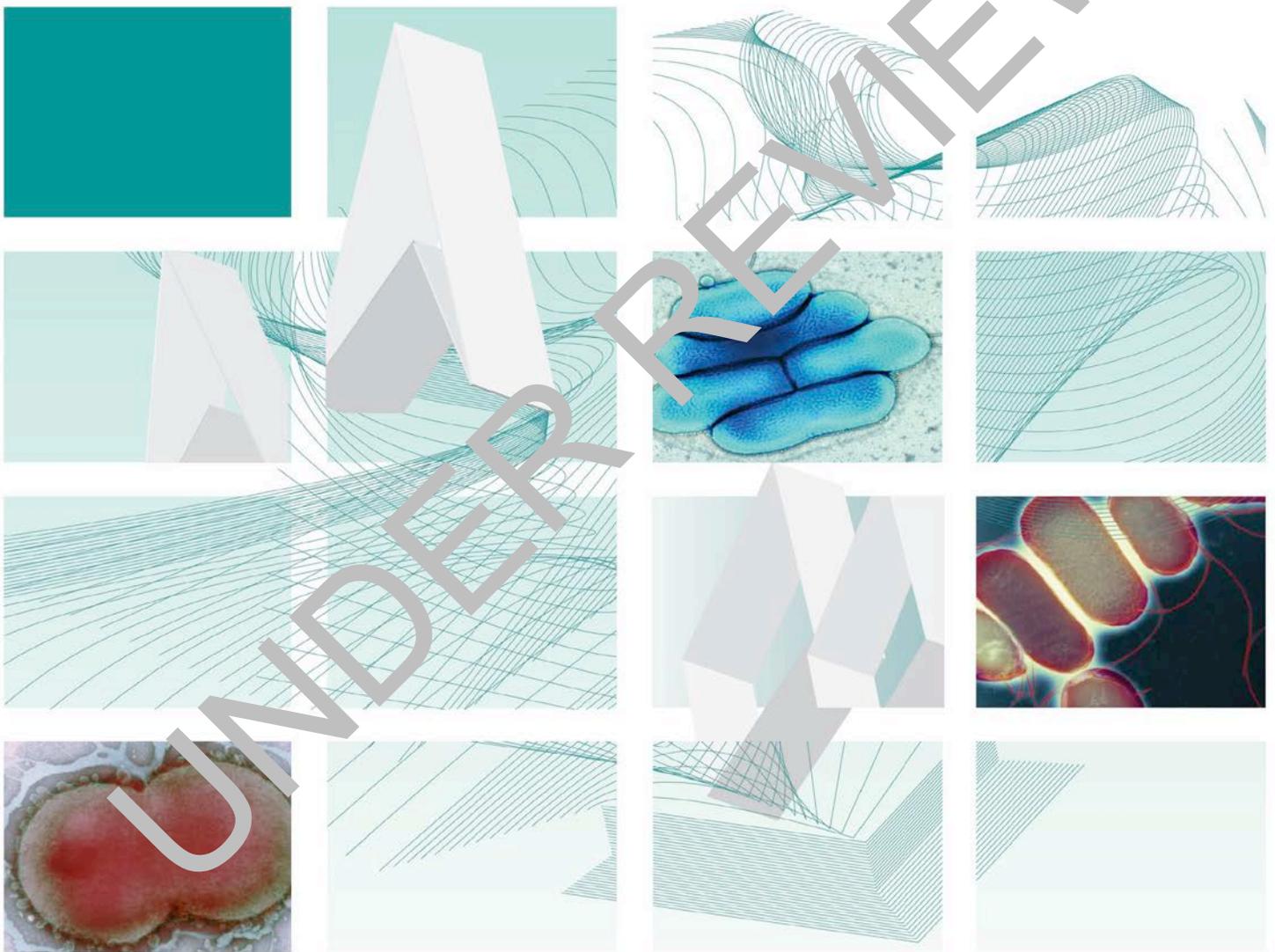




# UK Standards for Microbiology Investigations

## Identification of *Neisseria* species



UNDER REVIEW



## 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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UK Standards for Microbiology Investigations are produced in association with:



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NICE has accredited the process used by Public Health England to produce Standards for Microbiology Investigations. Accreditation is valid for 5 years from July 2011. More information on accreditation can be viewed at [www.nice.org.uk/accreditation](http://www.nice.org.uk/accreditation).

