology and their need for replacement immunoglobulin therapy will have already been assessed by their immunologist (in line with advice to be disseminated through the UK Primary Immunodeficiency Network – UK PIN).

All other individuals with immunosuppression who are not already on IVIG replacement therapy will require assessment at the time of an exposure. These individuals can be divided into two groups A and B depending on the degree of immunosuppression see Appendix 8 on page 52 for assessing for details of Group A and B and prophylaxis.

Neither previous vaccination nor a low level of antibody will guarantee protection against measles in profoundly immunosuppressed individuals\textsuperscript{15}. See Immunoglobulin Handbook\textsuperscript{13} for further information on immunosuppression.

**Live vaccines contra-indicated**

Live vaccines such as MMR can, in some situations, cause severe or fatal infections in immunosuppressed individuals due to extensive replication of the vaccine strain. For this reason, severely immunosuppressed individuals should not be given MMR and vaccination in immunosuppressed individuals should only be given in consultation with an appropriate specialist\textsuperscript{15}.

**Immunosuppressed categories**

The Green Book\textsuperscript{15} states that the following immunosuppressed individuals should not receive MMR (in addition to pregnant women).

- Patients with evidence of severe primary immunodeficiency, for example, severe combined immunodeficiency, Wiskott-Aldrich syndrome and other combined immunodeficiency syndromes.
- Patients currently being treated for malignant disease with immunosuppressive chemotherapy or radiotherapy, or who have terminated such treatment within at least the last six months.
- Patients who have received a solid organ transplant and are currently on immunosuppressive treatment.
- Patients who have received a bone marrow transplant, until at least 12 months after finishing all immunosuppressive treatment, or longer where the patient has developed graft-versus-host disease. The decision to vaccinate should depend upon the type of transplant and the immune status of the patient. Further advice can be found in current guidance produced by the European Group for Blood and Marrow Transplantation\textsuperscript{17} and the Royal College of Paediatrics and Child Health (RCPCH)\textsuperscript{18}.
- Patients receiving systemic high-dose steroids, until at least three months after treatment has stopped. This would include children who receive prednisolone, orally or rectally at a daily dose (or its equivalent) of 2mg/kg/day for more than one week, or 1mg/kg/day for one month. For adults, an equivalent dose is harder to define but immunosuppression should be
considered in those who receive at least 40mg of prednisolone per day for more than one week. Occasionally, individuals on lower doses of steroids may be immunosuppressed and at increased risk from infections. In those cases, live vaccines should be considered with caution, in discussion with a relevant specialist physician.

- Patients receiving other types of immunosuppressive drugs (e.g. azathioprine, cyclosporine, methotrexate, cyclophosphamide, leflunomide and the newer cytokine inhibitors) alone or in combination with lower doses of steroids, until at least six months after terminating such treatment. The advice of the physician in charge or immunologist should be sought.

- Patients with immunosuppression due to human immunodeficiency virus (HIV) infection, where there is evidence of severe immunosuppression.

**Other immunosuppressive conditions and considerations**

Many patients with relatively minor immunodeficiencies should receive all recommended vaccinations, including live vaccines. Where there is doubt or a relatively severe immunodeficiency is present, individual specialist advice should be sought. Further detail can be obtained from Chapter 6 of the Green Book\textsuperscript{15} and the Best Practice Statement Immunisation of the Immunocompromised Child\textsuperscript{5}, which provides more detailed advice about immunising children with immunodeficiencies.

As non-systemic corticosteroids, such as aerosols or topical or intra-articular preparations, do not cause systemic immunosuppression, administration of live vaccines is not contraindicated to these groups.

Live vaccines are likely to be safe in those receiving other immunomodulating drugs, for example, interferon. However, advice should be sought from the specialist in charge of the therapy to ensure that the patient has not been immunosuppressed by the treatment.

Replacement schedules of corticosteroids for people with adrenal insufficiency do not cause immunosuppression and are not, therefore, contraindications for administration of live vaccines.
8.4. Protecting unvaccinated groups

Gypsy and New Age Travellers, or any other highly mobile Travellers, some religious groups, migrants from other EU countries and many non-EU countries are more likely to have missed their routine doses of MMR vaccine. Communities who have previously declined vaccination may change their minds during an outbreak and they should be given the opportunity to access MMR.

In an outbreak situation, it is important to specifically target unvaccinated groups so that they can receive MMR or HNIG if indicated.

