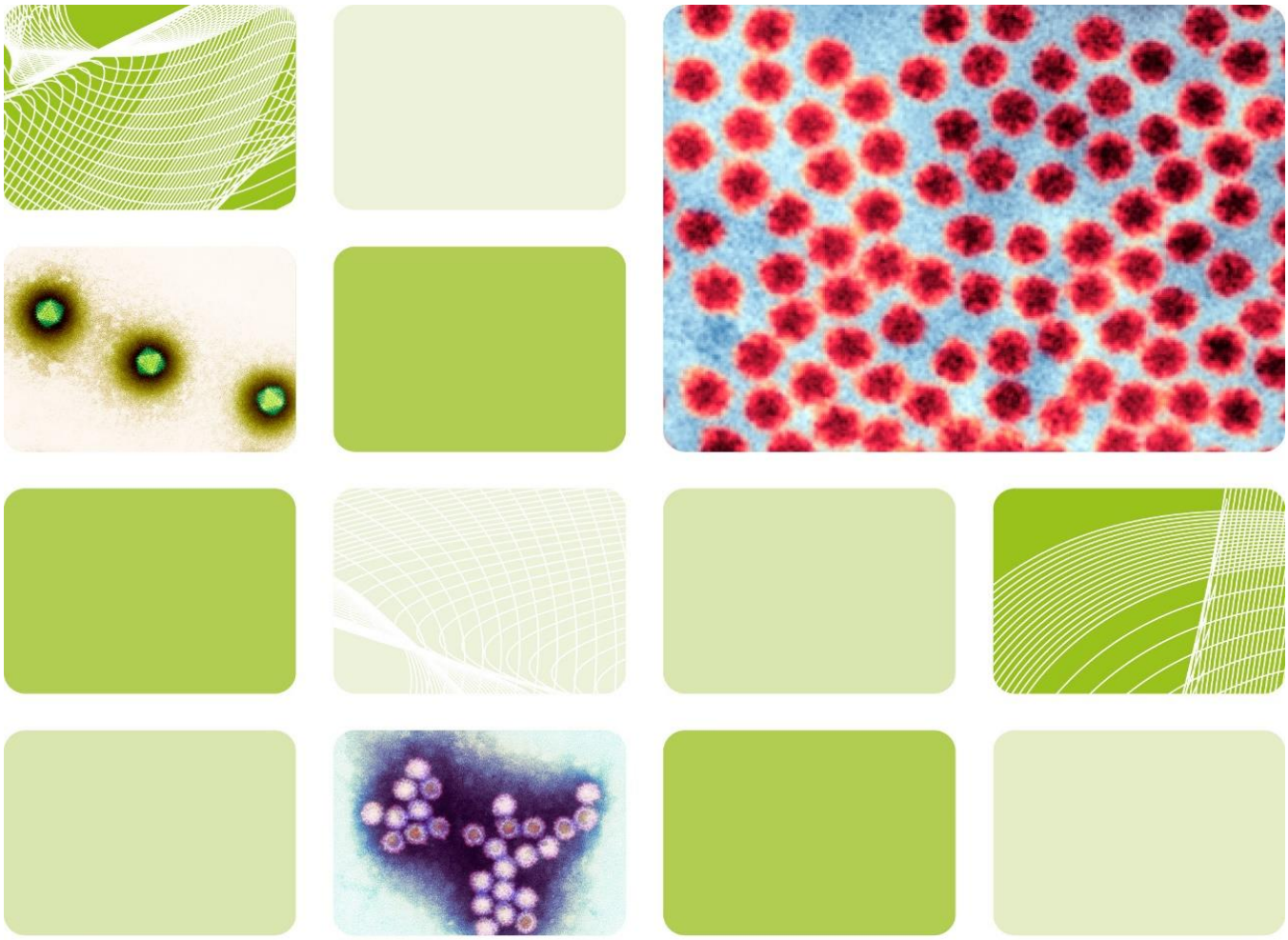
UK Health Security Agency

UK Standards for Microbiology Investigations

Investigation of exposure to vesicular and non-vesicular rash in pregnancy



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Acknowledgments

UK Standards for Microbiology Investigations (UK SMIs) are developed under the auspices of UKHSA working in partnership with the partner organisations whose logos are displayed below and listed on the UK SMI website. UK SMIs are developed, reviewed and revised by various working groups which are overseen by a steering committee.

The contributions of many individuals in clinical, specialist and reference laboratories who have provided information and comments during the development of this document are acknowledged. We are grateful to the medical editors for editing the medical content.

UK SMIs are produced in association with:

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Contents

Amendment table

Each UK SMI document has an individual record of amendments. The amendments are listed on this page. The amendment history is available from standards@ukhsa.gov.uk.

Any alterations to this document should be controlled in accordance with the local document control process.