For full details on our accreditation visit: [www.nice.org.uk/accreditation](http://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](mailto: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.	6/10.03.14
Issue no. discarded.	2.1
Insert Issue no.	2.2
<b>Section(s) involved</b>	<b>Amendment</b>
Whole document.	<p>Document has been transferred to a new template to reflect the Health Protection Agency's transition to Public Health England.</p> <p>Front page has been redesigned.</p> <p>Status page has been renamed as Scope and Purpose and updated as appropriate.</p> <p>Professional body logos have been reviewed and updated.</p> <p>Standard safety and notification references have been reviewed and updated.</p> <p>Scientific content remains unchanged.</p>

Amendment No/Date.	5/11.09.07
Issue no. discarded.	2
Insert Issue no.	2.1
<b>Section(s) involved</b>	<b>Amendment</b>
Front Page	Northern Ireland logo added
Annex	PDF links inserted to cross- reference NSM documents
Introduction	Technical information added and Taxonomy
4	Flowchart in Visio format
Referrals	Amended and link added

# UK Standards for Microbiology Investigations<sup>#</sup>: Scope and Purpose

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## 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.

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<sup>#</sup>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/web/HPAwebFile/HPAweb\\_C/1317133470313](http://www.hpa.org.uk/web/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. (2014). Identification of *Neisseria* Species. UK Standards for Microbiology Investigations. ID 6 Issue 2.2. <http://www.hpa.org.uk/SMI/pdf>.

UNDER REVIEW

## Scope of Document

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This SMI describes the identification of pathogenic *Neisseria* species isolated from clinical specimens and their differentiation from non-pathogenic *Neisseria* species and the related genera of *Moraxella* and *Kingella*. The identification of these two genera is covered in [ID 11 - Identification of \*Moraxella\* Species and Morphologically Similar Organisms](#).

This SMI should be used in conjunction with other SMIs.

## Introduction

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### Taxonomy

The genus *Neisseria* belongs to the family Neisseriaceae. The genus consists of *N. gonorrhoeae* and *N. Meningitidis*, which are of clinical significance, and several non-pathogenic species.

### Characteristics<sup>1</sup>

#### *Neisseria* species<sup>2</sup>

*Neisseria* species are obligate human pathogens with no other natural host. They are Gram negative cocci, 0.6-1.0µm in diameter, occurring singly but more often in pairs with adjacent sides flattened. They are non-motile and flagella are absent. Some species produce a greenish-yellow carotenoid pigment and may be nutritionally fastidious and haemolytic. The optimum growth temperature is 35°C-37°C. *Neisseria* are oxidase positive and catalase positive (except *Neisseria elongata*). All except *Neisseria gonorrhoeae* and *Neisseria canis* reduce nitrite.

The clinically important species of *Neisseria* species (*Neisseria gonorrhoeae*, *Neisseria meningitidis*, *Neisseria lactamica*, *Neisseria cinerea* and *Moraxella catarrhalis*) are relatively easy to identify from the non pathogenic *Neisseria*.

*N. gonorrhoeae* and *N. meningitidis* are the two main pathogens of the group. The other species of *Neisseria* such as *N. lactamica*, *N. cinerea* and *M. catarrhalis* are generally considered commensals, but have been implicated as causes of infection in patients who are immunocompromised.

#### *Moraxella* species

*Moraxella* species may be rods or cocci. The rods are often very short and plump, resembling a coccus shape and are usually 1.0-1.5 x 1.5-2.5µm in size. Cells occur in pairs and short chains with one plane of division. The cocci are smaller, 0.6-1.0µm in diameter and occur as single cells or in pairs with adjacent sides flattened. Differing planes of division sometimes result in tetrads. Cells may be capsulate. *Moraxella* species are Gram negative with a tendency to resist decolourisation. Flagella are absent. Some strains may grow weakly under anaerobic conditions. Most species except *Moraxella osloensis* are nutritionally fastidious. The optimum growth temperature is 33°C-35°C. *Moraxella* species are usually catalase positive and no acid is produced from carbohydrates. All *Moraxella* species are oxidase positive.

