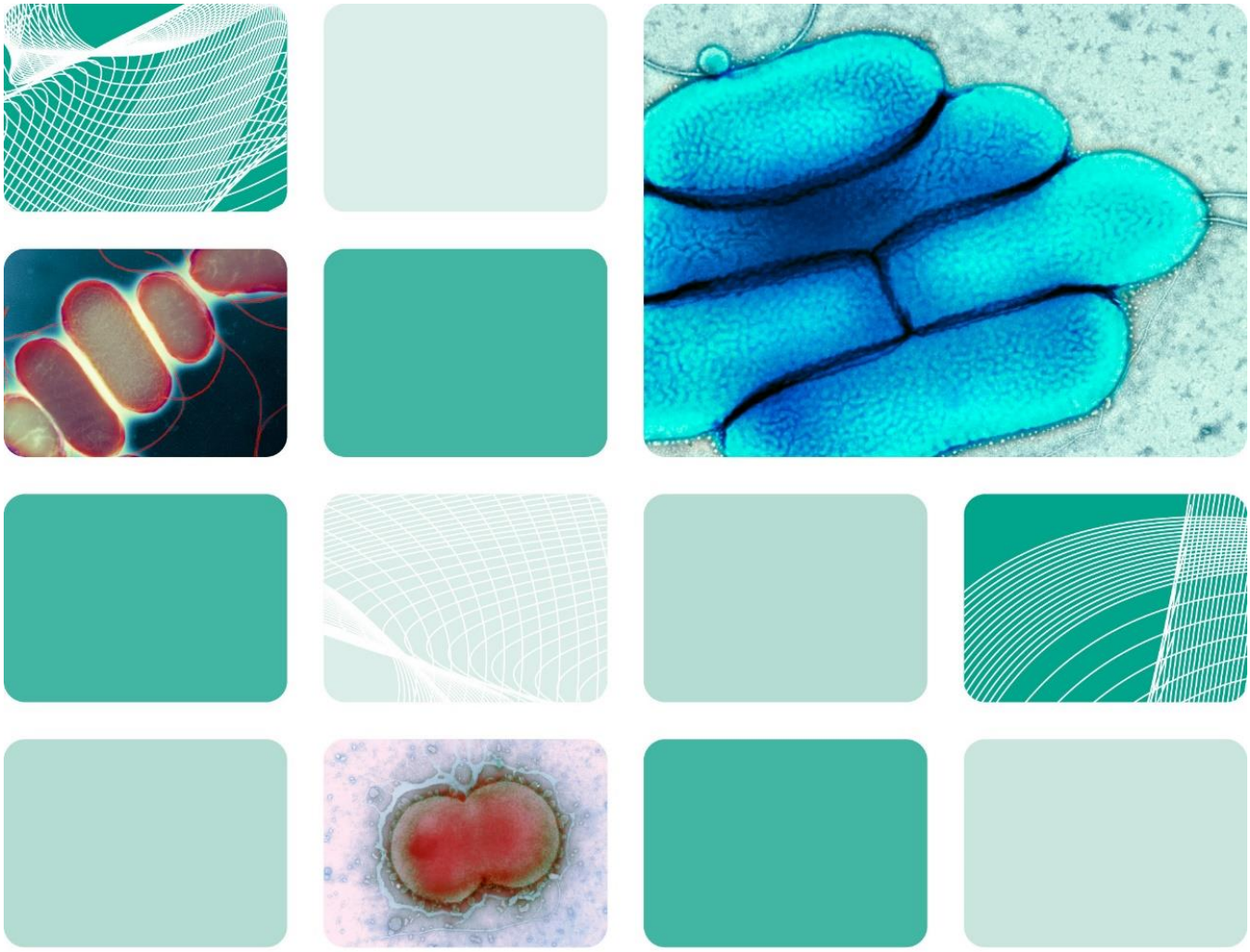
UK Health Security Agency

UK Standards for Microbiology Investigations

Investigation of superficial mouth samples



Issued by the Standards Unit, UK Standards for Microbiology Investigations, UKHSA