Members of the Traveller Community may have difficulty in accessing healthcare services, the Scottish Government report into Gypsy/Travellers and Care published in 2012, highlight some of these issues.\(^{19}\)

In addition, there are strongly held ‘alternative’ views in a small percentage of the population on the risks of MMR vaccine. Despite lack of any scientific foundation for these views, many of these people will resist offers of MMR vaccination and their rights to these views should be respected.
9. Communication

Detailed advice about the roles and responsibilities of an Incident Management Team (IMT) during an outbreak is contained in the document ‘Management of Public Health Incidents – Guidance on Roles and Responsibilities of NHS led Incident Management Teams’\(^1\). Health boards should use their locally developed communications plans during an outbreak or incident.

In any outbreak situation, clear communication is important. All information should be agreed by the IMT before it is sent to laboratory staff, general practitioners, occupational health, infection control staff, the public, media and key organisations involved in the management of the outbreak (e.g. schools). These key groups must be given information that will help to reinforce control measures agreed by the IMT.

One recent outbreak in London reported confusion amongst GPs and health professionals who were advised to leave only a one month gap between the first and second doses of MMR vaccination during the outbreak. As this advice differed from routine vaccination advice in the Green Book, GPs were confused\(^2\). It is important during an outbreak to make sure health professionals and the public understand why particular control advice is put in place.

Guidance on effective communication with the public on health risks is available from HPN\(^3\).
10. After an outbreak

Outbreaks provide an opportunity for learning and every effort should be made to complete an outbreak report. The Scottish Government issued advice to IMTs recommending that a report should be completed at the end of each outbreak. Further information is available in the publication, ‘Management of Public Health Incidents – Guidance on the Roles and Responsibilities of NHS led Incident Management Teams’. 
11. References

References in section 1
1. HPN methodology: Available at http://www.hps.scot.nhs.uk/about/guidancedevelopment.aspx
2. SIGN 50 methodology. Available at http://www.sign.ac.uk/methodology/
3. NICE guidelines manual: Available at http://www.nice.org.uk/guidelinesmanual

References in section 2

References in section 3
1. Public Health Act 2008 (Scotland), available at: http://www.scotland.gov.uk/Topics/Health/Policy/Public-Health-Act
3. Latest updates on the measles situation in England and Wales available from PHE website: http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/Measles/EpidemiologicalData/


References in section 4


References in section 5


3. Test kits are produced by MicrolImmune, for specifics see www.microimmune.co.uk

References in section 6


References in section 7


29. HPS interim guideline issued May 2013, Management of those healthcare workers exposed to a measles case. Available on SPHIR and by emailing NSS, HPSimmunisation@nhs.net.


References in section 8


17. European Group for Blood and Marrow Transplantation http://www.ebmt.org

18. The Royal College of Paediatrics and Child Health (RCPCH) http://www.rcpch.ac.uk


References in section 9


References in section 10

Appendix 1

Guidance review (and development) group membership

2012 Guidance Review Group (GRG) Members

David Breen (Chair) Consultant in Public Health Medicine (CD/EH), NHS Dumfries & Galloway

Celia Aitken Consultant Virologist, NHS Greater Glasgow & Clyde

Esther Curnock Public Health Speciality Registrar, NHS Ayrshire & Arran

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Alison Smith-Palmer, Guidance Coordinator

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Trevor Gibbs RCGP Scotland Deputy Chair (Policy)

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Pamela Joannidis Lead Nurse Infection Control, NHS Greater Glasgow & Clyde

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Katy Sinka Epidemiologist, Health Protection Scotland

Joy Tomlinson Consultant in Public Health Medicine, NHS Ayrshire & Arran

Lorna Willocks Consultant in Public Health Medicine (CD/EH), NHS Lothian

David Yirrell Consultant Clinical Scientist, NHS Tayside
Appendix 2

This figure summarises which tests are most appropriate to use at different stages of measles illness.

**Clinical signs**

- **Prodromal phase**
- **Incubation period**
- **Rash**

<table>
<thead>
<tr>
<th>Clinical sign</th>
<th>Time wrt appearance of rash</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCR on throat swabs</td>
<td>Day -10 to Day 0</td>
</tr>
<tr>
<td>PCR on urine</td>
<td>Day -5 to Day 0</td>
</tr>
<tr>
<td>Blood for measles IgG - existing immunity</td>
<td>Day 0</td>
</tr>
<tr>
<td>Blood for measles IgM</td>
<td>Day 0 to Day 5</td>
</tr>
</tbody>
</table>

**Laboratory measurements**

Solid line indicates detectable during the period indicated.
Dashed line indicates may be detectable during the period indicated, but this is not reliable.
Appendix 3

Algorithm for interpretation of measles test results. PCR testing on throat swabs is the preferred method for rapid diagnosis of measles in Scotland.