### ***Kingella* species**

*Kingella* species are straight rods, 1.0µm in length, often in pairs or short chains. Endospores are not formed. Cells are Gram negative but there is a tendency to resist decolourisation. They are non-motile. Growth is aerobic or facultatively anaerobic and the optimum growth temperature is 33°C-37°C. Two types of colony are produced on blood agar: a spreading, corroding type with twitching motility; and a smooth convex type, which does not show twitching motility. *Kingella* are oxidase positive, but may give a weak or negative reaction with tetramethyl-p-phenylenediamine. They are catalase negative and urease negative. Glucose and some other carbohydrates are utilised with acid production. *Kingella* may be mis-identified as *Neisseria* because they are Gram negative rods which are often arranged in pairs, oxidase positive and may grow on GC selective agar.

### **Principles of Identification**

Isolates from primary culture are identified by Gram stain, oxidase and by at least two of the following identification principles: carbohydrate utilisation, detection of preformed enzymes or reactivity with immunological reagents.

### **Technical Information/Limitations**

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N/A

# 1 Safety Considerations<sup>3-19</sup>

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## Hazard Group 2 organisms

Suspected isolates of *N. meningitidis* should always be handled in a microbiological safety cabinet.

*N. meningitidis* is in Hazard Group 2, although in some cases the nature of the work may dictate full Containment Level 3 conditions.

*N. meningitidis* causes severe and sometimes fatal disease. Laboratory acquired infections have been reported. The organism infects primarily by the respiratory route. An effective vaccine is available for some meningococcal serogroups.

Laboratory procedures that give rise to infectious aerosols must be conducted in a microbiological safety cabinet, isolator or be otherwise suitably contained.

Refer to current guidance on the safe handling of all Hazard Group 2 organisms documented in this SMI.

The above guidance should be supplemented with local COSHH and risk assessments.

Compliance with postal and transport regulations is essential.

## 2 Target Organisms

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### The main *Neisseria* species reported to have caused human infection

*N. gonorrhoeae*

*N. meningitidis*

*N. lactamica*

*N. sicca*

### Other species may be associated with human diseases

*N. subflava*

*N. cinerea*

*N. carnea*

*N. elongata* subspecies *nitroreducens*

*N. mucosa*

### Species which may be misidentified as *Neisseria* species

*Moraxella catarrhalis*\*

*Kingella denitrificans*\*

***Moraxella* species which have been isolated from clinical specimens**

*M. atlantae*\*

*M. catarrhalis*\*

*M. lacunata*\*

*M. nonliquefaciens*\*

*M. osloensis*\*

*M. phenylpyruvica*

***Kingella* species which have been isolated from clinical specimens**

*K. denitrificans*\*

*K. indologenes*

*K. kingae*\*

**Asaccharolytic *Neisseria* species which may be misidentified as *N. gonorrhoeae* or *N. meningitidis***

*N. canis*\*

*N. caviae*

*N. cinerea*\*

*N. cuniculi*

*N. elongate*\*

*N. flavescens*

*N. ovis*\*

\*Species reported to have caused human infection

## 3 Identification

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### 3.1 Microscopic Appearance

Gram stain (see [TP 39 - Staining Procedures](#))

*Neisseria* species are Gram negative cocci arranged in pairs with long axes parallel.

### 3.2 Primary Isolation Media

GC selective agar incubated for up to 48 hours in 5-10% CO<sub>2</sub> at 35°C-37°C. For maximum isolation rates plates should be left for 72 hours if possible.

GC selective agar usually consists of GC agar base supplemented with lysed or chocolatised horse blood with or without the addition of VitoX or IsoVitaleX. Antibiotic cocktails used for selection contain vancomycin or lincomycin, colistin, trimethoprim, and nystatin or amphotericin.

