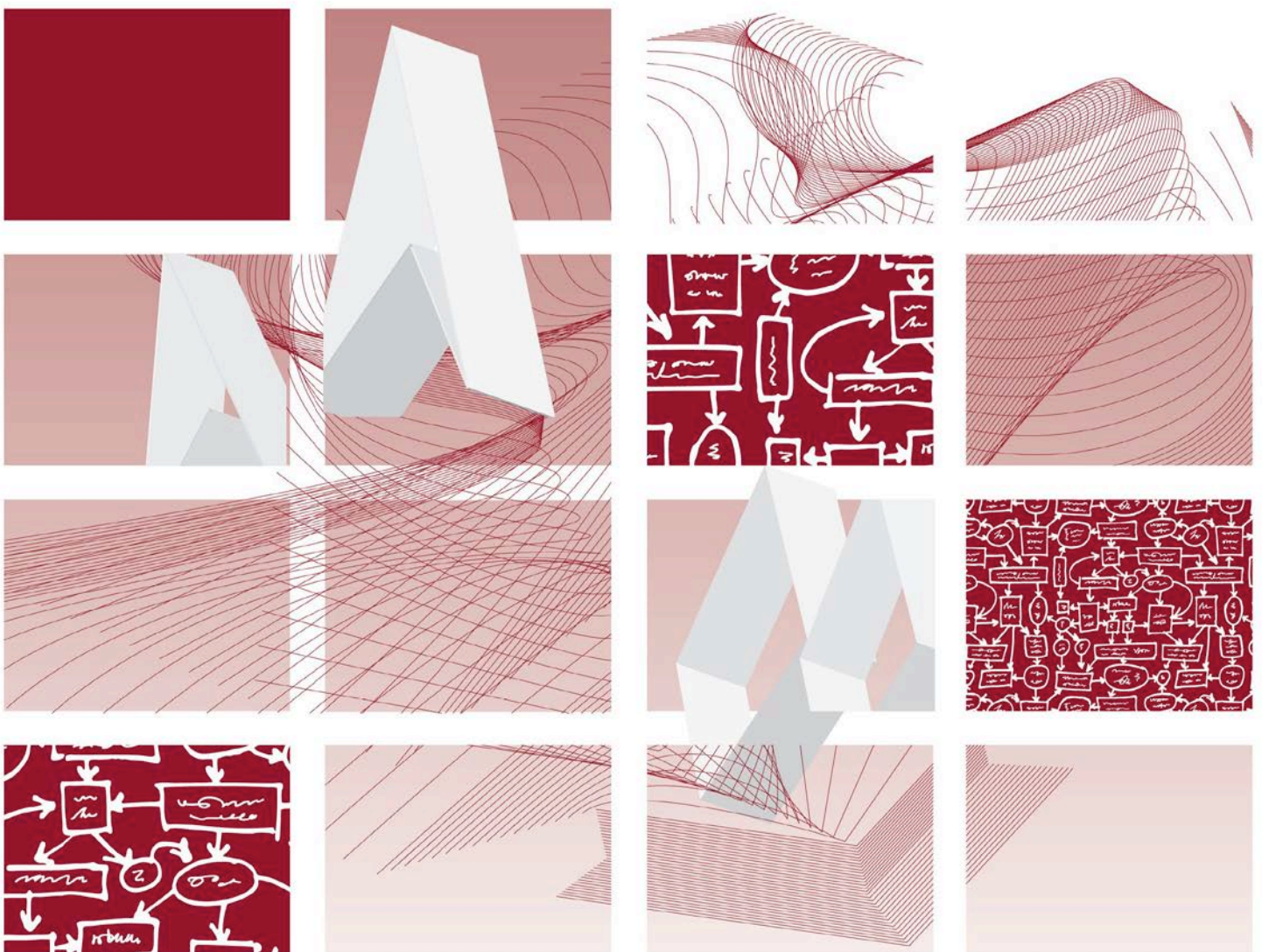




UK Standards for Microbiology Investigations

Gastroenteritis and Diarrhoea



Acknowledgments

UK Standards for Microbiology Investigations (SMIs) are developed under the auspices of Public Health England (PHE) working in partnership with the National Health Service (NHS), Public Health Wales and with the professional organisations whose logos are displayed below and listed on the website <http://www.hpa.org.uk/SMI/Partnerships>. SMIs are developed, reviewed and revised by various working groups which are overseen by a steering committee (see <http://www.hpa.org.uk/SMI/WorkingGroups>).