**Suspected measles case**
- Erythematous rash ≥ 3 Days
- Temperature 38°C
- Cough, conjunctivitis or coryza

Detection of virus
- a) Throat swab in VTM or lysis buffer
- b) Urine sample (optional)

Submit both samples

**PCR for measles**

- POS
  - Rash for ≤ 3 Days
    - Repeat sample if measles still suspected
    - Oral fluid testing for IgM and IgG
  - Rash for ≥ 3 Days
    - No evidence recent measles. Exclude other causes (Erythrovirus B19, rubella)

- Neg

Serology *
- Blood sample or oral fluid; after day 4

Test for IgM

- POS
  - No evidence of recent measles infection
  - Exclude other causes (Erythrovirus B19, rubella)
- Neg

Confirmed measles case. Laboratory to send sample to PHE Colindale for typing

* IgG seroconversion is an alternative, but second sample should be taken 10-14 days later. Oral fluid samples are taken with special kits held by the local HPT and should be returned directly to PHE Colindale for testing.
## Appendix 4

<table>
<thead>
<tr>
<th>NHS Board</th>
<th>Patient Name</th>
<th>Patient Address</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<table>
<thead>
<tr>
<th>Postcode</th>
<th>Telephone No</th>
<th>Mobile No</th>
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<tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>DOB / CHI</th>
<th>Age</th>
<th>Sex: Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<table>
<thead>
<tr>
<th>Occupation</th>
<th>Address of workplace/education/childcare/healthcare</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Other (? Prison)</th>
<th>Postcode</th>
<th>Telephone No</th>
</tr>
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<tbody>
<tr>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>Class / Year</th>
<th>Contact Person</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date of the last day case attended workplace/education/childcare</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th>GP</th>
<th>Surgery Address</th>
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<tbody>
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</table>

<table>
<thead>
<tr>
<th>Telephone No</th>
<th>Fax No</th>
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<table>
<thead>
<tr>
<th>Reporting Person</th>
<th>Occupation</th>
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<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Workplace Address</th>
<th>Postcode</th>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>E-mail Address</th>
<th>Telephone No</th>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fax No</th>
<th>Page No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Notification Dates:</th>
<th>Clinical</th>
<th>Lab Confirmed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HPS Informed:</th>
<th>Yes</th>
<th>No</th>
<th>Date</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
</table>

| Genotype | |
|----------||
### Was laboratory testing for measles done?

<table>
<thead>
<tr>
<th>Sample type*</th>
<th>Test Requested</th>
<th>Date taken</th>
<th>Positive/ negative result</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

* Repeat serology

* Please record whether blood/throat swab/urine or oral fluid test has been sent

### Clinical Details

<table>
<thead>
<tr>
<th>Morbilliform rash</th>
<th>Yes</th>
<th>No</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rash duration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date of onset</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cough?</td>
<td>Yes</td>
<td>No</td>
<td>Unknown</td>
</tr>
<tr>
<td>Coryza?</td>
<td>Yes</td>
<td>No</td>
<td>Unknown</td>
</tr>
<tr>
<td>Conjunctivitis?</td>
<td>Yes</td>
<td>No</td>
<td>Unknown</td>
</tr>
<tr>
<td>Fever at time of rash onset</td>
<td>Yes</td>
<td>No</td>
<td>Unknown</td>
</tr>
<tr>
<td>Underlying illness?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospitalised?</td>
<td>Yes</td>
<td>No</td>
<td>Unknown</td>
</tr>
<tr>
<td>Short Stay? e.g. A&amp;E Dept</td>
<td>Yes</td>
<td>No</td>
<td>Date</td>
</tr>
<tr>
<td>Date hospitalised</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days hospitalised</td>
<td></td>
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</tr>
<tr>
<td>Hospital</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Ward</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consultant</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Complications of Disease

<table>
<thead>
<tr>
<th>Pneumonia? Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encephalitis?</td>
<td>Yes</td>
</tr>
<tr>
<td>Seizures?</td>
<td>Yes</td>
</tr>
<tr>
<td>Other? Yes</td>
<td>No</td>
</tr>
<tr>
<td>Died? Yes</td>
<td>No</td>
</tr>
<tr>
<td>Date of Death</td>
<td></td>
</tr>
</tbody>
</table>

### Cause of Death

Epi-linked? Yes | No |
If epi-linked was this linked to an imported case? Yes | No |
Outbreak related? Yes | No | Outbreak name/number |
### Ever had measles-containing vaccine
- Yes
- No
- Don't Know

### Number of doses of measles-containing vaccine prior to illness onset

<table>
<thead>
<tr>
<th>Date given</th>
<th>Manufacturer</th>
<th>Batch Number</th>
<th>Information source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td></td>
<td></td>
<td>1 = Parent /self</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 = Parent held record (red book)</td>
</tr>
<tr>
<td>2nd</td>
<td></td>
<td></td>
<td>3 = Casenotes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 = SIRS</td>
</tr>
<tr>
<td>3rd</td>
<td></td>
<td></td>
<td>5 = Other</td>
</tr>
</tbody>
</table>

### Travel History

**History of foreign travel in the month before onset**
- Yes
- No

If Yes, where?