Whole Blood agar/heated blood (chocolate) incubated for 18-48 hours in 5-10% CO<sub>2</sub> at 35°C-37°C. These media usually consist of Columbia agar base supplemented with 5% horse blood or chocolatised horse blood.

### 3.3 Colonial Appearance

The species of *Neisseria* (which sometimes grows on non-selective medium) are usually pigmented and opaque. However, both *N. gonorrhoeae* and *N. meningitidis* form smooth, round, moist, uniform grey/brown colonies with a greenish colour underneath on primary isolation medium. *N. gonorrhoeae* may grow poorly on blood agar when the medium is very fresh or the number of bacteria present in the sample is especially high. As with all bacterial culture, the quality of the sample determines the quality of the isolates.

### 3.4 Test Procedures

**Oxidase test** (see [TP 26 - Oxidase Test](#))

Oxidase positive: *Neisseria* species and *Kingella* species and *M. catarrhalis*

### 3.5 Further Identification

*Neisseria* species can be differentiated from similar organisms by biochemical and other tests. At least two principles of identification should be used as there are very few taxonomic differences between members of the genus and therefore definitive identification can prove problematic.

#### 3.5.1 *Neisseria gonorrhoeae*<sup>20,21</sup>

*N. gonorrhoeae* is sexually transmitted, primarily causing infection of the anogenital tract and is always considered a pathogen. This contrasts with *N. meningitidis* which colonises the upper respiratory tract as a commensal and occasionally invades to cause systemic disease.

*Neisseria* have a typical Gram negative envelope, which consists of a cytoplasmic membrane, a thin layer of peptidoglycan and an outer membrane. Many of the major antigens of the cell envelope are shared between *N. gonorrhoeae* and *N. meningitidis*, with the exception of the capsule which is never expressed by *N. gonorrhoeae* but, when expressed by *N. meningitidis*, enhances survival in the blood.

#### Identification of *N. gonorrhoeae*

There are two approaches that can be taken to confirm the identity of *N. gonorrhoeae* and eliminate other *Neisseria* species.

1. The use of gonococcal specific antibodies, which confirms *N. gonorrhoeae* alone
2. The use of carbohydrate utilisation tests, with or without the detection of preformed enzymes such as the aminopeptidases and  $\beta$ -galactosidase, which will give the full speciation of the organism<sup>22</sup>

## Identification tests available:

### Carbohydrate utilisation

Traditionally identity has been confirmed by detecting the acidification of glucose-containing media, but not those containing maltose, sucrose or lactose. This is an oxidative and not a fermentative process. It is important that the basal medium is carbohydrate-free (if serum sugars are used, the serum should be checked for maltase activity). The inoculated plates or bottles are incubated in 5-10% CO<sub>2</sub> for 24 hours with the caps loosened, and are then allowed to stand on the bench for 30min to allow any acidification due to dissolved CO<sub>2</sub> to dissipate. There are disadvantages to this method in that it is slow and requires a heavy, pure growth of gonococci. Some meningococci metabolise maltose slowly and may require at least two days for acidification of the conventional test system, and some gonococci can be slow to utilise glucose. Several commercial systems are available for the rapid detection of carbohydrate utilisation.

### Preformed enzymes

Detection of aminopeptidases, gamma-glutamyl transferase and proline iminopeptidase together with β-galactosidase, with chromogenic substrates allows identification to species level. Reagents are available as commercial kits. This can be a useful alternative to the approaches above, but should only be used on strains isolated on selective media, as certain non-pathogenic *Neisseria* give similar reactions to those that are given by *N. gonorrhoeae*. However, *N. gonorrhoeae* that have a mutation in the proline iminopeptidase gene, and therefore appear negative for this enzyme are prevalent in England and Wales, and kits that detect solely for the production of aminopeptidases should not be used alone<sup>23,24</sup>.

### Carbohydrate and preformed enzymes combined

Many of the commercial kits that test for carbohydrate utilisation also include aminopeptidases. *N. gonorrhoeae* that are proline iminopeptidase negative will give anomalous results with these kits and should be confirmed with an immunological reagent.