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.

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For full details on our accreditation visit: www.nice.org.uk/accreditation.

Amendment Table

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

New or revised documents should be controlled within the laboratory in accordance with the local quality management system.

Amendment No/Date.	-/23.12.13
Issue no. discarded.	-
Insert Issue no.	1
Section(s) involved	Amendment

UK Standards for Microbiology Investigations[#]: Scope and Purpose

Users of SMIs

- SMIs are primarily intended as a general resource for practising professionals operating in the field of laboratory medicine and infection specialties in the UK.
- SMIs provide clinicians with information about the available test repertoire and the standard of laboratory services they should expect for the investigation of infection in their patients, as well as providing information that aids the electronic ordering of appropriate tests.
- SMIs provide commissioners of healthcare services with the appropriateness and standard of microbiology investigations they should be seeking as part of the clinical and public health care package for their population.

Background to SMIs

SMIs comprise a collection of recommended algorithms and procedures covering all stages of the investigative process in microbiology from the pre-analytical (clinical syndrome) stage to the analytical (laboratory testing) and post analytical (result interpretation and reporting) stages.

Syndromic algorithms are supported by more detailed documents containing advice on the investigation of specific diseases and infections. Guidance notes cover the clinical background, differential diagnosis, and appropriate investigation of particular clinical conditions. Quality guidance notes describe laboratory processes which underpin quality, for example assay validation.

Standardisation of the diagnostic process through the application of SMIs helps to assure the equivalence of investigation strategies in different laboratories across the UK and is essential for public health surveillance, research and development activities.

Equal Partnership Working

SMIs are developed in equal partnership with PHE, NHS, Royal College of Pathologists and professional societies.

The list of participating societies may be found at <http://www.hpa.org.uk/SMI/Partnerships>. Inclusion of a logo in an SMI indicates participation of the society in equal partnership and support for the objectives and process of preparing SMIs. Nominees of professional societies are members of the Steering Committee and Working Groups which develop SMIs. The views of nominees cannot be rigorously representative of the members of their nominating organisations nor the corporate views of their organisations. Nominees act as a conduit for two way reporting and dialogue. Representative views are sought through the consultation process.

SMIs are developed, reviewed and updated through a wide consultation process.

[#]Microbiology is used as a generic term to include the two GMC-recognised specialties of Medical Microbiology (which includes Bacteriology, Mycology and Parasitology) and Medical Virology.

Quality Assurance

NICE has accredited the process used by the SMI Working Groups to produce SMIs. The accreditation is applicable to all guidance produced since October 2009. The process for the development of SMIs is certified to ISO 9001:2008.

SMIs represent a good standard of practice to which all clinical and public health microbiology laboratories in the UK are expected to work. SMIs are NICE accredited and represent neither minimum standards of practice nor the highest level of complex laboratory investigation possible. In using SMIs, laboratories should take account of local requirements and undertake additional investigations where appropriate. SMIs help laboratories to meet accreditation requirements by promoting high quality practices which are auditable. SMIs also provide a reference point for method development.

The performance of SMIs depends on competent staff and appropriate quality reagents and equipment. Laboratories should ensure that all commercial and in-house tests have been validated and shown to be fit for purpose. Laboratories should participate in external quality assessment schemes and undertake relevant internal quality control procedures.

Patient and Public Involvement

The SMI Working Groups are committed to patient and public involvement in the development of SMIs. By involving the public, health professionals, scientists and voluntary organisations the resulting SMI will be robust and meet the needs of the user. An opportunity is given to members of the public to contribute to consultations through our open access website.

Information Governance and Equality

PHE is a Caldicott compliant organisation. It seeks to take every possible precaution to prevent unauthorised disclosure of patient details and to ensure that patient-related records are kept under secure conditions.

The development of SMIs are subject to PHE Equality objectives http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1317133470313. The SMI Working Groups are committed to achieving the equality objectives by effective consultation with members of the public, partners, stakeholders and specialist interest groups.

Legal Statement

Whilst every care has been taken in the preparation of SMIs, PHE and any supporting organisation, shall, to the greatest extent possible under any applicable law, exclude liability for all losses, costs, claims, damages or expenses arising out of or connected with the use of an SMI or any information contained therein. If alterations are made to an SMI, it must be made clear where and by whom such changes have been made.

