

NATIONAL STANDARD METHOD

GUIDANCE NOTE

# SURVEILLANCE OF POLIO IN THE UK

QSOP 31

Issued by Standards Unit, Evaluations and Standards Laboratory  
**Centre for Infections**

*Association of Medical Microbiologists*  
*Association of Medical Microbiologists*  
*Association of Medical Microbiologists*



**SURVEILLANCE OF POLIO IN THE UK**

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Page 1 of 16

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# STATUS OF NATIONAL STANDARD METHODS

National Standard Methods, which include standard operating procedures (SOPs), algorithms and guidance notes, promote high quality practices and help to assure the comparability of diagnostic information obtained in different laboratories. This in turn facilitates standardisation of surveillance underpinned by research, development and audit and promotes public health and patient confidence in their healthcare services. The methods are well referenced and represent a good minimum standard for clinical and public health microbiology. However, in using National Standard Methods, laboratories should take account of local requirements and may need to undertake additional investigations. The methods also provide a reference point for method development.

National Standard Methods are developed, reviewed and updated through an open and wide consultation process where the views of all participants are considered and the resulting documents reflect the majority agreement of contributors.

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### SURVEILLANCE OF POLIO IN THE UK

Issue no: 3.3 Issue date: 29.11.05 Issued by: Standards Unit, Evaluations & Standards Laboratory Page 2 of 16

Reference no: QSOP 31i3.3

This SOP should be used in conjunction with the series of SOPs from the Health Protection Agency

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<b>INDEX</b>	
<b>STATUS OF NATIONAL STANDARD METHODS .....</b>	<b>2</b>
<b>INDEX.....</b>	<b>3</b>
<b>AMENDMENT PROCEDURE .....</b>	<b>4</b>
<b>1 INTRODUCTION .....</b>	<b>5</b>
<b>2 THE ROLE OF HPA AND NHS LABORATORIES.....</b>	<b>5</b>
<b>3 THE ROLE OF THE ENTERIC UNIT ERNVL, SRMD, COLINDALE .....</b>	<b>6</b>
<b>4 RELEVANT NATIONAL STANDARD METHODS (TO BE ADDRESSED) .....</b>	<b>6</b>
<b>5 THE ROLE OF CDSC .....</b>	<b>7</b>
<b>APPENDIX 1. TECHNICAL INFORMATION ON THE LABORATORY DIAGNOSIS OF POLIOVIRUS INFECTION.....</b>	<b>8</b>
<b>APPENDIX 2. REQUEST FORM .....</b>	<b>10</b>
<b>APPENDIX 3. LETTER TO CLINICIANS .....</b>	<b>11</b>
<b>APPENDIX 4. PUBLIC HEALTH RESPONSE TO POTENTIAL WILD POLIOVIRUS INFECTION .....</b>	<b>12</b>
<b>APPENDIX 5. CASE DEFINITIONS FOR PARALYTIC POLIOMYELITIS .....</b>	<b>15</b>
<b>6 CONTACT .....</b>	<b>16</b>

**SURVEILLANCE OF POLIO IN THE UK**

Issue no: 3.3 Issue date: 29.11.05 Issued by: Standards Unit, Evaluations & Standards Laboratory Page 3 of 16

Reference no: QSOP 31i3.3

This SOP should be used in conjunction with the series of SOPs from the Health Protection Agency

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## AMENDMENT PROCEDURE

<b>Controlled document reference</b>	<b>QSOP 31</b>
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Each National Standard Method has an individual record of amendments. The current amendments are listed on this page. The amendment history is available from [standards@hpa.org.uk](mailto:standards@hpa.org.uk).

On issue of revised or new pages each controlled document should be updated by the copyholder in the laboratory.

