Public Health England

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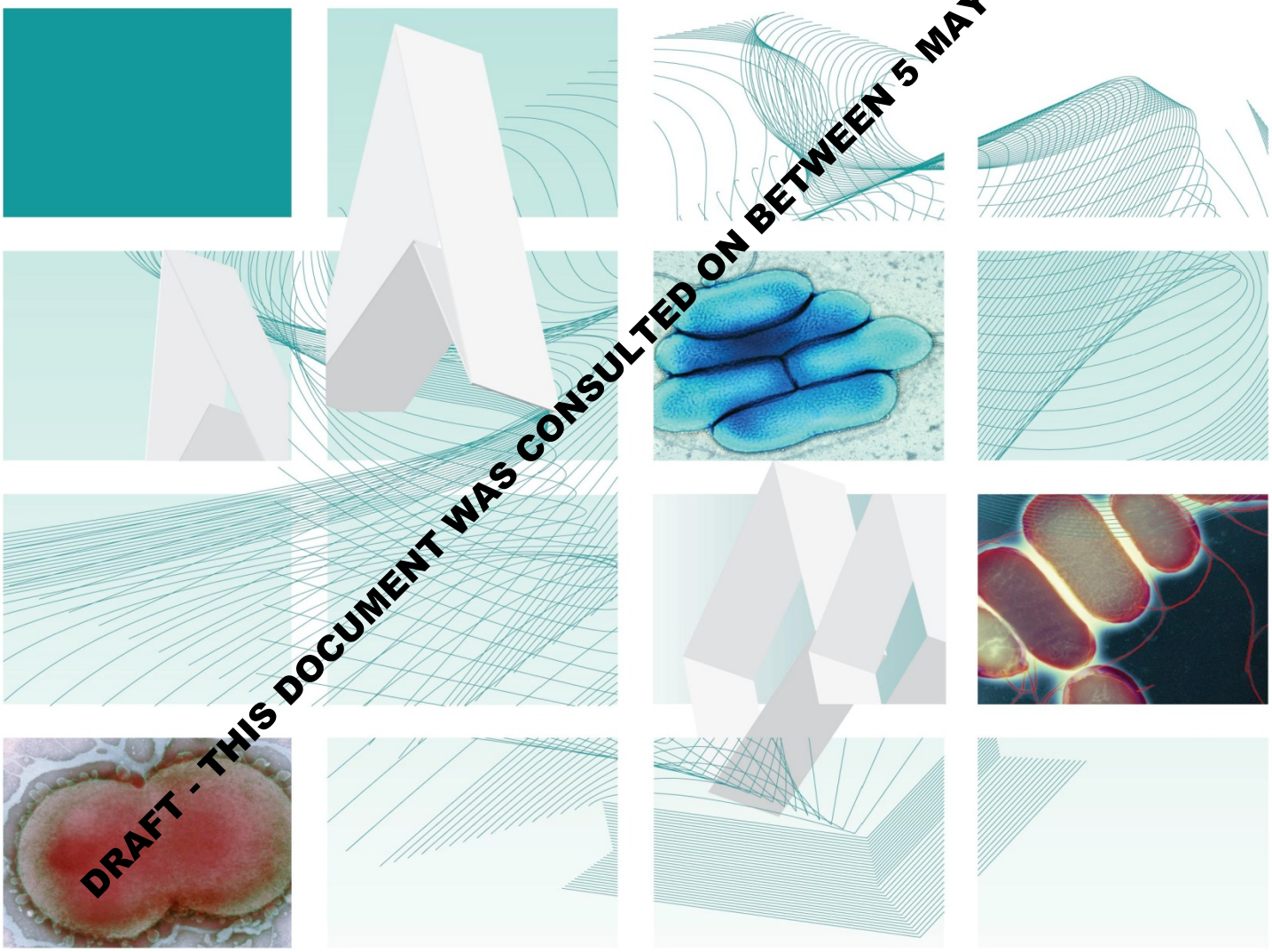
UK Standards for Microbiology Investigations

Investigation of Intravascular Cannulae and Associated Specimens



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Issued by the Standards Unit, Microbiology Services, PHE

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 https://www.gov.uk/uk-standards-for-microbiology-investigations-smi-quality-and-consistency-in-clinical-laboratories. SMIs are developed, reviewed and revised by various working groups which are overseen by a steering committee (see https://www.gov.uk/government/groups/standards-for-microbiology-investigations-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.