The evidence base and microbial taxonomy for the SMI is as complete as possible at the time of issue. Any omissions and new material will be considered at the next review. These standards can only be superseded by revisions of the standard, legislative action, or by NICE accredited guidance.

SMIs are Crown copyright which should be acknowledged where appropriate.

Suggested Citation for this Document

Public Health England. (2013). Gastroenteritis and Diarrhoea. UK Standards for Microbiology Investigations. S 7 Issue 1. <http://www.hpa.org.uk/SMI/pdf>.

Scope of Document

UK Standards for Microbiology Investigations (SMIs) comprise a collection of recommended algorithms for initial test selection and testing methods and confirmatory strategies. UK SMIs also contain guidance notes that describe the recommended standard set of investigations consistent with current good practice in different infective disease presentations, as well as examples of standard laboratory practice and general information on clinical syndromes.

The syndromic algorithms form part of the pre-analytical stage of the investigative process and are intended to guide clinicians and diagnostic laboratory staff in the choice of the correct pathway for the investigation of a sample based upon the clinical context. It is recognised that clinical details are essential to the optimal processing of samples and the documents perform best when sufficient, relevant clinical details are provided at the time of sample submission. The algorithms are presented in flowchart format to give a clear overview of how to proceed with the testing of specimens and the possible outcomes using the clinical history provided. If the primary testing set does not identify a causative pathogen, secondary testing should be performed if clinical and/or epidemiological features support such testing. Laboratories may wish to undertake second line tests either after, or at the same time as, the primary testing set according to the clinical and local epidemiological setting and laboratory operational capabilities. The flowcharts are intended to reflect current recommended practice; accounting for prevalence of infections in the UK, public health needs, and availability of tests, with references and links to more detailed guidance. National surveillance programmes for specific organisms should be taken into consideration when using the algorithms.

This document should be read in conjunction with relevant SMIs for laboratory processing and reporting of target organisms and public health actions.

S 7 – Gastroenteritis and Diarrhoea: Scope¹

The intended scope of this document is to describe which infections and relevant associated tests should be considered according to the different clinical presentations consistent with gastroenteritis and diarrhoea infection in adults and children, in social and healthcare settings, who are either immunocompetent or immunocompromised.

The syndromes included have been selected to reflect the common presenting groups of patients with infective gastroenteritis and diarrhoea. Symptoms and signs may include diarrhoea, nausea, vomiting, abdominal pain or tenderness, tenesmus, fever, faecal incontinence, and associated sepsis or dehydration.

There are an estimated 17 million cases of infectious intestinal disease annually in the UK². Not all community cases of acute diarrhoea and vomiting require laboratory investigation as many are self-limiting (please refer to: Public Health England (PHE), National Institute for Healthcare and Clinical Excellence (NICE) and Department of Health (DH) guidelines³⁻⁶).

The document takes account of UK data from the Infectious Intestinal Disease 2 (IID2) study 2011 which emphasised the under diagnosis of enteric viruses in all age groups². The most commonly identified organisms in the community were norovirus, sapovirus, *Campylobacter* species and rotavirus².

The main target organisms of this syndromic algorithm are:

- *Salmonella* species
- *Shigella* species
- *Campylobacter* species
- *Escherichia coli* VTEC (including O157)
- *Clostridium difficile*
- Cryptosporidium, Giardia, and Entamoeba
- Microsporidia
- Norovirus

In addition, samples may be screened for other organisms as indicated by clinical details. For example:

- *Vibrio* species
- *Plesiomonas* species
- *Yersinia* species
- Toxin producers (*Bacillus* species, *Bacillus cereus*, *Staphylococcus aureus*, *Clostridium perfringens*, *Clostridium botulinum*)
- Adenovirus, Astrovirus, Rotavirus and Sapovirus

Microscopy for white blood cells (WBC) and red blood cells (RBC) is no longer recommended as it is considered to be of little clinical value^{7,8}.