### Immunological

Identification by immunological means can be achieved using antibodies linked to fluorescently-labelled staphylococcal protein A or latex. These commercially available reagents contain a mixture of monoclonal antibodies raised to specific epitopes on the major outer membrane protein, Por. Because the reagents contain a mixture of antibodies rather than a single antibody to a cross-reactive epitope, false negative reactions do occur, although uncommonly. Because the mixtures themselves are different occasional isolates occur that give a false negative with one, but are positive with another reagent.

### Approaches to identification of *N. gonorrhoeae*

Identification should be achieved by a combination of test procedures which both identify the organism and exclude other *Neisseria* species. *N. gonorrhoeae* is usually isolated from high risk patients, where it is only necessary to perform presumptive identification followed by a single confirmatory test. However, in low risk patients,

children and sexual abuse (medicolegal) cases it is necessary to use more than one confirmatory test.

## Presumptive Identification

There are four minimum criteria that all isolates of *N. gonorrhoeae* should meet:

1. Growth on media selective for pathogenic *Neisseria* species

**Note:** If the *Neisseria gonorrhoeae* strain in question is sensitive to vancomycin it will fail to grow on this medium

2. Appropriate colonial morphology on such media
3. Typical Gram stain morphology (Gram negative diplococci)
4. Oxidase positive

- **High Risk: Patients attending for sexual health care such as GUM patients (high prevalence populations)**

Patients considered to be high risk should have both genital samples and non genital samples (rectal and pharyngeal) tested. One, preferably two, additional tests are required for the confirmation of isolates from genital samples where the Gram stain and oxidase on the specimen has given a presumptive diagnosis of infection with *N. gonorrhoeae*. These should be either biochemical or immunological. Any isolates that give a negative result with an immunological test should be tested in addition with a biochemical test that detects carbohydrate utilization, with/without aminopeptidases to eliminate the possibility of an aminopeptidase negative *N. gonorrhoeae*.

- **Low Risk: Patients attending primary care (low prevalence populations)**<sup>25-27</sup>

It is recommended that for isolates from patients considered low risk (but with out medico-legal implications) two additional tests should be used for confirmation following presumptive identification. These should be biochemical and immunological. Biochemical kits should not include those that detect aminopeptidases alone, but can be those kits that include both carbohydrates and aminopeptidases.

- **Medico-legal: Child or sexual abuse**<sup>26,27</sup>

In Medico-legal cases the Sexually Transmitted Bacteria Reference Laboratory (STBRL) recommend that isolates should be identified by satisfying the minimum criteria and three additional tests; biochemical, immunological and molecular (molecular tests should be referred to STBRL).

In Medico-legal patients, sufficient specific tests must be undertaken to ensure, as far as possible, that the identification is robust enough to withstand close scrutiny in a court of law. Identification by means of at least one or two confirmatory tests should be carried out at the initial laboratory. This should be followed by confirmation of the identification by the Reference Laboratory as a sensible additional precaution. Isolates should be stored in a viable state at least until a final report is received from the Reference Laboratory in case posted isolates die or are lost. If results are to be used in forensic evidence the 'chain of evidence' must be shown to be intact. The chain of evidence is a formal record of the specimen's progress from point of collection of the sample to the issue of the final report. This should include a fully documented (time, date, place and signatures) chain of persons handling the sample and performing and

interpreting the tests, and in addition it should record the conditions of the specimen's storage.

Molecular methods carried out at STBRL include in-house methods to detect *N. gonorrhoeae* specific DNA by amplification of *cppB* and *ompIII* genes for identification and genotyping by means of NG-MAST<sup>28-30</sup>.

### Susceptibility testing<sup>24</sup>

Most laboratories perform susceptibility testing on all isolates of *N. gonorrhoeae* by means of disc testing following the British Society of Antimicrobial Chemotherapy (BSAC) guidelines. It is recommended that each antimicrobial agent used for therapy should be tested. It should be noted that if nalidixic acid is used to screen for ciprofloxacin resistant isolates that the occasional nalidixic acid susceptible ciprofloxacin resistant isolate of *N. gonorrhoeae* has been detected. An alternative method, which is useful for laboratories testing only a few isolates, is the E-test method using ciprofloxacin.