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PHE Publications gateway number: 2015010

UK Standards for Microbiology Investigations are produced in association with:

Logos correct at time of publishing.

Contents

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.	# <tab+enter>/dd.mm.yy <tab+enter>
Issue no. discarded.	#.# <tab+enter>
Insert Issue no.	#.# <tab+enter>
Section(s) involved	**Amendment**

UK SMI[#]: Scope and Purpose

Users of SMIs

Primarily, SMIs are intended as a general resource for practising professionals operating in the field of laboratory medicine and infection specialties in the UK. SMIs also 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. The documents also 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 https://www.gov.uk/uk-standards-for-microbiology-investigations-smi-quality-and-consistency-in-clinical-laboratories. 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.

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

[#] 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.

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 https://www.gov.uk/government/organisations/public-health-england/about/equality-and-diversity.

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. (YYYY <tab+enter>). Investigation of Intravascular Cannulae and Associated Specimens. UK Standards for Microbiology Investigations. B 20 Issue. https://www.gov.uk/uk-standards-for-microbiology-investigations-smi-quality-and-consistency-in-clinical-laboratories

Scope of Document

Type of Specimen

Line tips eg, CVP or Hickman lines, swabs of cannula insertion sites, blood

Scope

This SMI describes the processing and bacteriological investigation of intravascular cannulae and associated specimens. It should also be noted that the words "cannulae" and "catheters" are widely used interchangeably and in this document, the same applies to the two terms.

This SMI should be used in conjunction with other SMIs.

Introduction

The use of indwelling cannulae for reliable intravascular access is an essential feature of modern health care for both monitoring and intervention. Insertion of intravascular cannulae allows continuous and painless access to the circulation for administration of fluids and electrolytes, medications, blood products and nutritional support. In addition the intravascular access can be used for blood sampling, haemodynamic monitoring, haemodialysis and haemofiltration. Each year, millions of intravascular devices are used in acutely or chronically ill hospitalised patients around the world. These devices come in various lengths to suit peripheral or central insertion and can have single or multiple lumens. Although the vast majority of these devices are cannulae for peripheral use, central venous or arterial catheters are also used especially in patients with difficult peripheral access or when haemodynamic monitoring is indicated.

Cannula-related infections are amongst the most important nosocomial infections. Skin colonisation (which is often asymptomatic) acts as a precursor of systemic or localised infection. The overall incidence of infection related to the use of intravascular cannulas is about 1%, however this figure may be as high as 4-8% for central venous cannulas used for total parenteral nutrition. In high risk patients, central venous line infections carry a significant mortality rate and a high cost[1].

Intravascular device related blood stream infection is a significant clinical problem. Evidence Based Practice for Infection Control (EPIC) guidelines have been issued by the Department of Health for the prevention of hospital acquired infections associated with the use of central venous catheters[2]. Catheter-related blood stream infections (CR-BSI) can be defined as the isolation of the same organism ie identical species from the colonised catheter and peripheral blood in a patient with accompanying clinical signs and symptoms of bloodstream infection (BSI) and no other apparent source of BSI[3].The guidelines recommend several practices and strategies for reducing the risk of CR-BSI, including catheter type, site of insertion, optimum aseptic technique, good catheter care, and the appropriate use of antimicrobial coated or impregnated central venous catheters (CVCs).