The enteric diseases covered include three types of infections; examples of causative organisms are given below¹:

- **Non inflammatory (enterotoxin or adherence/ superficial invasion)** eg *Vibrio cholera*, *E. coli* (enterotoxigenic (ETEC), enteropathogenic (EPEC), enteroaggregative (EAEC), heat labile toxin (LT), heat stable toxin (ST)), *Clostridium perfringens*, *Bacillus cereus*, *Staphylococcus aureus*, *Giardia lamblia*, rotavirus, norovirus, *Cryptosporidium* species, microsporidia and *Cyclospora cayetenensis*
- **Inflammatory disease or cytotoxic destruction** eg *Shigella* species, *E. coli* (enterohaemorrhagic (EHEC), enteroinvasive (EIEC)), *Salmonella enteritidis*, *Vibrio parahaemolyticus*, *Clostridium difficile*, *Campylobacter jejuni*, *Entamoeba histolytica*
- **Penetration of intact mucosa to multiply in the lymphatic or reticuloendothelial system** eg *Salmonella* Typhi, *Yersinia enterocolitica*, *Campylobacter fetus*, *Vibrio vulnificus*

Stool samples are usually referred for investigation in the following situations:

- When the clinician requires a microbiological diagnosis
 - When there is persistent diarrhoea/malabsorption
 - When there is blood, mucous or pus in the stool

- When there is a history of diarrhoea and/or vomiting, and the patient is systemically unwell
- When there is a history of recent hospitalisation
- When there is a history of antibiotic therapy
- When public health requires sampling to be carried out. For example:
 - When investigating outbreaks of diarrhoea and/or vomiting in contacts of patients infected with organisms such as *E. coli* VTEC (including O157) or *S. Typhi*
 - When there is a suspected public health hazard (eg if a patient with diarrhoea is a food handler)
- When the patient is immunocompromised
- When there is a history of foreign travel (to areas other than Western Europe, North America, Australia or New Zealand)

Clinicians and laboratories should consult local policy on the “three day rule” (see footnote a)⁹. Testing for *C. difficile* is required for inpatients as soon as infective diarrhoea is suspected⁶. Formed stools are unsuitable for investigation for *C. difficile*; these should be rejected and an appropriate comment appended to the report.

The history of the patient should identify risk factors for unusual causes of acute gastroenteritis and any extra-intestinal causes.

In addition to patient identifiable information (name, age etc.), patient history (including clinical features and epidemiological information) should be recorded on the request form including³:

- Acute/outbreak case
- Immune status
- Healthcare or community acquired. If patient is hospitalised, date of admission and date of symptom onset should be included
- Recent foreign travel (2-3 weeks) including location
- Waterborne infection/farm animal exposure
- Food intake (eg shellfish, chicken)
- Recent antibiotic use
- Other information (eg suspected food poisoning, viral gastroenteritis, contact with cases)

Note: this document does not cover the following:

- Non-infectious causes of diarrhoea (eg colitis or proctitis)
- Investigation of algal toxins (eg diarrhetic shellfish poisoning)
- Investigation of *Helicobacter pylori* (refer to [B 55 – Investigation of *Helicobacter pylori*](#))
- Investigation of *Mycobacterium* species (refer to [B 40 – Investigation of Specimens for *Mycobacterium* species](#))¹⁰

- Investigation of viral hepatitis (refer to [S1 – Acute Infective Hepatitis](#))
- Investigation of overgrowth with *Clostridium perfringens* or *Candida* species
- Further management of the patient with infective gastroenteritis
- Faecal screening for antibiotic resistant bacteria (eg glycopeptide-resistant enterococci or multi-drug resistant *Acinetobacter* species)

This SMI should be used in conjunction with other SMIs including [B 10 – Processing of Faeces for *Clostridium difficile*](#), [B 30 – Investigation of Faecal Specimens for Enteric Pathogens](#) and [B 31 – Investigation of Specimens other than Blood for Parasites](#).

1 Notification to PHE^{11,12} or Equivalent in the Devolved Administrations¹³⁻¹⁶

The Health Protection (Notification) regulations 2010 require diagnostic laboratories to notify Public Health England (PHE) when they identify the causative agents that are listed in Schedule 2 of the Regulations. Notifications must be provided in writing, on paper or electronically, within seven days. Urgent cases should be notified orally and as soon as possible, recommended within 24 hours. These should be followed up by written notification within seven days.