Any isolates that show decreased susceptibility to the third generation cephalosporins, ceftriaxone or cefixime or azithromycin should be referred to STBRL for confirmation.

### 3.5.2 *Neisseria meningitidis*

For information on screening for Meningococci see [B 51 - Screening for Meningococci](#).

Growth of *Neisseria meningitidis* from a normally sterile site such as CSF (cerebrospinal fluid) or blood is considered definitive for the diagnosis of meningococcal disease<sup>31</sup>. At case presentation it is generally recommended that two samples are taken, one for microbiological culture and one for PCR (DNA-based detection) where meningococcal disease is suspected. Samples of CSF received in microbiology laboratories from suspected cases of meningitis are routinely tested for cell counts (and differential counts) and followed by Gram staining to achieve rapid confirmation. The lack of sensitivity of microscopy and an increase in the preadmission administration of antibiotics reduce the chances of positive microscopy or culture. This has increased the importance of DNA-based detection methods such as PCR. Latex agglutination, although useful in some cases, is not as sensitive as PCR assay for the confirmation and serogroup characterisation of meningococci. PHE Meningococcal Reference Unit offers a PCR testing service to confirm meningococcal disease case and determine accurate serogroup characterisation to inform England and Wales' epidemiology. DNA-based assays also allow further molecular subtyping if required.

Invasive disease with *Neisseria meningitidis* is generally associated with specific serogroups. Meningococcal strains are carried asymptomatically in the oro- and nasopharynx and are often isolated from urogenital sites in both men and women. Apart from resistance to sulfonamides (not used in therapy), meningococci remain susceptible to the antibiotics classically used for treatment and chemoprophylaxis. Since 1985 a decrease in susceptibility to penicillin has been observed due to changes in penicillin protein binding sites. Reduced susceptibility is ascribed to organisms with penicillin MICs  $\geq 0.1$  mg/L: care should be taken not to infer resistance because meningococci are clinically responsive to the therapeutic levels attained in patients. Some extremely rare strains of meningococci have been identified as harbouring beta-lactamase producing plasmids. Resistance to rifampicin is sometimes observed following chemoprophylaxis of case contacts and this may occasionally be observed in secondary case clusters. Due to the nature of the infection it is very important that

laboratories obtain accurate resistance data both for treatment and epidemiological purposes. This is best achieved locally by use of E-tests<sup>32</sup>. Staff need to be trained in their use for valid results to be obtained. It is also expected that all isolates will have undergone wider disc sensitivity testing to confirm susceptibility to locally used therapeutic agents.

Once an isolate has been identified using the method outlined in 3.5, confirmation of the isolate is made in the following way;

- Biochemical testing kit. It is important to note that a number of glucose and maltose negative meningococci have been reported<sup>22</sup>
- Rapid biochemical commercial kit
- Characterisation where it is required to serogroup level would normally involve a commercial latex kit or slide agglutination reagents. The latex agglutination kits are designed for direct use on CSF or serum, but will also work for cultures. Slide agglutinating sera are for use on cultures only. Heated clinical samples or formalin treated suspensions of cultures should be processed within microbiological safety cabinets to reduce aerosols

### Differentiation of *N. meningitidis* from similar phenotypes

*N. meningitidis* can be identified by acid production from glucose and maltose but not from lactose or sucrose, and by the production of gamma glutamylaminotransferase. Maltose negative strains of *N. meningitidis* have been described and may be differentiated from *N. gonorrhoeae* by their ability to produce gamma-glutamylaminotransferase. Glucose negative variants of *N. meningitidis* may also be observed.