Amendment number/date	10/21.01.26
Issue number discarded	6.1
Insert issue number	6.2
Section(s) involved	**Amendment**
Algorithm 4	Addition of 'immunity' to the title.
Algorithm 5	Title amended from '*Investigation of chickenpox in immunocompetent people exposed to vesicular rash or confirmed chickenpox[t] (who have no evidence of past infection or full immunisation) during pregnancy'* to *Investigation of varicella immunity in immunocompetent people exposed to vesicular rash[t] or confirmed chickenpox /shingles (who have no evidence of past infection or full immunisation) during pregnancy*
	Added footnote 'c' to the 1st top box.
	Second row, box 2 (right) '>' changed to '≥' 100 mIU/ml.
	Third row, first box (left) '*Susceptible to Chickenpox. Consider prophylaxis: VZIG or antiviral. Advise patient to contact healthcare services if rash and/or symptoms develop'* changed to 'Susceptible to Varicella'. Risk assess exposure. If significant consider prophylaxis[s].
	Amendment to footnote S. Addition of '*IVIG should only be offered if the woman is unable to take oral antivirals due to malabsorption or renal toxicity'.*
Table 4	>100 mIU/ml changed to ≥100 mIU/ml
Reference	Reference 11 updated to reflect the updated UKHSA guidance.

Amendment number/date	9/08.05.25
Issue number discarded	6
Insert issue number	6.1
Section(s) involved	**Amendment**
Whole document.	**This is an administrative point change.** **The content of this UK SMI document has not changed.** **The last scientific and clinical review was conducted on 09/03/2021.** Hyperlinks throughout document updated to Royal College of Pathologists website. Public Health England replaced with UK Health Security Agency throughout the document, including the updated Royal Coat of Arms. Partner organisation logos updated. Broken links to devolved administrations replaced. References to NICE accreditation removed. Scope and Purpose replaced with General and Scientific information to align with current UK SMI template.
Public health responsibilities of diagnostic laboratories	This section has been added to UK SMI templates to highlight the public health responsibilities that diagnostic laboratories have as part of their duties.

Amendment number/date	8/09.03.21
Issue number discarded	5
Insert issue number	6
Anticipated next review date*	09.03.24
Section(s) involved	**Amendment**
Whole document	Document written in the new UK SMIs virology template.

	Document now includes investigation of pregnant people exposed to chickenpox or shingles.
Algorithm 1	An overview algorithm has been added
Algorithm 5	An algorithm describing VZV IgG quantitative testing has been added
Footnotes	Footnotes were updated
Interpreting and reporting tables	Interpreting and reporting tables were added to the document An extra table with VZV qualitative testing was added to the document

*Reviews can be extended up to five years subject to resources available.

1 General information

View general information related to UK SMIs.

2 Scientific information

View scientific information related to UK SMIs.

3 Scope of document

This document covers the investigation of samples from immunocompetent people exposed to certain vesicular and maculopapular rashes during pregnancy, and describes a laboratory procedure to investigate possible contact with the following viruses:

- Parvovirus B19 (fifth disease, erythema infectiosum, slapped cheek syndrome)
- Rubella virus (German measles)
- Rubeola virus (measles)
- Varicella zoster virus (chickenpox/shingles)

The recommendations assume that immunisation status has been determined from the vaccination record and/or serology results. A person is considered immune if they are immunocompetent and either have had two doses of a vaccine that protects against Rubella virus, Rubeola virus and Varicella zoster virus or have laboratory evidence of prior immunity[1] or laboratory confirmed prior infection. Where immunisation history or prior tests suggest no immunity proceed to testing algorithms.

It is common not to know the cause of an infective maculopapular rash illness at the time of contact notification, and for limited information to be available. Whilst laboratory testing to determine the cause of the rash in the source of the contact is recommended, this may not occur or may occur too slowly. Therefore, for pregnant contacts of maculopapular rash illness, investigation of parvovirus B19, rubella and measles immunity should be considered in parallel if indicated by clinical and epidemiological features. If the contact has a laboratory confirmed diagnosis, immunity testing of the contact is only necessary for that viral cause. Clinical features and local epidemiology can inform the likelihood of the viral cause, for example, in measles respiratory symptoms (coryza, sneezing, cough) are prominent, early features of infection in most patients and may be used to differentiate measles from parvovirus B19 and rubella infection. Regardless of a request for specific rubella or parvovirus B19 testing, UKHSA guidance recommends that pregnant people should be simultaneously investigated for immunity to both infections unless their immune status is already known[2].

If immunisation history or tests indicate immunity to all viruses under investigation, reassure risk of illness is remote. The patient should be advised to seek medical advice if they develop symptoms. All rashes should be reported during pregnancy, regardless of known immunity or vaccination status[2].

This document is restricted to viruses with clear management intervention during pregnancy; bacterial rashes such as scarlet fever and syphilis have not been considered. Many viral pathogens can cause illness with rash, but are not included in this document; some examples of these include: Enterovirus, Herpes Simplex Virus (HSV), Human Herpesvirus 6 and 7 (HHV 6 and 7), Cytomegalovirus (CMV), Epstein-Barr Virus (EBV) and Zika virus.

Enterovirus, HHV 6 and 7, and EBV are not associated with congenital infection syndromes. HSV and CMV are associated with congenital infection and HSV is much more associated with perinatal infections[3,4].