Acknowledgments

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

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

UK SMIs are produced in association with:

Displayed logos correct as of December 2025

Contents

Amendment table

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

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

Amendment number/date	13/03.10.25
Issue number discarded	7.2
Insert issue number	7.3
Section(s) involved	**Amendment**
4 Oral mucositis	Two references included to provide additional evidence for target organisms
9.5.1 Culture media, conditions and organisms	Correction: removal of comma after ‘Group A’. The table was restructured for clarity.
Whole document.	Hyperlinks throughout document updated to Royal College of Pathologists website. Public Health England replaced with UK Health Security Agency throughout the document, including the updated Royal Coat of Arms Partner organisation logos updated. Broken links to devolved administrations replaced. References to NICE accreditation removed. Scope and Purpose replaced with General and Scientific information to align with current UK SMI template. ‘Public health responsibilities of diagnostic laboratories’ section added. Enterobacteriaceae changed to Enterobacterales throughout.

Amendment no/date.	12/23.08.22
Issue no. discarded.	7.1
Insert issue no.	7.2

Section(s) involved	Amendment
Introduction	Correction made to the link on page 8 from UK SMI B17 Investigation of tissues and biopsies to UK SMI B 14: investigation of pus and exudates

Amendment no/date.	11/02.12.15
Issue no. discarded.	7
Insert issue no.	7.1
Section(s) involved	**Amendment**
4.5.3 Culture media, conditions and organisms.	Error in atmosphere column corrected.

Amendment no/date.	10/20.10.15
Issue no. discarded.	6.3
Insert issue no.	7
Section(s) involved	**Amendment**
Whole document.	Document restructured, rewritten and expanded to meet the requirements of the new scope. Hyperlinks updated to gov.uk.
Title of the document.	Changed to capture more sample types.
Page 2	Updated logos added
Types of specimen	Saliva and oral rinses added in
Culture	Amended to include new sample types
References	Reviewed and updated

1 General information

View general information related to UK SMIs.

2 Scientific information

View scientific information related to UK SMIs.

3 Scope of document

Type of specimen

Mouth swab, saliva and oral rinse

This UK SMI describes the processing, and bacteriological and mycological investigation of superficial mouth samples. Predominately mouth swabs but saliva and oral rinses are also covered. Infections of salivary glands (parotid, submandibular and sub-lingual) include bacterial and viral infections and are not covered in this UK SMI.

This UK SMI should be used in conjunction with other UK SMIs.

4 Introduction

Infections of the oral mucosa usually present as acute conditions. Usually these arise from the colonising oral flora but can also result from a flare-up of a chronic low-grade infection.

Oral mucosal infections are typically associated with biofilms formed on the inanimate surfaces present in the oral cavity such as the teeth and dentures.

Infections of the gingiva (gingivitis, including acute ulcerative gingivitis) and periodontal tissues (periodontitis) are the most common forms of oral infection and processing specimens from these infections are covered in UK SMI B 14: investigation of pus and exudates.

Oral mucositis

Oral mucositis is a painful complication of chemotherapy or head and neck radiotherapy, caused by direct cytotoxicity of the treatment regime. Super-infection usually with yeasts, oral bacteria and nosocomial bacteria such as *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* can exacerbate the problem and microbiological examination can help to guide symptomatic treatment [1,2].