Amendment Number/ Date	Issue no. Discarded	Insert Issue no.	Page	Section(s) involved	Amendment
5/ 29/11/05	3.2	3.3		<b>All</b>	Document updated

### **SURVEILLANCE OF POLIO IN THE UK**

Issue no: 3.3 Issue date: 29.11.05 Issued by: Standards Unit, Evaluations & Standards Laboratory Page 4 of 16  
Reference no: QSOP 31i3.3

This SOP should be used in conjunction with the series of SOPs from the Health Protection Agency

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# SURVEILLANCE OF POLIO IN THE UK

## 1 INTRODUCTION

The World Health Organisation aims to have eradicated wild poliovirus from all regions of the world. Prior to any decision to stop mass immunisation against polio however, it will be essential to demonstrate that all countries are free of wild poliovirus infections. Certification of a country or region as polio-free will require demonstration that surveillance systems are adequate to detect any endemic wild poliovirus infections.

In 1997/8, the PHLS was asked to prepare part of the UK submission to the WHO Commission for the certification of eradication in the European region. This aimed to demonstrate that current clinical and laboratory practice was adequate to detect cases of paralytic illness, aseptic meningitis and asymptomatic infection due to wild poliovirus. The UK submission was forwarded from the DH in Spring 1998 and it was accepted by the commission that the UK is now free of wild poliovirus. Formal certification could not proceed, however, until the whole region had been free of wild polio for three years. Europe was declared polio-free in 2002. It is essential that enhanced surveillance of poliovirus continues as importation from endemic regions is still possible. Furthermore, outbreaks of poliomyelitis caused by vaccine derived recombinant strains have occurred in countries certified as polio-free and where vaccine uptake has fallen. We need to demonstrate that cases with a possible diagnosis of poliomyelitis are adequately investigated to exclude infection with wild poliovirus. Supporting evidence is also provided by ability to correctly identify non-polio enteroviruses and vaccine strains of poliovirus. Detailed review of the clinical and laboratory data from all suspected cases of paralytic poliomyelitis (including cases of acute flaccid paralysis with persistent paralysis) should be performed by the UK Expert Panel. Cases of paralysis which are not adequately investigated should also be subjected to clinical review.

In 2004, the UK changed from using live oral polio vaccine (OPV) to inactivated vaccine. All poliovirus isolates, unless known to have come from persons recently given OPV, must now be regarded as potentially non-vaccine strains.

This document sets out the HPA roles in maintaining surveillance of polio in the UK until certification is completed worldwide.

## 2 THE ROLE OF HPA AND NHS LABORATORIES

Laboratories should try to ensure that poliovirus infection is excluded in all cases of acute flaccid paralysis (including Guillain-Barre syndrome) according to the WHO criteria. This involves the submission of two stool samples for viral culture. Samples should be taken 48 hours apart and within two weeks of onset (see Appendix 1).

Laboratories should discuss all cases of suspected polio with ERNVL or CDSC at an early stage. Such cases should be reported to the local CCDC.

**2.1** Laboratories should recommend the following additional investigations in cases of suspected polio (see Appendix 1):

- Biochemistry, microscopy and viral culture of CSF specimens
- Viral culture of throat swabs / NPAs
- Viral culture of stool from household contacts
- Enterovirus PCR on stool, CSF or throat swabs / NPAs

### SURVEILLANCE OF POLIO IN THE UK

Issue no: 3.3 Issue date: 29.11.05 Issued by: Standards Unit, Evaluations & Standards Laboratory Page 5 of 16  
Reference no: QSOP 31i3.3

This SOP should be used in conjunction with the series of SOPs from the Health Protection Agency

[www.evaluations-standards.org.uk](http://www.evaluations-standards.org.uk)

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- Poliovirus PCR on stool, CSF or throat swabs (available at ERNVL)
- Acute and convalescent serum for neutralising antibody to poliovirus 1, 2 and 3 (available at ERNVL)
- Poliovirus IgM assay arranged through ERNVL

Laboratories should perform all routine investigations according to the National Standard Methods (where appropriate / when available).

**2.2** As part of enhanced surveillance, laboratories should refer the following to the Enteric Virus Unit (EVU), ERNVL (see Appendix 2):

- All poliovirus isolates
- Untypable enterovirus isolates (these can be tested in suitably trained local laboratories if preferred. If they can not type them then they should be sent to Colindale for typing)
- CSF samples that are enterovirus positive by PCR
- Enterovirus isolates from cases with paralytic symptoms
- Enterovirus isolates from cases with neurological conditions (include those that mention meningitis / encephalitis / meningism / irritability / headache / convulsions / apnoea and sudden death on the request form)

**2.3** Laboratories should facilitate CDSC obtaining copies of clinical information on cases of suspected polio (see Appendix 3).