For more information on EBV and CMV investigation, please refer to: UK SMI V 26: Epstein-Barr virus serology and UK SMI V 28: investigation of cytomegalovirus infection.

For further information regarding rash in pregnancy and definition of what constitutes "contact", refer to the UKHSA document "Guidance on the investigation, diagnosis and management of viral illness, or exposure to viral rash illness, in pregnancy" https://www.gov.uk/government/publications/viral-rash-in-pregnancy, the "National Measles Guidelines" https://www.gov.uk/government/publications/national-measles-guidelines, and the Green Book 'Immunisation against infectious diseases' (https://www.gov.uk/government/collections/immunisation-against-infectious-disease-the-green-book)[1,2,5,6]. Specific guidelines for Scotland are also available[7].

4 Safety considerations

This guidance should be supplemented with local COSHH and risk assessments.

Users are asked to refer to current guidance on the safe handling of the organisms mentioned in this UK SMI.

5 Specimen processing and procedure

5.1 Specimen type

Serology: Blood, serum

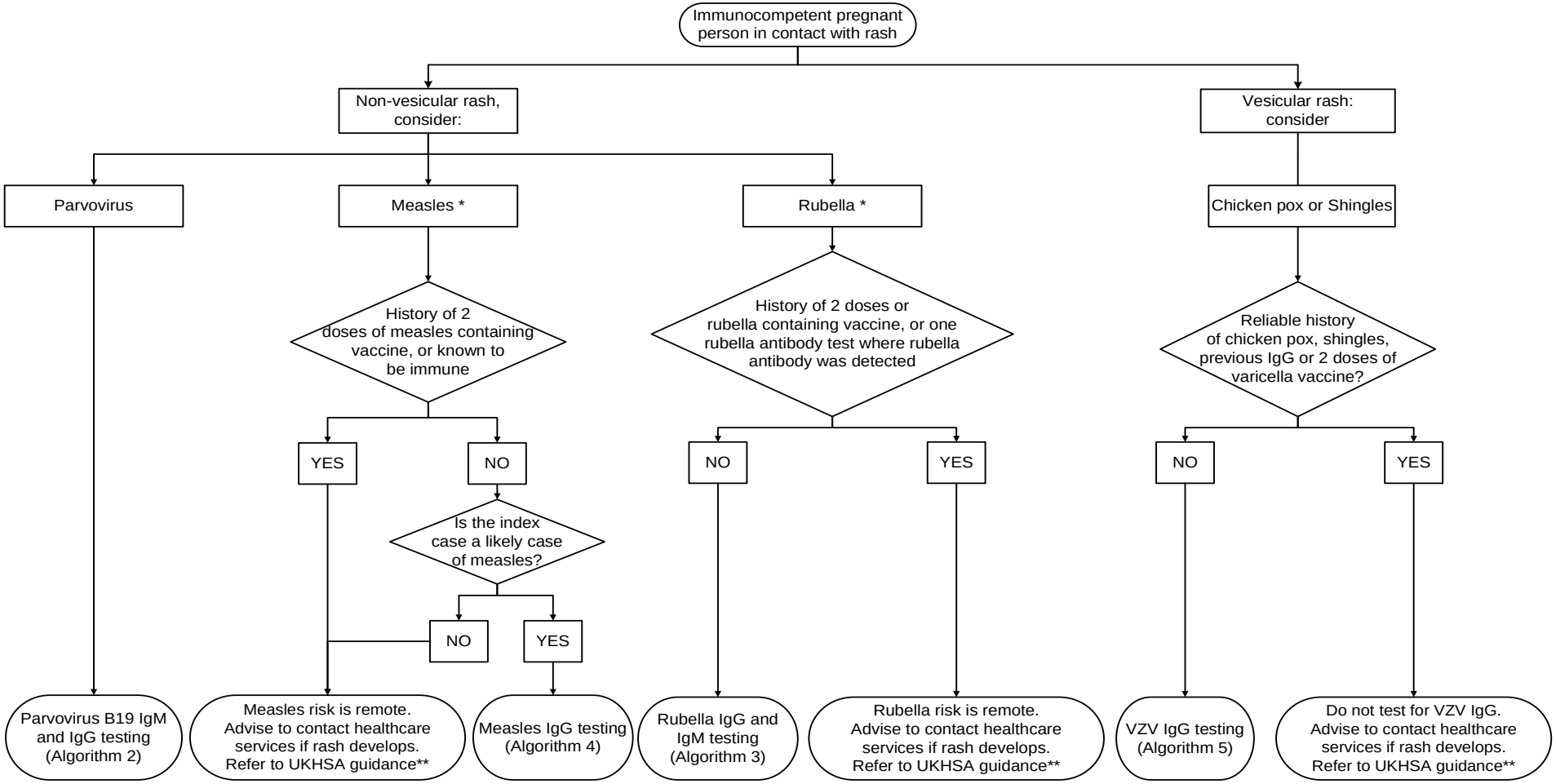
For NAAT: oral fluid, throat swab, vesicle swab, urine

5.2 Specimen transport and storage conditions

Specimens should be collected in appropriate CE marked leak proof containers and transported in sealed plastic bags. Specimens should be transported and processed according to manufacturer's instructions or local validation data[8].