### 3.5.3 Other *Neisseria* species

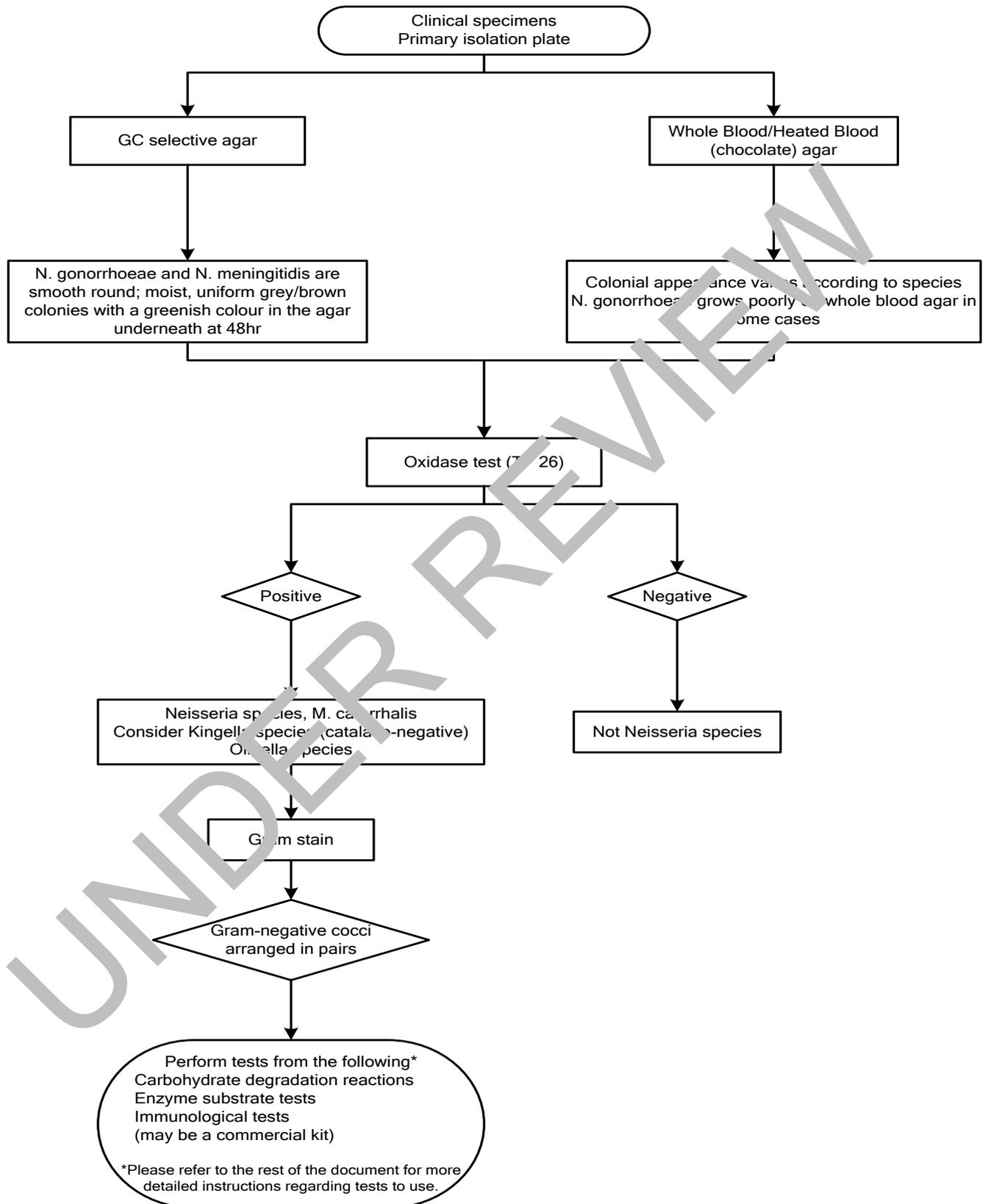
These can be identified by use of commercially available kits that have been validated. The accuracy of these kits has not been fully determined for species other than *N. gonorrhoeae* and *N. meningitidis* and therefore all results obtained should be treated with caution.

## 3.6 Storage and Referral

Short term storage – isolates should be kept in a viable state on heated blood (chocolate) agar slopes.

Long term storage – isolates should be frozen at -20°C to -80°C.