Erythematous and pseudomembranous candidosis[3,4]

Erythematous and pseudomembranous candidosis are the most frequent clinical presentations of oral fungal infection. The infections may involve the mucosal surfaces of the cheeks, tongue (dorsal and ventral surfaces) and both hard and soft palates. The most common cause is *Candida albicans*. *Candida* species other than *C. albicans* such as *Candida glabrata* may also be isolated, either alone or in combination with

C. albicans. This is especially common in the medically compromised or those with a history of prolonged antifungal therapy[5,6] . Atrophic candidosis (denture stomatitis) may occur in the palatal mucosa below the fitting surface of dentures, especially when patients sleep with their dentures in place and/or have xerostomia. *Candida* species other than *C. albicans* are important to identify, since they may demonstrate reduced susceptibility and clinical resistance to the first line anti-fungal agents and may be responsible for refractory or recurrent infections. Rarely, moulds may colonise and infect sinuses and result in palatal erosion. Specimens in the form of an oral rinse (known volume of sterile saline) are used to quantitatively determine colonisation or infection[7].

Angular cheilitis and peri-oral infections

Angular cheilitis and peri-oral infections are common infections affecting the angles of the mouth and lips, usually caused by an intra-oral reservoir of infection, typically biofilms associated with denture stomatitis. Infection may be due to *S. aureus*, *Candida* species and/or Group A streptococci. It is common for dentate patients with angular cheilitis to have infection with both *S. aureus* and *C. albicans* in the labial commissure region. Swabs should be taken from the lesions themselves. Swabs should also be collected from relevant intra-oral sites for example, denture-fitting surface and the anterior nares to identify sites of colonisation to be treated with eradication therapy, to reduce relapse rates.

Staphylococcal mucositis[8]

Patients who are severely medically compromised and have reduced salivary flow, together with parenteral feeding, may develop staphylococcal mucositis caused by *S. aureus.* Enterobacteria may also play a role in severe cases. The erythematous changes in the oral mucosa may be indistinguishable clinically from candidosis, requiring the need for microbiological investigation. Results should be interpreted in a clinical context since asymptomatic carriage of *S. aureus* or Enterobacteria may occur. Strict regular oral hygiene measures are usually sufficient to resolve clinical symptoms. Systemic antibiotics are not usually required although may play an important role in the management of severe oral mucositis in some patient groups such as the terminally ill.

Oral ulceration

There are many non-infective causes of oral ulceration such as traumatic ulcers, recurrent aphthous ulcers, inflammatory conditions and malignant lesions. Infective causes of oral ulceration are commonly viral in origin (for example, Herpes simplex). Uncommon bacterial causes of ulceration are syphilis and tuberculosis whilst other rare causes of oral ulceration include fungal infections such as histoplasmosis.

Abscess and deep seated infections

Abscess and deep seated infections (dental abscesses, and salivary gland abscesses) are dealt with in UK SMI B 14 - Investigation of abscesses and deep seated wound infections.

Osteomyelitis

Osteomyelitis, including bacterial, mycobacterial and fungal osteomyelitis are dealt with in UK SMI B 42 - Investigation of bone and soft tissue associated with osteomyelitis.

Vincent's angina

Borrelia vincentii and *Fusobacterium* species are associated with the infection known as Vincent's angina. It is characterised by ulceration of the pharynx or gums and occurs in adults with poor mouth hygiene or serious systemic disease[9].
See UK SMI B 9 – Investigation of throat related specimens.

5 Technical information/limitations

Limitations of UK SMIs

The recommendations made in UK SMIs are based on evidence (for example, 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[10,11]

UK 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".

6 Safety considerations[10-26]

6.1 Specimen collection, transport and storage[10-15]

Use aseptic technique.

Collect saliva and oral rinse specimens into appropriate CE marked leak proof containers and transport specimens in sealed plastic bags.

Use tubes with transport medium for transporting swabs and transport in sealed plastic bags[27].

Transport each swab in transport medium in a CE marked container in a sealed plastic bag.

Compliance with postal, transport and storage regulations is essential.

6.2 Specimen processing[10-26]

All Hazard group 2 organisms must be confirmed at containment Level 2.

Laboratory procedures that give rise to infectious aerosols must be conducted in a microbiological safety cabinet[18].

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

If there is histoplasma (and/or other relevant dimorphic pathogens causing oral ulceration) risk then containment level 3 is required using an appropriate cabinet.