Samples should be retained in accordance with The Royal College of Pathologists guidelines 'The retention and storage of pathological records and specimens'[9].

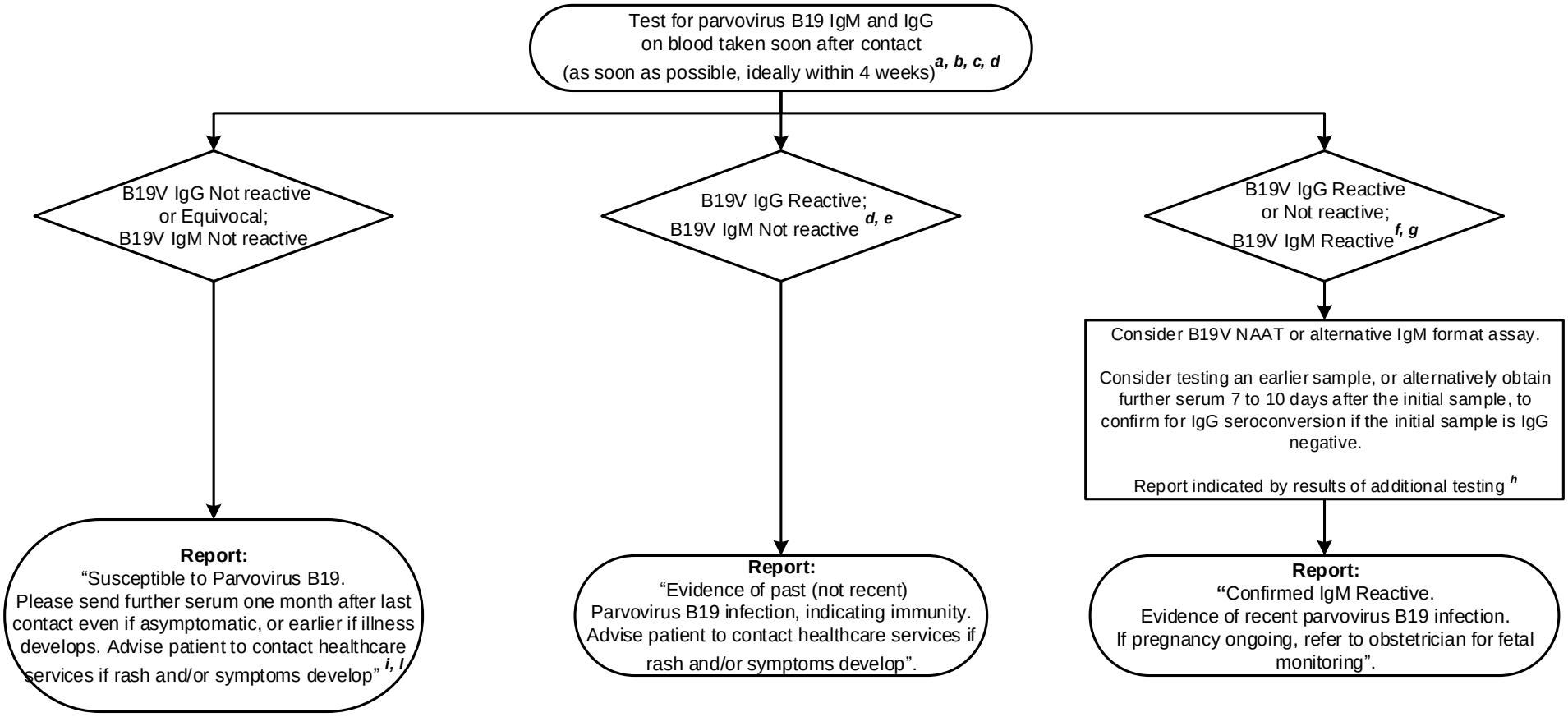
Algorithm 1: Overview



* Testing for measles and rubella will be subject to local epidemiology and decision
** UK Health Security Agency. Guidance on the investigation, diagnosis and management of viral illness, or exposure to viral rash illness, in pregnancy[2].