## 4 Identification of *Neisseria* species



## 5 Reporting

### 5.1 Presumptive Identification

#### ***N. gonorrhoeae***

If appropriate growth characteristics, colonial appearance, Gram stain of the culture and oxidase.

#### ***N. meningitidis***

If appropriate growth characteristics, colonial appearance, Gram stain of the culture, oxidase and serology results are demonstrated.

There are four minimum criteria that all isolates of *Neisseria* should meet:

1. Growth on media selective for pathogenic *Neisseria* species

**Note:** If the *Neisseria gonorrhoeae* strain in question is sensitive to vancomycin it will fail to grow on this medium

2. Appropriate colonial morphology on such media
3. Exhibit typical Gram stain morphology (Gram negative diplococci)
4. Oxidase positive

### 5.2 Confirmation of Identification

Using biochemical/immunological results following identification processes as outlined in this document and/or Reference Laboratory report.

### 5.3 Medical Microbiologist

Inform the medical microbiologist of all presumed and confirmed *N. meningitidis* isolates, and of all *Neisseria* species isolated from normally sterile sites, or in cases of invasive infection.

The medical microbiologist should also be informed if the request card bears relevant information eg:

- Cases of meningitis, septicaemia (especially with purpuric rash)
- Investigation of *N. meningitidis* outbreak, or of the carrier state

Inform the medical microbiologist of all presumed and confirmed *N. gonorrhoeae* isolates, and of all *Neisseria* species from:

- Mirrors
- Cases of sexual assault, rape or abuse
- All persons not known to be attending a Genitourinary Medicine clinic
- Extragenital sites (eg throat, anorectum because special care is indicated with identification procedures)

Follow local protocols for reporting to clinician

## 5.4 CCDC

Refer to local Memorandum of Understanding.

## 5.5 Public Health England<sup>33</sup>

Refer to current guidelines on CDSC and COSURV reporting.

## 5.6 Infection Control Team

Inform the infection control team of presumptive and confirmed isolates of *N. meningitidis*.

# 6 Referrals

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## 6.1 Reference Laboratory

For information on the tests offered, turn around times, transport procedure and the other requirements of the reference laboratory refer to:

Sexually Transmitted Bacteria Reference Laboratory  
Microbiology Services  
Public Health England  
61 Colindale Avenue  
London  
NW9 5EQ

Tel. +44 (0) 20 8327 6464

[http://www.hpa.org.uk/cfi/Reference\\_Laboratory/default.htm](http://www.hpa.org.uk/cfi/Reference_Laboratory/default.htm)

Meningococcal Reference Unit (MCRU)  
Manchester Medical Microbiology Partnership  
PO Box 209  
Clinical Sciences Building 2  
Manchester Royal Infirmary  
Oxford Road  
MANCHESTER  
M13 9WL  
Tel. +44 (0) 161 276 6757

Contact PHE's main switchboard: Tel. +44 (0) 20 8200 4400

Contact appropriate devolved nation reference laboratory for information on the tests available, turn around times, transport procedure and any other requirements for sample submission:

England and Wales

<http://www.hpa.org.uk/webw/HPAweb&Page&HPAwebAutoListName/Page/1158313434370?p=1158313434370>

Scotland

<http://www.hps.scot.nhs.uk/reflab/index.aspx>

Northern Ireland

<http://www.belfasttrust.hscni.net/Laboratory-MortuaryServices.htm>

## 7 Notification to PHE<sup>33,34</sup> or Equivalent in the Devolved Administrations<sup>35-38</sup>

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The Health Protection (Notification) regulations 2010 require diagnostic laboratories to notify Public Health England (PHE) when they identify the causative agent 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 diagnosis 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 Human Immunodeficiency Virus (HIV) & Sexually Transmitted Infections (STIs), Healthcare Associated Infections (HCAIs) and Creutzfeldt–Jakob disease (CJD) under ‘Notification Duties of Registered Medical Practitioners’: it is not noted under ‘Notification Duties of Diagnostic Laboratories’.

Other arrangements exist in Scotland<sup>35,36</sup>, Wales<sup>37</sup> and Northern Ireland<sup>38</sup>.

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