**2.4** Laboratories should assist CDSC and the local CCDC with the public health response to suspected cases (see Appendix 4).

### **3 THE ROLE OF THE ENTERIC UNIT ERNVL, CFI, COLINDALE**

The EVU will perform routine investigation and precede to intratypic characterisation of any poliovirus isolates. In particular information on the following should be sought at an early stage;

- All poliovirus isolates
- Enterovirus isolates from cases with paralytic symptoms
- Enterovirus isolates from people with possible neurological disease

EVU, ERNVL will report routine poliovirus investigations on specimens from cases with paralytic or other neurological symptoms within one week of receipt.

EVU, ERNVL will perform further investigation of cases of suspected polio according to approved SOPs. These investigations include:

- Neutralising antibody for poliovirus types 1,2 and 3
- Enterovirus PCR on stool, CSF or throat swab / NPA
- Poliovirus PCR on stool, CSF or throat swab / NPA
- Characterisation of polioviruses through sequencing of the VP1 region

EVU, ERNVL will provide advice on appropriate investigation of suspected cases.

EVU, ERNVL will support laboratories and CDSC in a public health response to a suspected case.

### **4 RELEVANT NATIONAL STANDARD METHODS (TO BE ADDRESSED)**

For additional details on specific areas of diagnosis refer to the following SOPs available through the Evaluations and Standards Laboratory web page ([www.evaluations-standards.org.uk](http://www.evaluations-standards.org.uk)) of the Health Protection Agency website ([www.hpa.org.uk](http://www.hpa.org.uk)):

#### **SURVEILLANCE OF POLIO IN THE UK**

Issue no: 3.3 Issue date: 29.11.05 Issued by: Standards Unit, Evaluations & Standards Laboratory Page 6 of 16

Reference no: QSOP 31i3.3

This SOP should be used in conjunction with the series of SOPs from the Health Protection Agency

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## 5 THE ROLE OF CDSC AT THE CENTRE FOR INFECTIONS

CDSC will offer advice on the appropriate investigation of suspected poliovirus cases to laboratories and CCDCs.

CDSC will offer advice and support to CCDCs in a public health response to a suspected case (see Appendix 4).

CDSC will liaise with local laboratories, CCDCs and clinicians to obtain further clinical information from all suspected cases of polio (see Appendix 3).

CDSC will collate clinical and laboratory information for review by the UK expert panel for:

- All cases of paralysis which are investigated for poliovirus infection
- For cases of paralysis where stool samples were not taken at the appropriate stage.
- All enterovirus identifications

CDSC will collate information on poliovirus and enterovirus isolates and identifications reported to CDSC and referred to EVU, ERNVL.

CDSC will collate data on cases of suspected poliomyelitis from any source (notified to ONS, paralysis reported to the Medicines Control Agency, referred to EVU, ERNVL or reported to CDSC) according to agreed case definitions (see Appendix 5).

# APPENDIX 1. TECHNICAL INFORMATION ON THE LABORATORY DIAGNOSIS OF POLIOVIRUS INFECTION

## 1 APPROPRIATE SPECIMENS

Throat swabs	first week of illness
Faeces	up to fourth week of illness
CSF	early
Serum	first week and 2 - 3 weeks later

## 2. VIRUS ISOLATION

### 2.1 Preparation of specimens

Throat swabs	clarify transport medium containing swab by low speed centrifugation
Faeces	make 10% suspension and clarify by low speed centrifugation
CSF	use neat

### 2.2 Inoculation of cell cultures

Inoculate specimens into cell cultures following local laboratory procedures. Examine cell sheet daily for cytopathic effects. If no cytopathic effects are visible after one week, scrape cells into tissue culture medium, freeze and thaw and reinoculate into fresh cells.

### 2.3 Recommended cells

Poliovirus grows in a wide range of all cultures of human and primate origin. RD (Rhabdomyosarcome) cells are particularly sensitive for isolation of poliovirus and enteroviruses (and can be supplied by ERNVL if required). Other suitable cells include MRC5 or other human fibroblasts, primary and secondary monkey kidney, Hep2, Hep2C, HeLa and PLC.