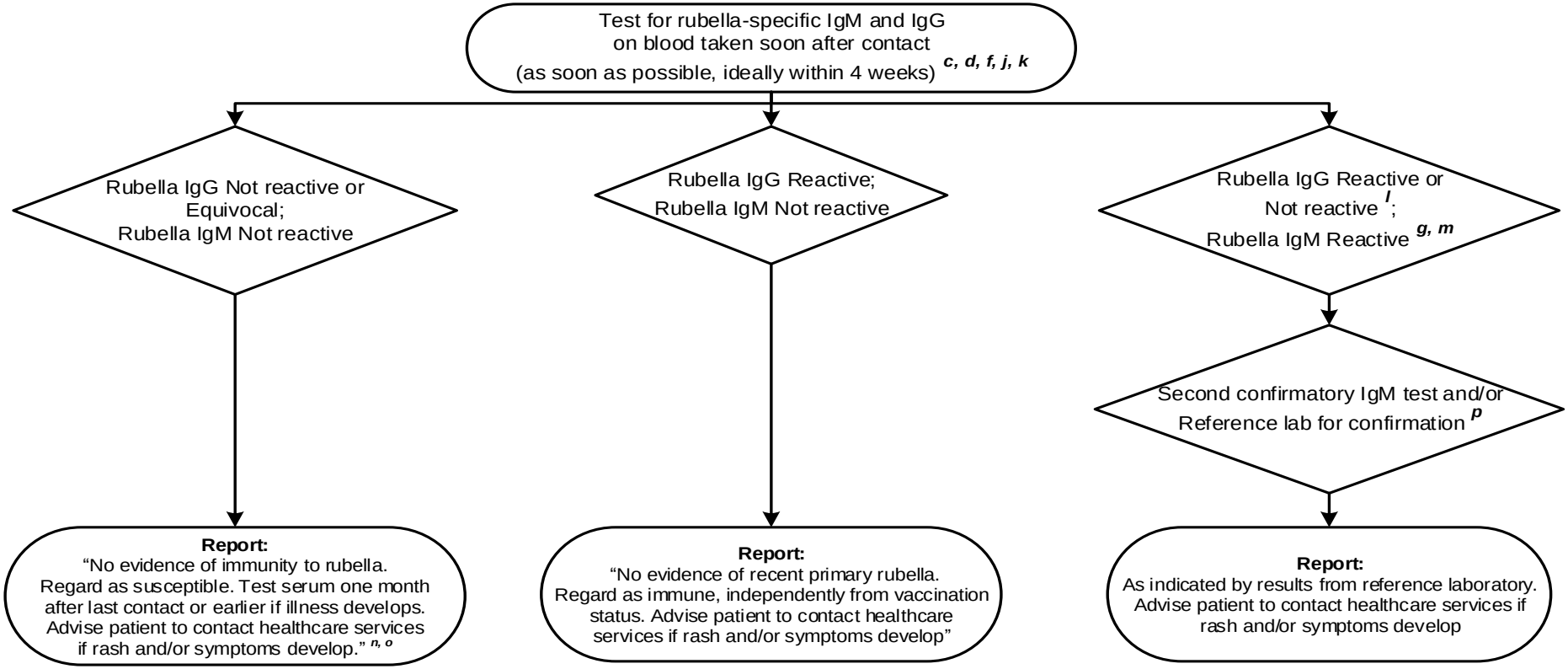
Algorithm 2: Investigation of parvovirus B19 (B19V) in immunocompetent people exposed to non-vesicular rash during pregnancy

This information is also presented in Table 1



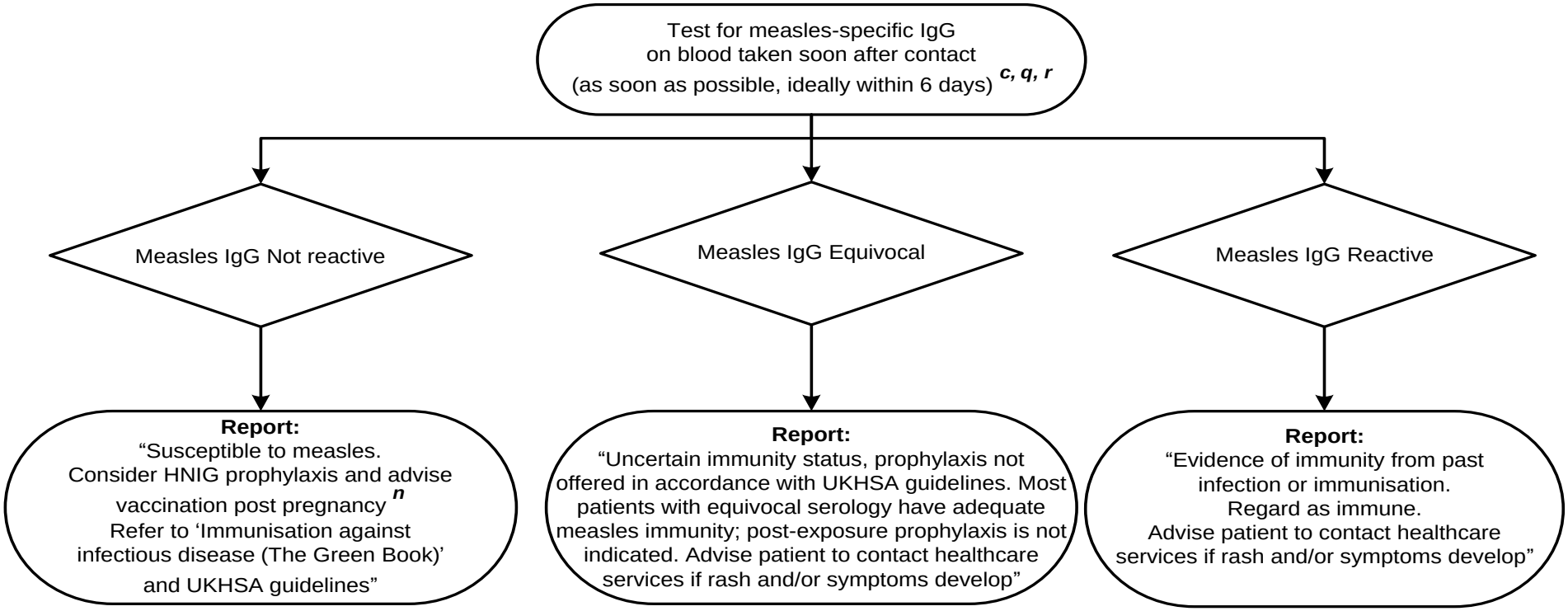
Algorithm 3: Investigation of rubella in immunocompetent people exposed to non-vesicular rash during pregnancy (with no serological or vaccination evidence of past infection)

This information is also presented in Table 2.