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

7 Specimen collection

7.1 Type of specimens

Mouth swab, saliva and oral rinse

7.2 Optimal time and method of collection[28]

For safety considerations refer to Section 6.1.

Collect specimens before starting antimicrobial therapy where possible[28].

To assure that the preconditions of the sampling for oral infections are comparable it is advised that patients should not:

1. eat or drink within 2 hours

2. brush their teeth within 2 hours

3. use any mouth rinse of disinfectant within 2 hours prior to sampling

If possible samples should be taken in the morning under fasting conditions.

Unless otherwise indicated collect each swab for bacterial and/or fungal culture and place in appropriate transport medium [27,29-32].

Collect specimens other than swabs into appropriate CE marked leak proof containers and place in sealed plastic bags.

Sample any lesions or inflamed areas using cotton tipped swabs. Samples of denture fitting surfaces should also be swabbed as these are more sensitive sites than the palatal mucosa to recover *Candida* species. The use of a tongue depressor or spatula may be helpful. Oral rinses can be useful to follow up level of colonisation. These are collected by rinsing with 10mL of sterile saline for one minute.

7.3 Adequate quantity and appropriate number of specimens[28]

Numbers and frequency of specimens collected depend on the clinical condition of patient.

8 Specimen transport and storage[10,11]

8.1 Optimal transport and storage conditions

For safety considerations refer to Section 6.1.

Specimens should be transported and processed as soon as possible[28].

Collect mucosal swabs in transport medium which should be transported and processed as soon as possible. If processing is delayed, refrigeration is preferable to storage at ambient temperature.

Oral rinses should be transported in a CE marked leak proof containers and placed in sealed plastic bags and processed as soon as possible.

9 Specimen processing/procedure[10,11]

9.1 Test selection

Most mouth samples are swabs unless the patient is immunocompromised or has other clinical indications.

Saliva samples may be collected for microbiological investigation and for other types of assessment. Increasingly saliva is being used as a sample for new diagnostic techniques, but also for assessing xerostomia and risk of dental caries. Care is needed to avoid contamination of these specimens and cross infection from these specimens. Sometimes culture is done with an exact volume of saliva in order to assess the count of a particular organism (for example *S. mutans* or lactobacilli per mL of the original saliva sample.

9.2 Appearance

N/A

9.3 Sample preparation

For safety considerations refer to Section 6.2.

For oral rinses (saliva/mouth washings) centrifuge at 3200 rpm for 10 minutes.

Decant supernatant into disinfectant and re suspend the deposit in 1mL PBS.

This is now the neat sample.

Inoculate 50µL onto a sabouraud agar plate using a hockey stick to spread out for single colonies and a Columbia agar plate.

For comparison it is sometimes useful to dilute neat sample 1:100 (0.1mL + 9.9mL PBS). Inoculate 50µL onto a Columbia Blood Agar and use a hockey stick to spread out. A MacConkey/Cystine lactose electrolyte deficient agar (CLED) plate may also be useful.

9.4 Microscopy

Direct microscopic examination with Calcofluor staining may be helpful if histoplasma or mould infection is suspected.

9.5 Culture and investigation

Inoculate each agar plate using a sterile loop or a loopful of liquid (UK SMI Q 5 - Inoculation of culture media for bacteriology).

For the isolation of individual colonies, spread inoculum with a sterile loop.