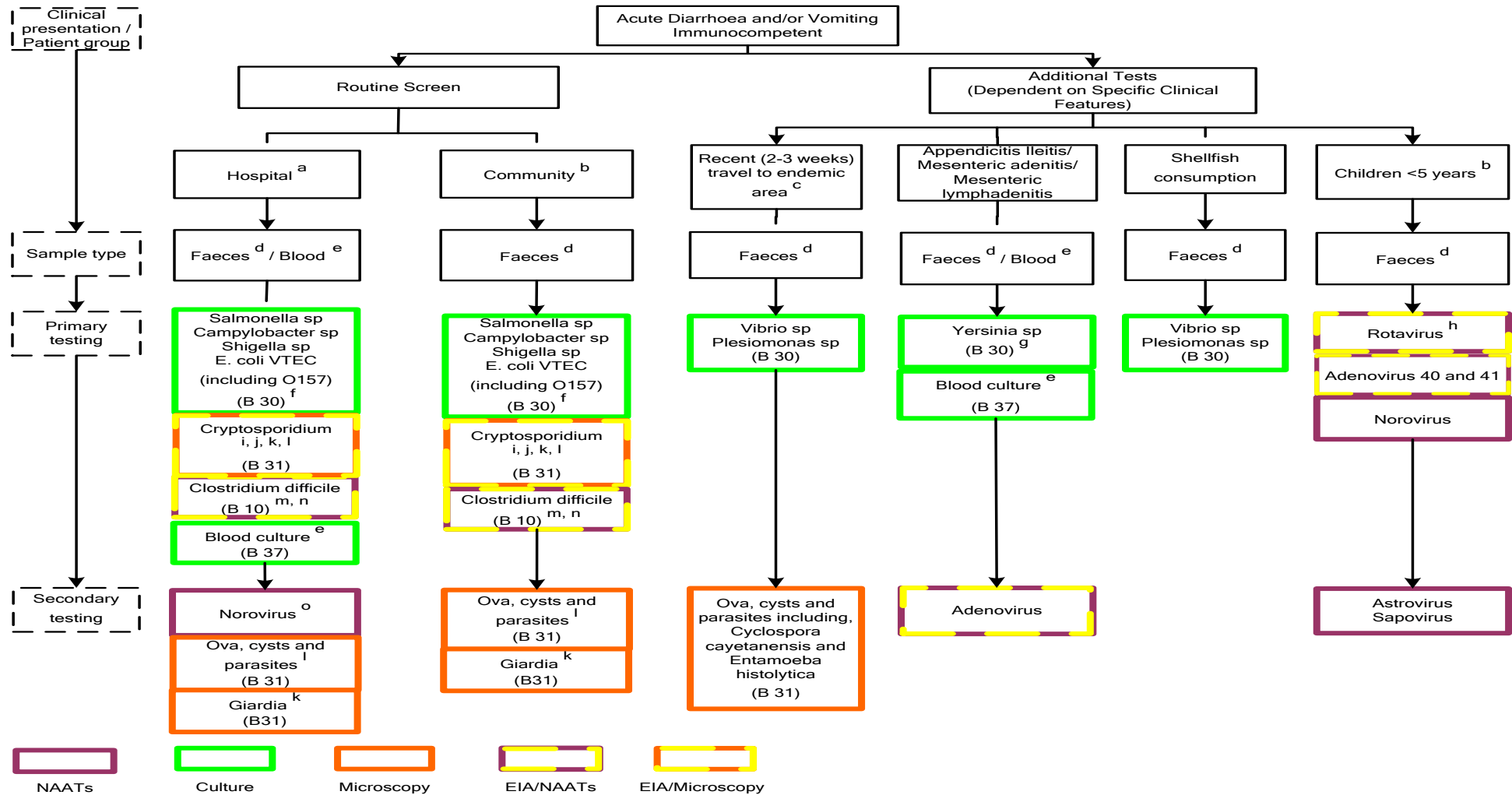
For the purposes of the Notification Regulations, the recipient of laboratory notifications is the local PHE Health Protection Team. If a case has already been notified by a registered medical practitioner, the diagnostic laboratory is still required to notify the case if they identify any evidence of an infection caused by a notifiable causative agent.

Notification under the Health Protection (Notification) Regulations 2010 does not replace voluntary reporting to PHE. The vast majority of NHS laboratories voluntarily report a wide range of laboratory diagnoses of causative agents to PHE and many PHE Health protection Teams have agreements with local laboratories for urgent reporting of some infections. This should continue.

Note: The Health Protection Legislation Guidance (2010) includes reporting of HIV & STIs, HCAs and CJD under 'Notification Duties of Registered Medical Practitioners': it is not noted under 'Notification Duties of Diagnostic Laboratories'.