### 2.4 Virus typing

Isolates should be identified and typed eg by neutralisation, fluorescence etc.

Commercial fluorescence tests are available for the identification of polioviruses and a limited range of enteroviruses. Neutralising antisera are available from:  
Statens Serum Institut, 5 Artillerivej, 2300 Copenhagen, Denmark.  
Tel: +45 3268 3268  
Fax: +45 3268 3868  
Email: serum@ssi.dk  
www.ssi.dk

## 3 POLIOVIRUS ISOLATES

Poliovirus isolates should be sent to EVU, ERNVL for intratypic vaccine marker tests and genotyping, together with the completed form for Enhanced Surveillance of Polio.

### 3.1 PCR

PCR can be used for the detection of polioviruses and enteroviruses in faeces, throat swabs, CSF and early serum specimens.

#### SURVEILLANCE OF POLIO IN THE UK

## 4 SEROLOGY

Antibody tests for polio infection are available at EVU, ERNVL (minimum volume required is 300 uL). Sera should be sent together with the "Enhanced Surveillance of Polio" form.

Polio serology may be requested for reasons other than investigation of neurological illness eg immune status for travellers, patients who are immunocompromised and for Occupational Health purposes. These will be treated as referred tests. Serum samples should be submitted with the "Enhanced Surveillance of Polio" form.

## 5 FURTHER INFORMATION

For further information contact EVU, ERNVL 020 8327 + extension

Jim Gray	(x 6025)
Miren Iturriza	(x 6225)
Hazel Appleton	(x 6212)
Brian Megson	(x 6015)
David Brown	(x 6016)
Main switchboard and out of hours	020 8200 4400

### SURVEILLANCE OF POLIO IN THE UK

Issue no: 3.3 Issue date: 29.11.05 Issued by: Standards Unit, Evaluations & Standards Laboratory Page 9 of 16  
Reference no: QSOP 31i3.3

This SOP should be used in conjunction with the series of SOPs from the Health Protection Agency

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## APPENDIX 2. REQUEST FORM

<b>HPA ENHANCED SURVEILLANCE OF POLIO REQUEST FOR POLIO INVESTIGATION</b>
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### PATIENT DETAILS

Patient's name: \_\_\_\_\_ Hospital no: \_\_\_\_\_

Date of birth / age : \_\_\_\_\_ Sex: Male  Female

**SPECIMEN(s) FOR:** Virus typing  PCR  Serology

List all specimens enclosed:

Specimen (give source sample)	Date of specimen	Your lab no:

Result of your typing (if performed): \_\_\_\_\_

### CLINICAL DETAILS

What prompted this specimen to be taken?

- Neurological symptoms Please specify \_\_\_\_\_
- Immunosuppressed
- Occupational screening
- Other Please specify \_\_\_\_\_

If symptomatic, give approximate date of onset? \_\_\_\_\_

Has the patient ever been vaccinated? Yes  No  N/K  OPV or IPV

In the three months prior to onset, had the patient

Travelled abroad?\* Yes  No  N/K  If yes, country

Received OPV? Yes  No  N/K  If yes, give date

\_\_\_\_\_

Had contact with an OPV recipient? Yes  No  N/K

Completed by: \_\_\_\_\_ Laboratory:

Please return this form, with the specimens to:  
ERNVL, Centre for Infection, 61, Colindale Avenue, London NW9 5HT

**Please discuss all patients with suspected polio with Dr David Brown (Tel: 0208 200 4400 Ext.6016) or Dr Mary Ramsay (020 8327 7085) at an early stage.**

#### SURVEILLANCE OF POLIO IN THE UK

Issue no: 3.3 Issue date: 29.11.05 Issued by: Standards Unit, Evaluations & Standards Laboratory Page 10 of 16  
Reference no: QSOP 31i3.3

This SOP should be used in conjunction with the series of SOPs from the Health Protection Agency  
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## APPENDIX 3. LETTER TO CLINICIANS

### Polio eradication 2000

Dear Dr \_\_\_\_\_

Re: Case name / identifier: \_\_\_\_\_ Reported on/by: \_\_\_\_\_

As you may know, the World Health Organisation aims to eradicate wild poliovirus in the first few years of the new millennium. Before any decision to stop vaccination can be made, however, it will be important to demonstrate that wild poliovirus is absent in every country. This requires a process of certification, where the surveillance data from each country is presented to the WHO regional commission for critical review. The UK is shortly due to be certified and I am currently collating data to present to the commission.