9.5.1 Culture media, conditions and organisms

Specimen	Clinical details/ conditions	Standard media	Incubation			Cultures read	Target organism(s)
			Temp °C	Atmos	Time		
Mouth swab, Saliva and oral rinse	Oral candidosis Fungal infection	Sabouraud agar	35-37	Air	40-48hr*	Daily	*C. albicans,* Non-albicans yeasts
	Oral erythema Denture stomatitis Angular cheilitis Mouth ulcer	Blood agar	35-37	CO_2 5-10%	16-24hr	daily	Group A streptococcus, *S. aureus,* Coliforms
	Oral mucositis Immunocompro-mised patients	MacConkey/ CLED agar	35-37	Air	16-24hr	daily	*Coliforms* and non-fermentative gram negatives
		Chromogenic agar	35-37	Air	16-24hr	daily	*Candida species*
*If Histoplasmosis is suspected the length of incubation should be extended and carried out in Containment Level 3. If an unusual fungal infection is suspected a second Sabouraud plate should be set up at 30°C and incubation time extended.							

9.6 Identification

Refer to individual UK SMIs for organism identification.

9.6.1 Minimum level of identification in the laboratory

Yeasts	Yeasts level Patients showing treatment failure require a full identification.
Staphylococcus aureus	species level
Lancefield group A streptococcus	species level
Enterobacterales	"coliform" level if dominant growth

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

Immunocompromised Patients

Candida species	species level
Aspergillus species and other moulds	genus level
Staphylococcus aureus	species level
Lancefield group A streptococcus	species level
Coliforms	Coliforms level or if clinically indicated species level
Pseudomonas	Pseudomonas level if dominant growth or if clinically indicated species level
Acinetobacter	*Acinetobacter* level if dominant growth or if clinically indicated species level
Stenotrophomonas	Stenotrophomonas level if dominant growth or if clinically indicated species level

9.7 Antimicrobial susceptibility testing

Refer to British Society for Antimicrobial Chemotherapy (BSAC) and/or EUCAST guidelines.

C. albicans is not routinely tested unless associated with recurrent infection, requested by clinician or the patient's history indicates significant immunosuppression.

9.8 Referral for outbreak investigations

N/A

10 Referral to reference laboratories

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

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

England

Wales

Scotland

Northern Ireland

Note: In case of sending away to laboratories for processing, ensure that specimen is placed in appropriate package and transported accordingly.

11 Reporting procedure

11.1 Microscopy

Report for fungi if applicable.

11.1.1 Microscopy reporting time

All results should be issued to the requesting clinician as soon as they become available, unless specific alternative arrangements have been made with the requestors.

Urgent results should be telephoned or transmitted electronically in accordance with local policies.

11.2 Culture

Report clinically significant organisms isolated **or**

Report other growth, eg: “Mixed upper respiratory tract flora” **or**

Report absence of growth or

Report presence or absence of specific named pathogens

Report quantitative growth if applicable. For rinses report as[7]:

Heavy growth: $>10^4$cfu/mL

Moderate growth = 10^2-10^3cfu/mL

Light growth = $<10^2$cfu/mL

11.2.1 Culture reporting time

Interim or preliminary results should be issued on detection of potentially clinically significant isolates as soon as growth is detected, unless specific alternative arrangements have been made with the requestors.

Urgent results should be telephoned or transmitted electronically in accordance with local policies.

Final written or computer-generated reports should follow preliminary and verbal reports as soon as possible.

11.3 Antimicrobial susceptibility testing

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

12 Notification to UKHSA[33,34,] or equivalent in the devolved administrations[35-38]

The Health Protection (Notification) regulations 2010 require diagnostic laboratories to notify UK Health Security Agency (UKHSA) 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 UKHSA 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 UKHSA. The vast majority of NHS laboratories voluntarily report a wide range of laboratory diagnoses of causative agents to UKHSA and many UKHSA 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[35,36], Wales[37] and Northern Ireland[38].