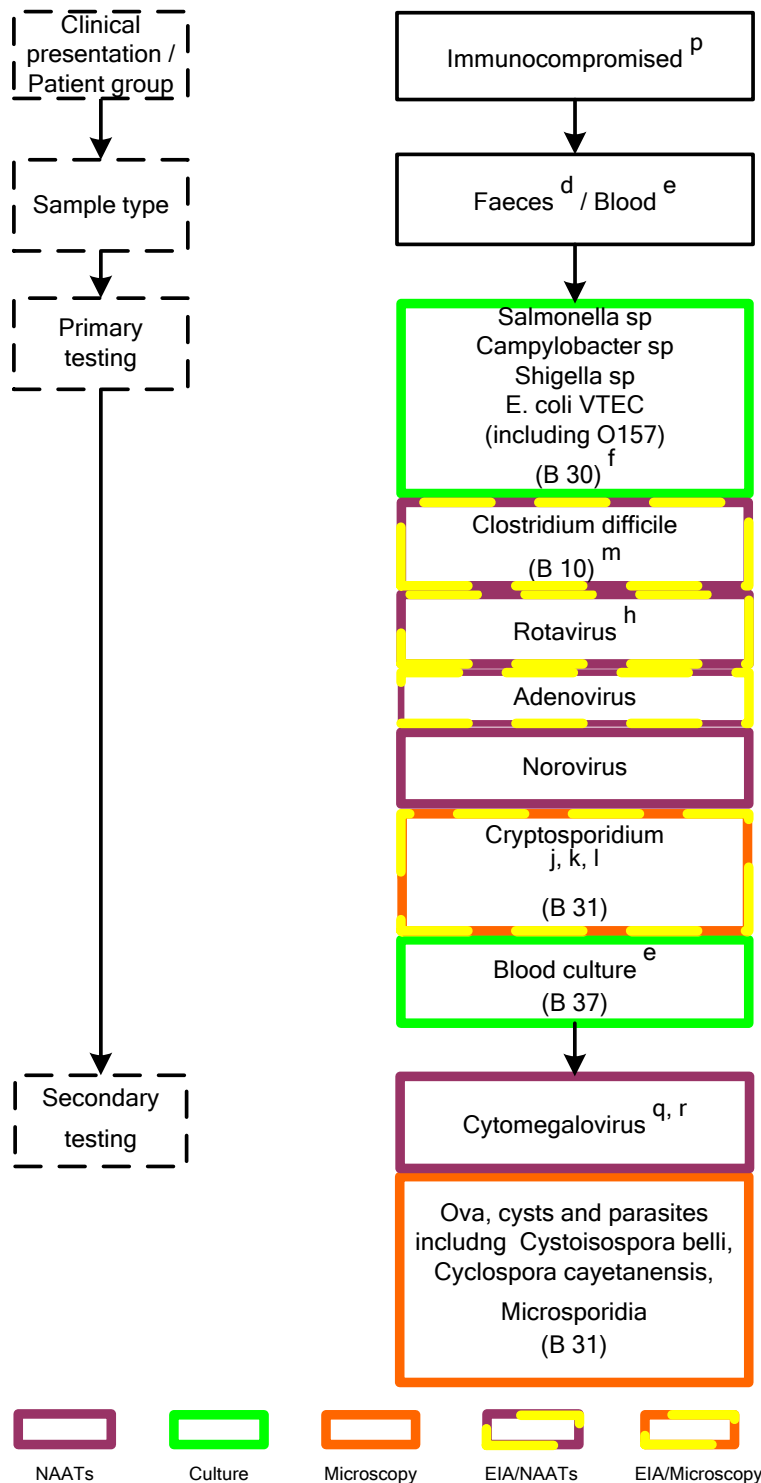
Other arrangements exist in Scotland^{13,14}, Wales¹⁵ and Northern Ireland¹⁶.