Types of Cannulae

Specific examples of descriptions of cannulae (or catheters), defining their siting, use or design, include:

- **Peripheral lines** – These lines are usually inserted into the veins of the forearm or the hand to administer medication, fluids or nutrition eg, Venflons, Abbocaths and Parenteral nutrition catheters. They can be used either short term or long term.
- **Midline catheters** – These are inserted via the antecubital fossa into the proximal basilic or cephalic veins. They do not enter the central veins and are for short-term use to sample blood or administer fluids intravenously
- **Central lines** – These are inserted into central veins (such as triple lumen, subclavian lines, jugular lines or less commonly femoral lines) with the tip residing in the vena cava. This permits intermittent or continuous infusion of irritant, vesicant or hyper-osmolar drugs/fluids and/or access into the venous system and can be used short term or long term eg, peripherally inserted central catheter (PICC).There are various subtypes of central lines and their uses. They are as follows:
  - Monitoring lines, eg, central venous pressure lines, Swan Ganz lines, arterial lines
  - Long term access such as chemotherapy, antibiotics, blood sampling, continuous renal replacement therapy (CRRT), haemodialysis eg, Hickman lines, Broviac lines, Groshong lines, Hickman-like catheters such as Lifecath, RedoTPN, etc
  - Miscellaneous eg, dialysis lines (Vascath used for haemofiltration), and umbilical cannulae for exchange transfusions in neonates
  - Implantable ports eg TIVAD, Portacath. These are subcutaneous ports or reservoirs with self-sealing septum which are tunnelled beneath the skin and accessed by a needle through intact skin. They are implanted in subclavian or internal jugular veins. It is associated with low rates of infection
  - Antimicrobial coated or impregnated CVCs: recent studies have demonstrated that antimicrobial coated or impregnated CVC can reduce the incidence of catheter colonisation and CR-BSI in appropriate situations[2]
- **Catheter hubs, stopcocks and needle-free connectors** are used to reduce the risk of accidental needle puncture or biological contamination in clinical settings. Manufacturer's recommendations should be adhered when using these devices[4]

Cannula-related bacteraemia or cannula-related fungaemia

The cannula may be the source of a bacteraemia or fungaemia. This is likely to be so if it is infected with the same organism as that isolated from a blood culture, usually in the absence of an identifiable alternative focus of infection, and when cultures from infusions are negative[5]. Infection of intravenous cannulae may lead to widespread dissemination of infection. More usually the patient develops a fever and may become generally unwell.

Cannula-related sepsis

This is defined as the presence of clinical sepsis when two or more of the following occur; such as fever, leucocytosis, or hypotension, documentation of a catheter isolate (irrespective of quantitative count), and negative blood cultures obtained within 48h before and 24h after catheter removal. There is usually no other source of sepsis demonstrated, and this resolves following catheter removal[6].

Localised infection

This can occur at the insertion site and subcutaneous track of the device[7]. Clinical signs of infection include erythema, exudate formation, oedema and thrombophlebitis. The patient may complain of pain or irritation at the insertion site, and may become pyrexial. This infection is caused by pyogenic bacteria such as *Staphylococcus aureus*.

Cannula removal and culture

According to the Centres for Disease Control and Prevention - Infectious Diseases Society of America (CDC-IDSA) guidelines, it recommends that culture of tips should only be done when CRBSIs are suspected. Cannula tip culture gives valuable information but necessitates the removal of the cannula. This can sometimes result in the loss of venous access that can interfere seriously with the medical management of the patient, although sometimes catheter removal is necessary to gain control of a catheter-related infection, especially with certain organisms, such as *Candida* species[8,9].

Cannula associated swabs (eg, swabs of catheter insertion sites) may be employed as alternative specimens. However, routine investigation of cannula associated swabs from asymptomatic patients is of dubious value.

When skin and blood culture results concur, removal of the cannula is recommended[10,11], although this may not happen in practice unless clinical sepsis unresponsive to antibiotics is present. Quantitative and semi-quantitative culture methods have been described for these sites, but are not recommended in this SMI.