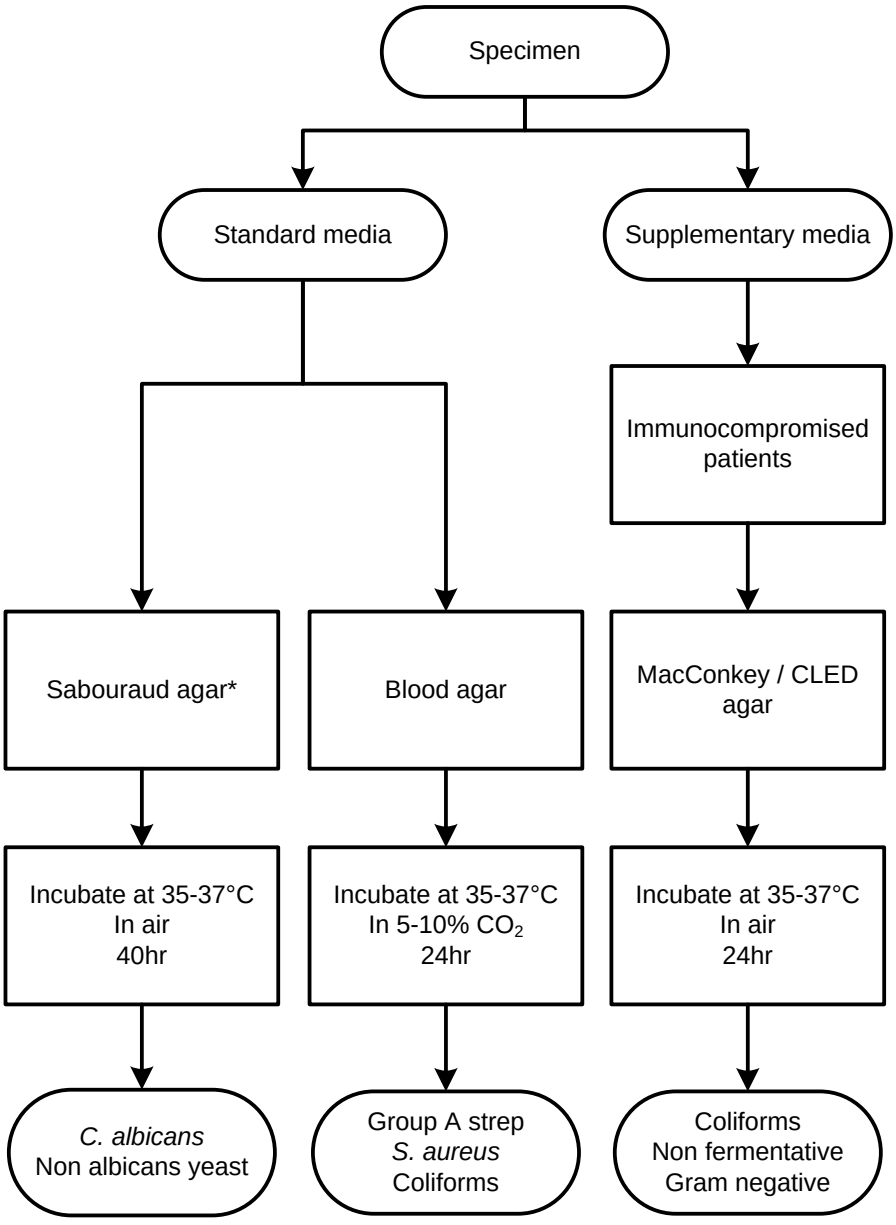
13 Public health responsibilities of diagnostic laboratories

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

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

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

Algorithm: Investigation of superficial mouth samples



*If histoplasmosis is suspected the length of incubation should be extended and carried out in Category 3 conditions.

If an unusual fungal infection is suspected a second Sabouraud plate should be set up at 30°C and incubation time extended.

References

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

1. Frey-Furtado L, Magalhães I, Sampaio-Maia B, Azevedo MJ. Oral microbiome characterization in oral mucositis patients—A systematic review. J Oral Pathol Med. 2023; 52(10): 911-918.

2. Diaz PI, Hong BY, Frias-Lopez J, Dupuy AK, Angeloni M, Abusleme L, Terzi E, Ioannidou E, Strausbaugh LD, Dongari-Bagtzoglou A. Transplantation-associated long-term immunosuppression promotes oral colonization by potentially opportunistic pathogens without impacting other members of the salivary bacteriome. Clin Vaccine Immunol. 2013 Jun;20(6):920-30.