Sporadic Cases (Immunocompetent)^{17,18}



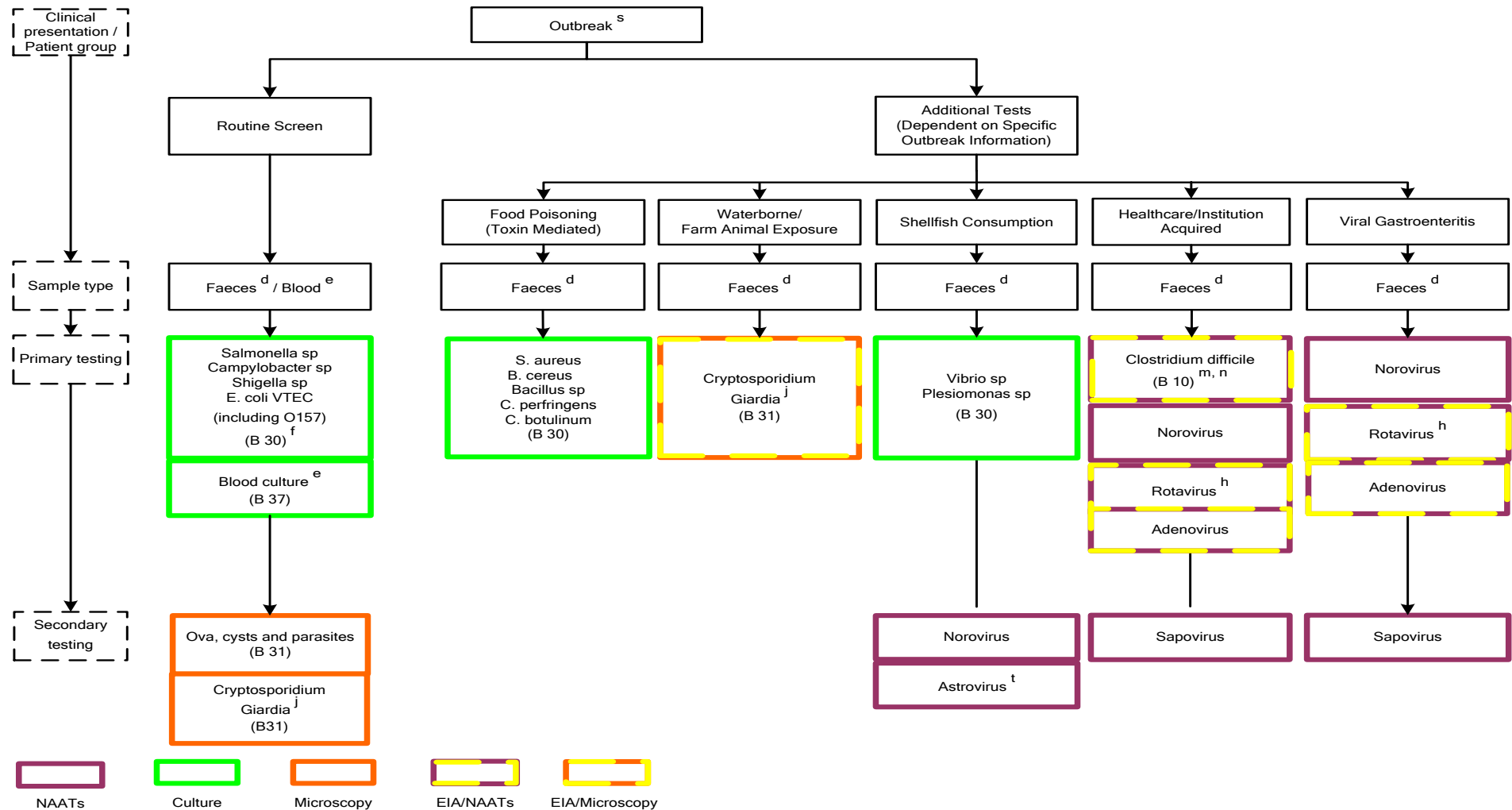
To view associated SMI documents please access from: <http://www.hpa.org.uk/SMI>

Immunocompromised¹⁷⁻²⁰



To view associated SMI documents please access from: <http://www.hpa.org.uk/SMI>

Outbreaks^{17,18}



To view associated SMI documents please access from: <http://www.hpa.org.uk/SMI>

Footnotes

- a) For gastroenteritis and diarrhoea acquired in a hospital setting, clinicians and laboratories should consult local policy on the “three day rule” for the microbiological investigation of faecal samples in their department.

Laboratories considering applying the “three day rule” should undertake analysis of their submission and positivity data and undertake an informed risk assessment. Clusters of diarrhoea cases must be investigated.

The “three day rule” does not apply to *C. difficile*. Testing for *C. difficile* is required for inpatients as soon as infective diarrhoea is suspected⁶.