The criteria that will be used will be extremely stringent and, in particular, evidence that wild poliovirus infection was excluded in **each** case of paralysis is required. The WHO has established a gold standard that **all** suspected cases of acute flaccid paralysis should be investigated by the submission of stool samples for virology. In the UK, however, where the diagnosis of paralytic polio is considered extremely unlikely, many such cases are excluded by clinical or other criteria. It will therefore be necessary for us to document the clinical findings and investigations in all suspected cases and to submit these for expert review. I am therefore writing to the clinicians of all cases which have been reported as acute flaccid paralysis, **including those where the diagnosis of poliomyelitis has since been rejected**, to obtain further details for this review. The data will be reviewed by Professor Richard Robinson and Professor Richard Hughes from Guys Hospital.

I would therefore be very grateful if you could send to me a copy of the discharge summary and/or outpatient letters (or the notes if you prefer) from the above case which was reported in (enter year). In particular we are interested in history of vaccination or travel, in laboratory investigations (eg. specimens sent for virology, examination of cells in the CSF), in the clinical presentation (eg. presence of sensory or upper motor neurone symptoms) and in the outcome (residual paralysis at least 60 days after onset). If you could please forward any information that we may not already have as soon as possible I would be very grateful.

With many thanks for your help with this important initiative.

Dr Mary Ramsay  
Consultant Epidemiologist

#### SURVEILLANCE OF POLIO IN THE UK

Issue no: 3.3 Issue date: 29.11.05 Issued by: Standards Unit, Evaluations & Standards Laboratory Page 11 of 16  
Reference no: QSOP 31i3.3

This SOP should be used in conjunction with the series of SOPs from the Health Protection Agency

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## APPENDIX 4. PUBLIC HEALTH RESPONSE TO POTENTIAL WILD POLIOVIRUS INFECTION

### Level one: single case of suspected vaccine associated paralytic polio

Defined as: Compatible illness in recent oral polio vaccine recipient or with history of contact with recipient or recent travel in an endemic area (with or without poliovirus isolate)

1. Ensure appropriate investigations (see Appendix 1) are initiated in case and contacts. Report to CDSC/ERNVL. Inform DH.
2. Offer IPV vaccine to unvaccinated close (household / health carers) contacts
3. Encourage opportunistic IPV vaccination of unvaccinated persons in school / locality.

### Level two: possible single case of wild poliovirus

Defined as: Poliovirus isolate from a person with paralytic symptoms who has no history of recent vaccination or contact with a vaccinee  
Poliovirus isolate from a person returning from a possible endemic area (any country other than western Europe, north America, or Australasia)  
Poliovirus isolate from a child in an itinerant family  
Poliovirus isolate from a child in a community which may refuse vaccination (eg Steiner communities)

1. Initiate appropriate investigations (see Appendix 1) of case and contacts immediately. Report immediately to CDSC and / or ERNVL. Contact DH to obtain supply of OPV.
2. Ensure all close family contacts are vaccinated with OPV immediately - regardless of vaccination status.
3. Immediately investigate vaccination coverage in population at risk (eg school, residential community, locality). If vaccine coverage in local childhood population is suspected to be below 85% consider a mop up campaign involving:
  - A single dose of OPV to persons of all ages if case occurs in a well defined community (regardless of vaccine history)  
OR
  - A single dose of OPV in all children of pre-school and school-age in locality (regardless of vaccine history)  
AND
  - Encourage opportunistic IPV vaccination (completion of vaccine course in all unvaccinated and partially vaccinated persons in locality)
4. If the target population (defined in 3) refuses vaccine
  - Consider giving a single dose of vaccine to persons in adjacent communities
  - Institute active surveillance for paralytic and non-paralytic polio infection in locality