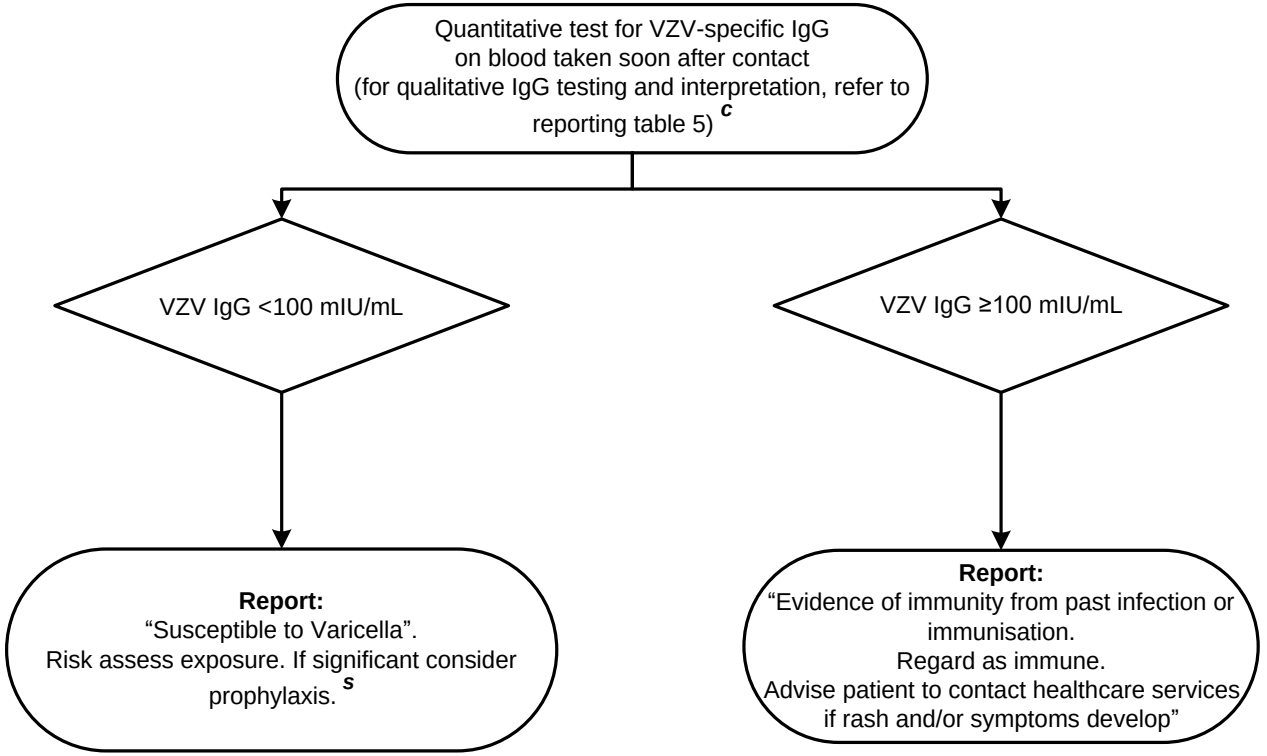
Algorithm 4: Investigation of measles immunity in immunocompetent people exposed to non-vesicular rash during pregnancy

This information is also presented in table 3



Algorithm 5: Investigation of varicella immunity in immunocompetent people exposed to vesicular rash[t] or confirmed chickenpox /shingles (who have no evidence of past infection or full immunisation) during pregnancy

This information is also presented in table 4.



Footnotes

a) The infectious period of patients with parvovirus B19 is 7 to 10 days before the onset of rash, including the day of onset[2].

b) The risks of fetal loss and hydrops fetalis are highest when parvovirus B19 infection occurs within the first 20 weeks of gestation. If exposed after 20 weeks of gestation the risks of fetal damage are low, but the testing algorithm should still be followed. Determining the date of infection can be difficult in the absence of maternal illness but may be possible when using retrospective testing of earlier samples.

c) If an earlier sample is available, such as an antenatal infectious disease screening (booking) blood taken ≥4 weeks before reporting rash contact, consider testing this for IgG rather than requesting a current sample. If IgG positive the risk of illness is remote.

d) If contact is declared ≥ 1 month after exposure, a negative IgM result may not exclude relatively recent infection. If possible, test earlier sample.

e) In some patients, testing an earlier sample and a current sample may detect unrecognised earlier infections in pregnancy through IgG seroconversion. Specialist advice should be sought if this occurs.