An alternative method of investigating cannula-associated infection that preserves central venous access is to take samples of blood simultaneously through the cannula and from a peripheral vein. Both samples are cultured quantitatively. If the concentration of organisms in the blood from the central line is equal to or greater than 10 times the concentration of organisms in blood from the peripheral vein, then central venous cannula infection is diagnosed[12]. This methodology has not been widely adopted because of its complexity and cost.

Infections and organisms

The incidence of infection is related to the length of time the cannula remains *in situ*. The catheter tip may be infected secondarily by organisms already infecting the hub or insertion site which track down the catheter lumen or tunnel; but it may also acquire organisms from fluids passing through it or from the bloodstream itself. Colonisation of cannulae is a far commoner source of CR-BSI than contaminated infusate. Organisms causing cannula-related infections may be acquired from[13,14]:

- Patients' microflora
- Hands of staff

- Contaminated disinfectants
- Contaminated hub
- Bacteraemia due to other causes
- Contaminated intravenous fluids
- Ward air

Most central venous line-associated infections are caused by organisms from the skin near the exit site which gains access to the intravascular segment of the cannula.

Organisms isolated from cannula tips and swabs commonly associated with cannula sites in descending order of frequency include[2,15]:

- Coagulase-negative staphylococci (CoNS)
- *Staphylococcus aureus* including MRSA
- Enterobacteriaceae
- Enterococci
- Pseudomonads
- *Corynebacterium* species
- Streptococci
- *Bacillus* species

Fungi may be isolated including:

- *Candida albicans* and other yeasts
- *Aspergillus* species
- *Fusarium* species
- *Malassezia furfur* (in patients receiving intralipid infusions)

Coagulase negative staphylococci

Coagulase negative staphylococci (CoNS) are the most frequent causes of cannula-related infections. It should also be noted that intraluminal colonisation of the common skin flora from repeated puncture through the septum may account for the high percentage of CoNS[16]. They can produce extracellular slime that facilitates adherence and may limit the access of antibiotics, and may reduce the host's inflammatory response. If a patient has a central venous cannula and coagulase negative staphylococci are isolated from multiple sets of blood cultures, infection with the organism must be considered seriously. However, there may be difficulty in interpretation of the significance of these isolates, as coagulase negative staphylococci are commonly isolated from contaminated blood cultures.

Any organism isolated in significant numbers should be considered as of potential significance when using methods of quantitative culture.

Technical Information/Limitations

Limitations of UK SMIs

The recommendations made in UK SMIs are based on evidence (eg sensitivity and specificity) where available, expert opinion and pragmatism, with consideration also being given to available resources. Laboratories should take account of local requirements and undertake additional investigations where appropriate. Prior to use, laboratories should ensure that all commercial and in-house tests have been validated and are fit for purpose.

Selective Media in Screening Procedures

Selective media which does not support the growth of all circulating strains of organisms may be recommended based on the evidence available. A balance therefore must be sought between available evidence, and available resources required if more than one media plate is used.

Specimen Containers[17,18]

SMIs use the term “CE marked leak proof container” to describe containers bearing the CE marking used for the collection and transport of clinical specimens. The requirements for specimen containers are given in the EU in vitro Diagnostic Medical Devices Directive (98/79/EC Annex 1 B 2.1) which states: “The design must allow easy handling and, where necessary, reduce as far as possible contamination of, and leakage from, the device during use and, in the case of specimen receptacles, the risk of contamination of the specimen. The manufacturing processes must be appropriate for these purposes”.