The “three day rule” suggests that faecal samples from patients should not undergo microbiological investigation except under the following circumstances^{9,21}:

- Those inpatients developing diarrhoea within three days of admission
 - Adults with nosocomial diarrhoea only if one of the following is applicable:
 - Aged 65 or more with pre-existing disease causing permanently altered organ function
 - Patients who are HIV positive
 - Patients with neutropenia
 - Suspected nosocomial outbreak (eg Salmonella)
 - Those with suspected non-diarrhoeal manifestations of enteric infections
- b) The algorithm recognises that sporadic causes of viral infection managed in the community will only be diagnosed in those aged <5 years.
- c) Endemic areas for the following organisms include²²:
- *Vibrio* species and *Plesiomonas shigelloides*: Asia, Africa and Latin America²³⁻²⁷
 - *Cyclospora cayetanensis*: Tropics including Haiti, Guatemala, Peru and Nepal²⁸
 - *Entamoeba histolytica*: Central and South America, Africa, and India²⁹
- d) Methods with varying sensitivities and specificities for testing of faeces are available. Alternative diagnostic techniques may have potential advantages and disadvantages and should therefore be evaluated and validated prior to use. Molecular methods (eg multiplex PCR) and enzyme immunoassays (EIA) may perform better than plate based methods, and should therefore be considered for use where available following validation to ensure appropriate clinical interpretation³⁰⁻³⁴.
- e) Blood cultures are only recommended if the patient presents as systemically unwell.
- f) Testing for other organisms such as non O157 Verocytotoxic *E. coli* (non O157 VTEC), *Yersinia enterocolitica*, *Yersinia pseudotuberculosis*, and *Aeromonas* species may be required depending on clinical details. Other organisms such

as Enterotoxigenic *E. coli* (ETEC), Enteropathogenic *E. coli* (EPEC), Enteroinvasive *E. coli* (EIEC), *Clostridium septicum* and *Edwardsiella tarda* may be isolated through routine investigations.

- g) Culture after discussion with medical microbiologist.
- h) Testing criteria: Laboratories may opt to test only during the seasonal increase.
- i) Testing criteria: All symptomatic patients (presenting with stools that take the shape of container) should be tested for Cryptosporidium infection^{35,36}.
- j) The sensitivity of modified Ziehl Neelsen microscopy for detecting Cryptosporidia is significantly less than for other tests³⁰.
- k) Giardia has been shown to have similar prevalence to Cryptosporidium²; laboratories may wish to consider adding Giardia to the primary testing set based on local risk assessment and operational capabilities.
- l) Ova, cysts and parasites (OCP) are not routinely included in the primary testing set as yields are extremely low. If more parasitology is required, other than Cryptosporidium and Giardia, a request for OCP should be submitted following consultation with a microbiologist.
- m) A two stage testing approach is recommended by the Department of Health. Refer to current guidelines⁵.
- n) Testing criteria: Hospital inpatients \geq 2yrs, Community \geq 65yrs or $<$ 65 where clinically indicated⁶.
- o) Consider testing for norovirus on hospital inpatients of all age groups³⁷. If a Norovirus outbreak is suspected, consider submitting stool samples as early as possible during the acute phase of the illness³⁸.
- p) Patients who are immunocompromised include those with inherited or acquired abnormalities of the immune system and patients who have had organ transplant, immunosuppressive therapy, or steroid treatment. Not all tests in this flowchart will be appropriate for all immunocompromised patients. Discussion with a clinician is required to establish the degree to which the patient is immunocompromised, and therefore the relevance of each test^{19,20}. Cross refer to outbreak algorithm for additional tests if an outbreak is suspected.
- q) Nucleic Acid Amplification Tests (NAATs) testing on blood and/or faecal samples. Consider biopsy.
- r) Varicella zoster virus and herpes simplex virus infections may also cause colitis in the immunocompromised. Epstein Barr virus related lymphoproliferative disease may present with gastrointestinal symptoms.
- s) All outbreak samples should be discussed with the microbiologist and the outbreak response lead to agree appropriate tests based on the clinical and epidemiological information available. The outbreak investigation would usually be led by the infection control team (hospital outbreaks) or the public health team (community outbreaks).
- t) Astrovirus may also be considered; seafood-related outbreaks have been documented³⁹.

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