#### SURVEILLANCE OF POLIO IN THE UK

Issue no: 3.3 Issue date: 29.11.05 Issued by: Standards Unit, Evaluations & Standards Laboratory Page 12 of 16  
Reference no: QSOP 31i3.3

This SOP should be used in conjunction with the series of SOPs from the Health Protection Agency

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### Level three: confirmed single case of wild poliovirus

Defined as: Poliovirus isolate confirmed as wild by intratypic differentiation at ERNVL

1. Collect stool samples from household contacts. Consider collection of stool samples from wider population
2. Report immediately to CDSC. DH and WHO will be informed
3. Institute active surveillance for paralytic and non-paralytic infection in locality.
  - Advise local laboratories and clinicians
  - Encourage stool samples in all acute neurological illnesses
  - Consider stool survey in healthy contacts
4. If the infection appears to be imported. Immediately investigate vaccination coverage in population at risk (eg school, residential community, locality). If vaccine coverage in local childhood population is suspected to be below 85% consider a mop up campaign involving:
  - A single dose of OPV to persons of all ages if case occurs in a well defined community (regardless of vaccine history)  
OR
  - A single dose of OPV in all children of pre-school and school-age in locality (regardless of vaccine history)  
AND
  - Opportunistic IPV vaccination (encourage completion of vaccine course in all unvaccinated and partially vaccinated persons in the locality)
5. If the infection appears to be indigenous perform retrospective case-finding
  - Contact local laboratories to obtain any recent enterovirus isolates
  - Perform stool survey in health persons at risk
6. If infection is thought to be indigenous, conduct a mop up campaign involving:
  - A single dose of OPV to persons of all ages if case occurs in a well defined community (regardless of vaccine history)  
OR
  - A single dose of OPV in all children of pre-school and school-age in locality (regardless of vaccine history)  
AND
  - Opportunistic IPV vaccination (encourage completion of vaccine course in all unvaccinated and partially vaccinated persons in the locality)
7. If the target population (defined in 4 or 6) refuses vaccine
  - Consider giving a single dose of vaccine to person in adjacent communities
8. Consider a mop-up campaign in other age groups / populations depending on the epidemiological circumstances

#### SURVEILLANCE OF POLIO IN THE UK

Issue no: 3.3 Issue date: 29.11.05 Issued by: Standards Unit, Evaluations & Standards Laboratory Page 13 of 16

Reference no: QSOP 31i3.3

This SOP should be used in conjunction with the series of SOPs from the Health Protection Agency

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#### **Level four: epidemiologically linked cases of paralytic polio**

Defined as: Compatible illness occurring in two or more people in the same locality within an eight week period where two or more individuals have no history of recent vaccination or contact with a recipient (with or without poliovirus isolates).

1. Initiate appropriate investigations of case and contacts immediately. Report immediately to CDSC and/or ERNVL. Inform DH.
2. Ensure close family contacts are vaccinated with OPV immediately - regardless of vaccination status.
3. Institute active surveillance and retrospective case-finding for paralytic and non-paralytic infection in locality.
  - Advise local laboratories and clinicians
  - Encourage stool samples in all acute neurological illnesses
  - Perform stool survey in healthy contacts
  - Contact local laboratories to obtain any recent enterovirus isolates
4. Conduct a mop up campaign involving:
  - A single dose of OPV to persons of all ages if case occurs in a well defined community (regardless of vaccine history)  
OR
  - A single dose of OPV in all children of pre-school and school-age in locality (regardless of vaccine history)  
AND
  - Opportunistic vaccination (completion of all unvaccinated persons in locality)
5. Consider a mop-up campaign in other age groups / populations depending on the epidemiological circumstances.

#### **SURVEILLANCE OF POLIO IN THE UK**

Issue no: 3.3 Issue date: 29.11.05 Issued by: Standards Unit, Evaluations & Standards Laboratory Page 14 of 16

Reference no: QSOP 31i3.3

This SOP should be used in conjunction with the series of SOPs from the Health Protection Agency

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## APPENDIX 5. CASE DEFINITIONS FOR PARALYTIC POLIOMYELITIS

### Definition of a case of paralytic poliomyelitis

A patient with clinical features compatible with paralytic poliomyelitis from whom either vaccine or wild poliovirus has been isolated from a clinical specimen.