Matrix-Assisted Laser Desorption/Ionisation - Time of Flight Mass Spectrometry (MALDI-TOF MS)

Direct identification of bacteria and yeast from blood culture bottle broth by MADLI-TOF methods is promising and it has the potential to speed the identification process in the laboratory thereby reducing turnaround times as well as resulting in significant improvements to patient care. Rapid identification of blood culture contaminants may also allow more rapid discontinuation of unnecessary antimicrobial therapy. Different protocol types have been reported by several studies to accurately identify the microorganisms present in positive blood culture broth; however, a lack of standardised protocols and the use of different software for mass analysis and different blood culture bottles make it difficult to compare the performances of the different methods[19-22].

1 Safety Considerations[17,18,23-37]

1.1 Specimen Collection, Transport and Storage[17,18,23-26]

Use aseptic technique.

Collect specimens in appropriate CE marked leak proof containers and transport specimens in sealed plastic bags.

Collect swabs into appropriate transport medium and transport in sealed plastic bags[38].

Compliance with postal and transport regulations is essential.

1.2 Specimen Processing[17,18,23-37]

Containment Level 2 organisms.

Laboratory procedures that give rise to infectious aerosols must be conducted in a microbiological safety cabinet[29].

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

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

2 Specimen Collection

2.1 Type of Specimens

Line tips eg, CVP or Hickman lines, swabs of cannula insertion sites, blood

2.2 Optimal Time and Method of Collection[39]

For safety considerations refer to Section 1.1.

Collect specimens before antimicrobial therapy where possible[39].

Cannulae should be collected in appropriate CE marked leak proof containers and transported and processed as soon as possible.

Unless otherwise stated, swabs for bacterial and fungal culture should be placed in appropriate transport medium[38,40-43].

2.2.1 Correct specimen type and method of collection

Cannulae

Disinfect the skin around the cannula entry site, remove cannula using aseptic technique, and cut off 4cm of the tip into an appropriate CE marked leak proof container using sterile scissors[7]. Place in sealed plastic bags for transport.

Note 1: Skin disinfection procedures depend on local protocols and may vary.

Note 2: Cannulae should only be sent if there is evidence of infection.

Swabs

Sample the inflamed area / exudate around the catheter insertion site using an appropriate swab.

Blood

Collection of blood from the patient should be carried out following Department of Health guidance[44]. At least two blood cultures should be obtained when catheter infection is suspected by peripheral venepuncture[15]. For more information on blood cultures, refer to B 37 – Investigation of Blood Cultures (for Organisms other than *Mycobacterium* species) but microscopy, sub-culturing and further testing should be handled in accordance with the methods outlined in this SMI.

2.3 Adequate Quantity and Appropriate Number of Specimens[39]

Numbers and frequency of specimen collection are dependent on clinical information.

3 Specimen Transport and Storage[17,18]

3.1 Optimal Transport and Storage Conditions

For safety considerations refer to Section 1.1.

Specimens should be transported and processed as soon as possible[39].

Specimens should be transported and received in the laboratory within one working day of collection and processed as soon as possible. Requirements of individual testing laboratories should be referred to[45].

If processing is delayed, refrigeration is preferable to storage at ambient temperature[39].

4 Specimen Processing/Procedure[17,18]

4.1 Test Selection

Culture techniques

Diagnosis of CR-BSI may be difficult due to the lack of clear clinical definitions. Definitive diagnosis can only be achieved if the catheter is removed and the tip culture yield potentially pathogenic organisms in sufficient quantity[2]. Techniques that have been used to diagnose local or systemic infection associated with cannulae include[46]:

- Semiquantitative and quantitative culture of cannula segments
- Broth culture of cannula segments, particularly the tip
- Staining of cannulae
- Culture of blood aspirated through an intravascular cannula
- Culture of the cannula hub
- Culture of the cannula insertion site
- Ultrasonication of cannulae

Semiquantitative method

Culture of the cannula surface is used to predict which are truly infected and likely to cause bloodstream infections. The terminal 4 - 5cm segment of the cannula is rolled over the entire surface of the agar plate back and forth several times (4-5 times) and

then immersed in sterile enrichment broth. The inoculated agar plate and the broth tube were both incubated and the number of colonies counted after incubation[6,47].