<table>
<thead>
<tr>
<th>Date of Return</th>
</tr>
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<tbody>
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</table>

**Did case arrive from overseas <21 days before rash onset?**
- Yes
- No

If Yes, country arrived from

<table>
<thead>
<tr>
<th>Departure Airport</th>
<th>Departure Date</th>
</tr>
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<tbody>
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<table>
<thead>
<tr>
<th>Arrival Airport</th>
<th>Arrival Date</th>
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</table>

### Events/Functions attended

(During infectious period 5 days before rash, 4 days after)

<table>
<thead>
<tr>
<th>Date</th>
<th>Details</th>
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<tbody>
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Other

<table>
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<tr>
<th>Date</th>
<th>Details</th>
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</tbody>
</table>
## Household and Other Close Contacts requiring risk assessment

<table>
<thead>
<tr>
<th>Name</th>
<th>D.O.B</th>
<th>Contact details</th>
<th>Relationship</th>
<th>Signs &amp; Symptoms</th>
<th>MMR Status</th>
<th>HNIG*** req.</th>
<th>Action taken</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

* To access HNIG, contact your local hospital pharmacy department
<table>
<thead>
<tr>
<th>* Has the case had contact with any of the below:</th>
<th>Yes</th>
<th>No</th>
<th>Date of contact &amp; Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirmed case of measles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Probable case of measles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possible case of measles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pregnant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immunocompromised</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unimmunised infant &lt;12months</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Have you advised the patient (or guardian) about exclusion from work/education/childcare?  
Yes [ ]  No [ ]

| Final Case Classification *Indigenous? | Yes [ ]  No [ ]  **Preventable?** Yes [ ]  No [ ]  ***HNIG?** Yes [ ]  No [ ] |
|--------------------------------------|----------------|----------------|----------------|
| P = probable                         | C = Lab confirmed or epi-linked to lab confirmed case | D = discarded | X = lost to follow up |

* Indigenous is a case that cannot be proved to be imported  
** Probably – born during or after 1968. No evidence of vaccination or confirmed measles in the past.  
No contraindications.  
*** Please see Chapter 2 in HNIG Guideline Handbook

Comments: .................................................................................................................................................................................................
........................................................................................................................................................................................................
........................................................................................................................................................................................................
........................................................................................................................................................................................................

Timeline:
Signed...........................................Print Name.................................................................
Designation.................................................................
## Appendix 5

### Summary measles outbreak record

<table>
<thead>
<tr>
<th>NHS board:</th>
<th>Location of Measles outbreak:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Case status</th>
<th>MMR-2</th>
<th>MMR-1</th>
<th>Result</th>
<th>Date specimen taken</th>
<th>Type of specimen taken</th>
<th>Source of exposure</th>
<th>Rash onset date</th>
<th>Date of Birth</th>
<th>Age</th>
<th>Postcode</th>
<th>Case ID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>
Appendix 6

Algorithm for management of occupational measles contacts in special settings including hospitals, prisons and schools, and other settings where large numbers of non-immune or immunosuppressed individuals gather. If contact is immunosuppressed, refer to Appendix 8 on page 52.

Contact with ‘Probable’ or Virologically-Confirmed Case of Measles*

Risk Assessment
Has there been more than 15 minutes contact or direct contact (e.g. face to face), during infectious period 5 days prior to 4 days after rash onset?

If yes

Evidence of immunity?
(previously received two doses of measles containing vaccine or written evidence of previous infection)

If yes

Fit for work
But use opportunity to encourage vaccine uptake

If no

Check measles antibodies (IgG)

Positive

Fit for work

Negative

- Exclude from day 5 after first exposure to day 21 after last exposure
- Provide post-exposure prophylaxis: MMR x2 for immunocompetent adults if within 72 hrs of exposure

* Meets clinical case definition with epidemiological link or laboratory – confirmed case
Appendix 7

Management of Non-Immunosuppressed Pregnant Woman exposed to Measles

(May not apply to pregnant Woman born and raised outside the UK)

Non-Immunosuppressed Pregnant Women (Contact made)