f) In some patients, IgM may be persistent. In these situations testing an earlier sample may assist diagnosis by demonstrating presence or absence of seroconversion.

g) Caution should be taken when interpreting IgM results; low reactivity is often non-specific. Consider testing for potential cross reacting IgM and for recent EBV infection.

h) If confirmation is delayed, an interim report may be required. Interim report based on low level activity IgM results should state that low reactivity may be non-specific.

i) Investigate later sample for parvovirus B19 IgG and IgM.

j) This algorithm refers to pregnant people whose immunisation status to rubella is unknown or unconfirmed[2]. If a pregnant person is regarded as immune (see footnote c) the risk of rubella infection is remote but they are to return for testing if relevant illness (rash, arthralgia) develops[1,2].

k) The risk of severe congenital defect with rubella virus occurs predominantly when infection happens within the first 16 weeks of gestation, although cases of deafness may result from infection occurring between 16 and 20 weeks. If exposed after 20 weeks, the risk is remote. However, continue testing to confirm the date of infection relative to gestational age[10].

l) If an earlier sample has tested as IgG negative and seroconversion has occurred, further investigation is required.

m) Primary rubella is uncommon in the UK and most initial reactive IgM results are most likely false positive and should be referred for further testing. The clinical team should be contacted to establish the clinical setting and to ensure a follow up sample is received in good time. Interim reports should clearly state that IgM and IgG avidity confirmatory results are pending.

n) A two dose course of MMR vaccine is advised on completion of pregnancy and in the absence of any contraindication if the patient is confirmed as susceptible[2].

o) Investigate later serum for rubella IgG and IgM. Diagnose and advise on results and consider NAAT if illness develops or seroconversion is observed in follow up sample.

p) Obtain further serum 7 to 10 days after initial test, or test blood stored earlier for comparison. Serology test results compatible with rubella infection should always be referred to reference laboratory for confirmation of results and IgG avidity.

q) In susceptible pregnant people, human normal immunoglobulin (HNIG) prophylaxis will be issued up to 6 days after exposure[6,7].

r) Isolated IgG results from tests carried out ≥ 6 days after exposure cannot be interpreted in this clinical scenario. Refer to UKHSA guidelines for post-exposure prophylaxis for measles[6].

s) Antivirals are now the prophylaxis of choice for exposure to varicella or shingles for susceptible women exposed in any stage of pregnancy. IVIG should only be offered if the woman is unable to take oral antivirals due to malabsorption or renal toxicity [11].

t) Hand, foot and mouth disease caused by enteroviruses have similar symptoms to chickenpox. It is recommended to send a throat or vesicle swab for laboratory confirmation by PCR when clinical features are not strongly consistent with chickenpox or VZV.

6 Interpreting and reporting laboratory results

Table 1: Interpretation and reporting table for parvovirus B19 IgM and IgG tests:

	B19 IgG	B19 IgM	Interpretative comment	Notes
1	Not reactive or Equivocal	Not reactive	Susceptible to parvovirus B19. Please send further serum 1 month after last contact even if asymptomatic, or earlier if illness develop. Investigate later sample for parvovirus B19 IgG and IgM.	Advise to contact healthcare services if rash and/or symptoms develop
2	Reactive	Not reactive	Evidence of past (not recent) parvovirus B19 infection, indicating immunity	
3	Reactive/ Not reactive	Reactive	Report for results from additional testing: Confirmed IgM reactive. Evidence of recent parvovirus B19 infection. If pregnancy ongoing, refer to obstetrician for fetal monitoring	Test earlier samples or obtain further serum 7 to 10 days after initial sample to look for seroconversion Consider B19 NAAT or alternative IgM assay

Table 2: Interpretation and reporting table for rubella-specific IgM and IgG tests:

	Rubella IgG	Rubella IgM	Interpretative comment	Notes
1	Not reactive or Equivocal	Not reactive	No evidence of immunity to rubella. Regard as susceptible. Test serum one month after last contact or earlier if illness develops. Advise patient to contact healthcare services if rash and/or symptoms develop.	Consider NAAT (oral fluid, throat swab or urine) if illness develops or seroconversion is observed on later samples
2	Reactive	Not reactive	No evidence of recent primary rubella. Regard as immune, independently from vaccination status. Advise patient to contact healthcare services if rash and/or symptoms develop	

	Rubella IgG	Rubella IgM	Interpretative comment	Notes
3	Reactive/ Not reactive	Reactive	Report results from reference laboratory Issue interim report Advise patient to contact healthcare services if rash and/or symptoms develop	Test earlier samples or obtain further serum 7 to 10 days after initial sample to confirm finding. Refer to Reference laboratory for confirmation of results and avidity Consider public health notification of initial result, depending on local protocol

Table 3: Interpretation and reporting table for measles-specific IgG test:

	Measles IgG	Interpretative comment	Notes
1	Not reactive	Susceptible to measles. Consider HNIG prophylaxis and advise vaccination post pregnancy. Refer to “Immunisation against infectious disease (The Green Book)” and UKHSA guidelines	Prophylaxis (HNIG) is recommended, consider vaccination post pregnancy Advise to seek medical advice if rash and/or symptoms develop
2	Equivocal	Uncertain immunity status, prophylaxis not offered in accordance with UKHSA guidelines. Most patients with equivocal serology have adequate measles immunity; post-exposure prophylaxis is not indicated. Advise patient to contact healthcare services if rash and/or symptoms develop	Do not offer prophylaxis (HNIG), consider vaccination post pregnancy Most patient with equivocal serology have adequate measles immunity. Consider vaccination post pregnancy.
3	Reactive	Evidence of immunity from past infection or immunisation. Regard as immune. Advise patient to contact healthcare services if rash and/or symptoms develop	

Table 4: Interpretation and reporting table for VZV quantitative IgG test:

	VZV quantitative IgG	Interpretative comment	Notes
1	<100 mIU/ml	Susceptible to chickenpox. Consider prophylaxis as per UKHSA guidance. Advise patient to contact healthcare services if rash and/or symptoms develop	
2	≥100 mIU/ml	Evidence of immunity from past infection or immunisation. Regard as immune. Advise patient to contact healthcare services if rash and/or symptoms develop	

Table 5: If using VZV qualitative IgG test (no flowchart) consider the following interpretation and reporting table:

	VZV qualitative IgG	Interpretative comment	Notes
1	Not reactive	Susceptible to chickenpox. Consider prophylaxis: VZIG or antiviral	No serological evidence of previous infection Retest with a confirmatory quantitative assay (Table 4). If the result from quantitative testing will not be available within 10 days of exposure then VZIG should be given[11,12].
2	Equivocal	Uncertain immunity status. VZIG is not recommended.	Prophylaxis (VZIG) is not offered in this case in accordance with UKHSA guidelines[11] Retest with a confirmatory quantitative assay (Table 4). If the result from quantitative testing will not be available within 10 days of exposure then VZIG is not recommended[11,12].
3	Reactive	Evidence of immunity from past infection or immunisation. Regard as immune. Advise patient to contact healthcare services if rash and/or symptoms develop	Do not issue VZIG[11,12].

7 Public health responsibilities of diagnostic laboratories

Diagnostic laboratories have public health responsibility as part of their duties. Amongst these are additional local testing, or referral to further characterise the organism as required, primarily for public health purposes e.g. routine cryptosporidium detection; serotyping or microbial subtyping; and a duty to refer appropriate specimens and isolates of public health importance to a reference laboratory.

Diagnostic laboratory outputs inform public health intervention, and surveillance data is required to develop policy and guidance forming an essential component of healthcare. It is recognised that additional testing and referral of samples may entail some costs that has to be borne by the laboratory but in certain jurisdictions these costs are covered centrally.

Diagnostic laboratories should be mindful of the impact of laboratory investigations on public health and consider requests from the reference laboratories for specimen referral or enhanced information.

References

An explanation of the reference assessment used is available in the scientific information section on the UK SMI website.

1. Department of Health Immunisation against infectious disease 2006 - The Green Book. Updated 04 November 2013. 3rd ed. Great Britain: The Stationery Office; 2013. 1-514. **A, VI**

2. Public Health England. Guidance on the investigation, diagnosis and management of viral illness, or exposure to viral rash illness, in pregnancy 2019. **A, VI**

3. Boppana SB, Fowler KB. Persistence in the population: epidemiology and transmisson. In: Arvin A, Campadelli-Fiume G, Mocarski E, Moore PS, Roizman B, Whitley R et al., editors. Human Herpesviruses: Biology, Therapy, and Immunoprophylaxis. Cambridge; 2007. **A, IV**

4. Kenneson A, Cannon MJ. Review and meta-analysis of the epidemiology of congenital cytomegalovirus (CMV) infection. Rev Med Virol 2007;17:253-76. **A, I**

5. Public Health England. National measles guidelines November 2019 2019. **A, VI**

6. Public Health England. Post exposure prophylaxis for measles: Revised guidance 2019. **A, VI**

7. Scottish Health Protection Network. Guideline for the control of measles incidents and outbreaks in Scotland. 2019. **A, VI**

8. Baron EJ, Miller JM, Weinstein MP, Richter SS, Gilligan PH, Thomson Jr RB et al. A guide to utilization of the microbiology laboratory for diagnosis of infectious diseases: 2013 Recommendations by the Infectious Diseases Society of America (IDSA) and the American Society for Microbiology (ASM). Clinical Infectious Diseases 2013;57:485-8. **B, VI**

9. The Royal College of Pathologists. The retention and storage of pathological records and specimens (5th edition). 1-59. 2015. **A, VI**

10. Miller E, Cradockwatson JE, Pollock TM. Consequences of Confirmed Maternal Rubella at Successive Stages of Pregnancy. Lancet 1982;2:781-4. **B, II**

11. UK Health Security Agency. Guidelines on post exposure prophylaxis (PEP) for varicella/shingles GOV.UK 2025. **A, VI**

12. Public Health England. Guidance for issuing varicella-zoster immunoglobulin (VZIG). 22. 2017. **A, VI**