When culturing the external surface of the cannula tip, a threshold of >15 colonies of any organism is commonly accepted to predict cannula-related sepsis and is associated with bacteraemia in 10-14% of cases[6,48]. This threshold is based on the culture of a 4cm length. In practice, varying lengths of line are often received and interpretation should be made with care, and in conjunction with blood culture results. However, in practice this threshold may be too low where stringent removal precautions are not taken or there is a delay before processing. A threshold of >100 colonies may be more appropriate.

Multiple isolates present at >15 cfu are counted individually and their significance related to any blood culture isolate[6].

Quantitative method[49]

This method provides information on both the inner and outer surfaces of the cannula. A cut-off of 1000 cfu/mL is used as indicating sepsis[47,50]. The lumen result is reported to be a more reliable predictor of systemic infection where there is no evidence of localised exit site infection[47]. This method is labour intensive and is not recommended for routine use in this SMI. Both quantitative and semi-quantitative methods are equally effective in predicting absence of infection.

Enrichment method

The distal segment of the cannula is placed in enrichment broth, incubated for about 48hr and then organisms isolated on appropriate agar media. However, this does not distinguish among colonisation, infection or contamination of the cannula and is therefore not recommended in this SMI.

Endoluminal brush

This has been reported as an accurate method of detecting catheter related sepsis without the need for catheter removal[51].

Rapid diagnostic methods

Staining the cannula (or an impression smear of the cannula) with Gram stain or acridine orange have been described and these provide information without the 24-48hr delay required for isolation of organisms[52,53].

4.2 Appearance

N/A

4.3 Sample Preparation

For safety considerations refer to Section 1.2.

4.4 Microscopy

4.4.1 Standard

Stain an impression smear of the cannula or the isolate if clinically indicated either by Gram stain or Acridine Orange stain (refer to TP 39 – Staining Procedures).

Note: Refer to manufacturers' instructions with respect to preparing smears from blood culture bottles.

4.5 Culture and Investigation

Cannulae

Roll specimen across the agar surface several times (semiquantitative technique) to cover as much of the agar surface and external cannula surface as possible[47].

If >4cm is received, the distal end should be reduced to a 4cm length, prior to culture by cutting with sterile scissors or scalpel.

Swabs

Inoculate agar plate with swab (refer to Q 5 – Inoculation of Culture Media in Bacteriology). For the isolation of individual colonies, spread inoculum with a sterile loop.

Blood

Follow manufacturers' instruction on use of blood culture bottles. Inoculated bottles should be incubated as soon as possible, and within a maximum of four hours.

4.5.1 Culture media, conditions and organisms

Clinical details/ conditions	Specimen	Standard media	Incubation			Cultures read	Target organism(s)‡
			Temp °C	Atmos	Time		
Cannula-related bacteraemia **Cannula-related infection**	Cannulae	Blood agar	35-37	5-10% CO_2	24-48hr	Daily	≥15 cfu per plate of any organism
Local cannula site infection	Swabs	Blood agar	35-37	5-10% CO_2	24-48hr	Daily	Coagulase negative staphylococci *S. aureus* including MRSA* *Corynebacterium* species Enterobacteriaceae Enterococci Pseudomonads Streptococci *Bacillus* species Yeasts
	Blood	Automated liquid systems**	35-37	Air	24-48hr	Continuously	
For these situations, add the following:							
Clinical details/ conditions	**Specimen**	**Supplementary media**	**Incubation**			**Cultures read**	**Target organism(s)**
			Temp °C	**Atmos**	**Time**		
Cannula-related	Blood (after	Sabouraud agar	28-30	Air	Up to	2d and at	Yeasts#

fungaemia	flagging positive on blood culture automated systems) Cannulae	supplemented with Chloramphenicol and gentamicin or Chromogenic agar [54,55]			7d	5d	

* For more information on MRSA, refer to B 29 - Investigation of Specimens for Screening for MRSA.