- Born before 1970?
  - YES: Assume immune
  - NO:
    - Born between 1970 and 1990?
      - YES:
        - History of measles infection?
          - YES: Assume immune
          - NO:
            - Is it possible to test within 6 days of exposure?
              - YES: Test antibody levels
                - Positive: Assume immune
                - Negative or Equivocal: Offer HNIG
              - NO: Offer HNIG
            - YES: Assume immune
        - NO:
          - Born after 1990
          - Was full vaccinated?
            - YES: Assume immune
            - NO:
              - Is it possible to test within 6 days of exposure?
                - YES: Test antibody levels
                  - Positive: Assume immune
                  - Negative or Equivocal: Offer HNIG
                - NO: Offer HNIG

## Appendix 8

Algorithm for management of ‘high-risk’ and immunosuppressed measles contacts of probable or virologically confirmed case of measles.

<table>
<thead>
<tr>
<th>GROUP A</th>
<th>GROUP B</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients with malignant disease, other than those in Group B, until at least six months after completion of</td>
<td>Patients on treatment for Acute</td>
</tr>
<tr>
<td>immunosuppressive chemotherapy or radiotherapy</td>
<td>Lymphoblastic Leukaemia (ALL) within and until at least six months after completion of immunosuppressive chemotherapy</td>
</tr>
<tr>
<td>Patients who have received a solid organ transplant and are currently on immunosuppressive treatment</td>
<td>Patients who have received a bone marrow transplant until at least 12 months after finishing all immunosuppressive</td>
</tr>
<tr>
<td></td>
<td>treatment, or longer where the patient has developed graft-versus-host disease</td>
</tr>
<tr>
<td>Patients receiving systemic high-dose steroids until at least three months after treatment has stopped. This would</td>
<td>Patients with severe primary immunodeficiency (who would not be expected to have made a good initial response to</td>
</tr>
<tr>
<td>include children who receive prednisolone, orally or rectally, at a daily dose (or its equivalent) of 2mg/kg/day for</td>
<td>vaccine or disease in childhood</td>
</tr>
<tr>
<td>at least one week, or 1mg/kg/day for one month. For adults, an equivalent dose is harder to define but</td>
<td></td>
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<tr>
<td>immunosuppression should be considered in those who receive at least 40mg of prednisolone per day for more than</td>
<td></td>
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<tr>
<td>one week.</td>
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</tr>
<tr>
<td>Patients with immunosuppression due to Human Immunodeficiency Virus (HIV) infection who do not have a diagnosis of AIDS</td>
<td>Patients with a diagnosis of Acquired Immunodeficiency Syndrome (AIDS)</td>
</tr>
<tr>
<td>Patients receiving other types of immunosuppressive drugs (e.g. azathioprine, cyclosporine, methotrexate, cyclophosphamide, leflunomide, anti-TNF alpha and the newer cytokine inhibitors) alone or in combination with steroids, until at least six months after terminating such treatment</td>
<td></td>
</tr>
</tbody>
</table>
Management of Immunosuppressed Contacts of Probable or Virologically Confirmed Case of Measles

(May not apply to those born or raised abroad)

* See Table with classification of Immunosuppressed into Groups.

** HNIG is most effective if given within 3 days after exposure, but can be effective if given within 6 days (BNF, section 14.5.1, available at: http://www.medicinescomplete.com/mc/bnf/current/PHP8431-normal-immunoglobulin.htm).
### HPN Guideline Feedback Form

**Section A – About the Document (Guideline)**

<table>
<thead>
<tr>
<th>Guideline Title:</th>
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<tbody>
<tr>
<td>Author:</td>
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<tr>
<td>Publisher:</td>
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<tr>
<td>Date of Publication:</td>
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</tbody>
</table>

**Section B – About the Evaluation**

<table>
<thead>
<tr>
<th>Reviewer’s Name:</th>
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<tbody>
<tr>
<td>Reviewer’s Occupation:</td>
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<td>Reviewer’s Organisation:</td>
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<tr>
<td>Reviewer’s Contact Email Address: (Optional)</td>
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<tr>
<td>Date of Evaluation:</td>
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</tbody>
</table>

**Section C – Comments**

1. Does the Guideline meet your needs/inquiry at the time of evaluation? (Please explain why this is the case.)

2. Is there anything lacking in the Guideline? (Please explain.)

3. Do you have any other comments?

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An electronic version of this form can be downloaded here: [http://www.hps.scot.nhs.uk/about/guidancedevelopment.aspx](http://www.hps.scot.nhs.uk/about/guidancedevelopment.aspx)

Once completed please return this form to: NSS.HPN@nhs.net