### Clinical features compatible with paralytic poliomyelitis

- Acute flaccid paralysis
- Decreased or absent tendon reflexes in affected limbs
- No sensory or cognitive loss
- No other cause identified despite laboratory investigation
- Neurological deficit present 60 days after onset of symptoms unless the patient has died

### Categories of cases

1. Vaccine Recipient
2. Vaccine Contact
3. Wild Indigenous
4. Wild Imported
5. Other

### Definitions of categories of cases

#### 1. Vaccine recipient (Va R)#

- Clinical features compatible with paralytic poliomyelitis, and
- No laboratory evidence of wild-type virus\*, and
- Paralysis onset between 4 and 30 days after patient received oral polio vaccine†

# vaccinated abroad or in a patients with underlying immunodeficiency previously vaccinated with OPV

\* confirmation by isolation of vaccine virus

† for immunocompromised individuals these periods can be considerably longer

#### 2. Vaccine contact (Va C)

- Clinical features compatible with paralytic poliomyelitis, and
- No laboratory evidence of wild-type virus\*, and
- Contact with a vaccinee, and
- Paralysis onset between 4 and 75 days after vaccine received oral polio vaccine†

\* confirmation by isolation of vaccine virus

† for immunocompromised individuals these periods can be considerably longer

#### 3. Wild indigenous

- Clinical features compatible with paralytic poliomyelitis, and
- Wild-type virus isolation, and
- No travel to, and no contact with anyone who has travelled to or resided in, a country where wild poliovirus is known to circulate within 30 days before symptom onset

#### 4. Wild imported

- Clinical features compatible with paralytic poliomyelitis, and

#### SURVEILLANCE OF POLIO IN THE UK

Issue no: 3.3 Issue date: 29.11.05 Issued by: Standards Unit, Evaluations & Standards Laboratory Page 15 of 16

Reference no: QSOP 31i3.3

This SOP should be used in conjunction with the series of SOPs from the Health Protection Agency

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- Wild-type virus isolation, and
- Travel to or residence in a country where wild poliovirus is known to circulate within 30 days before symptom onset (see 5)

## 5. Other categories

### 5.1 Wild virus - import related

- Clinical features compatible with paralytic poliomyelitis, and
- Wild-type virus isolation, and
- Contact with anyone who has travelled to or resided in a country where wild poliovirus is known to circulate within 30 days before symptom onset, or contact with anyone who has acute poliomyelitis thought to have travelled to or resided in a country where wild poliovirus is known to circulate within 30 days before symptom onset

### 5.2 Vaccine associated case - possible or no known contact

- Clinical features compatible with paralytic poliomyelitis, and
- Vaccine virus isolation but no known direct contact with a vaccinee and no history of the patient receiving oral polio vaccine

### 5.3 Compatible case\*

- Clinical features compatible with paralytic poliomyelitis, and
- No poliovirus isolation from clinical specimens, and
- With or without serological evidence of recent poliovirus infection, and
- No evidence for infection with other neurotropic viruses

\* these cases are referred for expert review and subsequent categorisation

## 6 ACKNOWLEDGMENT AND CONTACTS

Any queries relating to this Guidance Note should be made to:

Dr DWG Brown, Director, Enteric, Respiratory and Neurological Virus Laboratory, Central Public Health Laboratory

Dr M Ramsay, Consultant Epidemiologist, Immunisation Division, Communicable Disease Surveillance Centre

This National Standard Method has been developed, reviewed and revised by the Virology Working Group on Standards and Quality ([http://www.hpa-standardmethods.org.uk/wg\\_virology.asp](http://www.hpa-standardmethods.org.uk/wg_virology.asp)). The contributions of many individuals in clinical virology laboratories and specialist organisations who have provided information and comment during the development of this document, and final editing by the Medical Editor are acknowledged.

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### SURVEILLANCE OF POLIO IN THE UK

Issue no: 3.3 Issue date: 29.11.05 Issued by: Standards Unit, Evaluations & Standards Laboratory Page 16 of 16

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