** If automated monitoring systems are used, refer to local protocols and manufacturer's recommendations. These should be checked continuously for bottles that flag positive. A blood agar plate should be set up for all bottles that are flagged positive to check for contamination.

Some yeasts can grow at much higher temperatures such as *Malassezia* species which grow strictly at 30-35°C and not outside this range[56]

‡ For appearance of relevant target organisms, refer to individual SMIs for organism identification.

Rapid test methods such as MALDI-TOF MS and NAATs should be performed according to manufacturers' instructions[20-22,57,58].

4.6 Identification

Refer to individual SMIs for organism identification.

4.6.1 Minimum level of identification in the laboratory

α-haemolytic streptococci	"α-haemolytic" level
β-haemolytic streptococci	Lancefield group level
Coagulase negative staphylococci	"coagulase negative" level
Coryneforms	"diphtheroids" level
Enterobacteriaceae	"coliforms" level
Enterococcus	genus level
Pseudomonads	"pseudomonads" level
S. aureus	species level
Yeasts	"yeasts" level

Organisms may be further identified if this is clinically or epidemiologically indicated.

4.7 Antimicrobial Susceptibility Testing

Refer to British Society for Antimicrobial Chemotherapy (BSAC) and/or the European Committee on Antimicrobial Susceptibility Testing (EUCAST) guidelines.

4.8 Referral for Outbreak Investigations

N/A

4.9 Referral to Reference Laboratories

For information on the tests offered, turnaround times, transport procedure and the other requirements of the reference laboratory click here for user manuals and request forms.

Organisms with unusual or unexpected resistance and whenever there is a laboratory or clinical problem, or anomaly that requires elucidation should be sent to the appropriate reference laboratory.

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

England and Wales

https://www.gov.uk/specialist-and-reference-microbiology-laboratory-tests-and-services

Scotland

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

Northern Ireland

http://www.publichealth.hscni.net/directorate-public-health/health-protection

5 Reporting Procedure

5.1 Microscopy

Report organism seen.

5.1.1 Microscopy reporting time

Report microscopy results for organisms as soon as available within 24hr of receipt.

5.2 Culture

5.2.1 Cannulae

Report the number of cfu of organism(s) isolated with an interpretative comment, eg, ≥15 cfu may be associated with systemic cannula-related infection, or may represent superficial colonisation or contamination - refer to blood culture results

OR

Report absence of growth.

5.2.2 Swabs

Report the amount (eg, heavy, moderate or scanty) of growth isolated with an interpretative comment relating to the presence of local infection

OR

Report the absence of growth.

5.2.3 Blood

Report all organisms which are isolated (with comment if isolate is of doubtful significance)

OR

Report absence of growth

Note: Results of all supplementary investigations should be reported.

5.2.4 Culture reporting time

Clinically urgent culture results to be telephoned or sent electronically.

Written report within 16-72hr stating, if appropriate, that a further report will be issued.

5.3 Antimicrobial Susceptibility Testing

Report susceptibilities as clinically indicated. Prudent use of antimicrobials according to local and national protocols is recommended.

6 Notification to PHE[59,60] or Equivalent in the Devolved Administrations[61-64]

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.

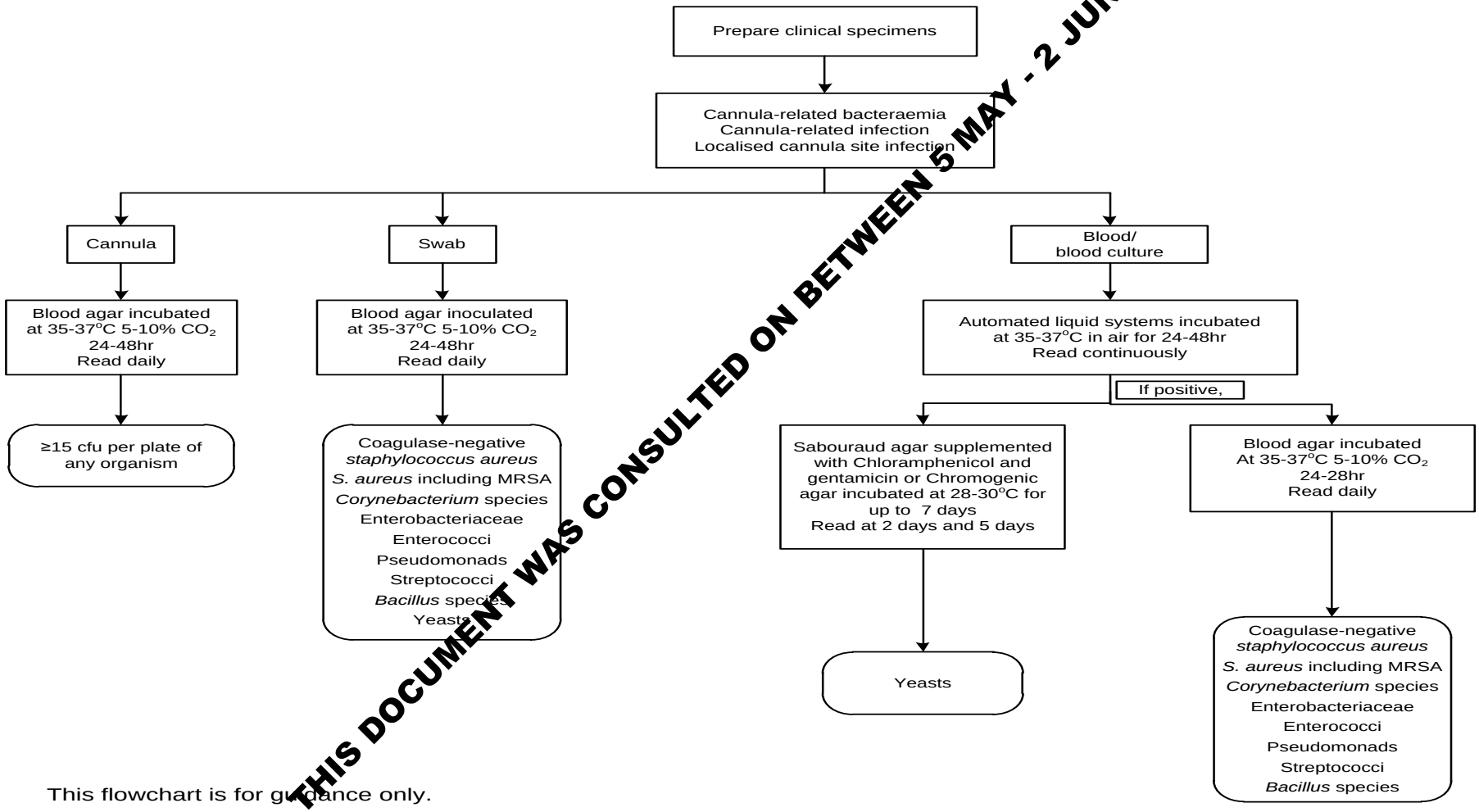
Notification under the Health Protection (Notification) Regulations 2010 does not replace voluntary reporting to PHE. The vast majority of NHS laboratories voluntarily report a wide range of laboratory diagnoses of causative agents to PHE and many PHE Health protection Teams have agreements with local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

Note: The Health Protection legislation Guidance (2010) includes reporting of 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'.

https://www.gov.uk/government/organisations/public-health-england/about/our-governance#health-protection-regulations-2010

Other arrangements exist in Scotland[61,62], Wales[63] and Northern Ireland[64].

Appendix: Investigation of Cannulae and Associated Specimens



This flowchart is for guidance only.

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