3. Rautemaa R, Ramage G. Oral candidosis--clinical challenges of a biofilm disease. Crit Rev Microbiol 2011;37:328-36.

4. Bagg J, Sweeney MP, Lewis MA, Jackson MS, Coleman D, Al MA, et al. High prevalence of non-albicans yeasts and detection of anti-fungal resistance in the oral flora of patients with advanced cancer. Palliat Med 2003;17:477-81.

5. Bagg J, Sweeney MP. Oral problems in advanced cancer. CME Cancer Medicine 2003;2:23-8.

6. Jobbins J, Bagg J, Finlay IG, Addy M, Newcombe RG. Oral and dental disease in terminally ill cancer patients. BMJ 1992;304:1612.

7. Epstein JB, Pearsall NN, Truelove EL. Quantitative relationships between Candida albicans in saliva and the clinical status of human subjects. J Clin Microbiol 1980;12:475-6.

8. Jackson MS, Bagg J, Kennedy H, Michie J. Staphylococci in the oral flora of healthy children and those receiving treatment for malignant disease. Microbial Ecology in Health & Disease 2000;12:60-4.

9. Finegold S. Anaerobic Gram-Negative Rods: Bacteroides, Prevotella, Porphyomonas, Fusobacterium, Bilophila, Sutterella. In: Gorbach SL, Bartlett JG, Blacklow NR, editors. Infectious Diseases. 2nd ed. Philadelphia: WB Saunders Company; 1998. p. 1904-15.

10. European Parliament. UK Standards for Microbiology Investigations (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".

11. Official Journal of the European Communities. Directive 98/79/EC of the European Parliament and of the Council of 27 October 1998 on *in vitro* diagnostic medical devices. 7-12-1998. p. 1-37.

12. Health and Safety Executive. Safe use of pneumatic air tube transport systems for pathology specimens. 9/99.

13. Department for transport. Transport of Infectious Substances, 2011 Revision 5. 2011.

14. World Health Organization. Guidance on regulations for the Transport of Infectious Substances 2013-2014. 2012.

15. Home Office. Anti-terrorism, Crime and Security Act. 2001 (as amended).

16. Advisory Committee on Dangerous Pathogens. The Approved List of Biological Agents. Health and Safety Executive. 2013. p. 1-32

17. Advisory Committee on Dangerous Pathogens. Infections at work: Controlling the risks. Her Majesty's Stationery Office. 2003.

18. Advisory Committee on Dangerous Pathogens. Biological agents: Managing the risks in laboratories and healthcare premises. Health and Safety Executive. 2005.

19. Advisory Committee on Dangerous Pathogens. Biological Agents: Managing the Risks in Laboratories and Healthcare Premises. Appendix 1.2 Transport of Infectious Substances - Revision. Health and Safety Executive. 2008.

20. Centers for Disease Control and Prevention. Guidelines for Safe Work Practices in Human and Animal Medical Diagnostic Laboratories. MMWR Surveill Summ 2012;61:1-102.

21. Health and Safety Executive. Control of Substances Hazardous to Health Regulations. The Control of Substances Hazardous to Health Regulations 2002. 5th ed. HSE Books; 2002.

22. Health and Safety Executive. Five Steps to Risk Assessment: A Step by Step Guide to a Safer and Healthier Workplace. HSE Books. 2002.

23. Health and Safety Executive. A Guide to Risk Assessment Requirements: Common Provisions in Health and Safety Law. HSE Books. 2002.

24. Health Services Advisory Committee. Safe Working and the Prevention of Infection in Clinical Laboratories and Similar Facilities. HSE Books. 2003.

25. British Standards Institution (BSI). BS EN12469 - Biotechnology - performance criteria for microbiological safety cabinets. 2000.

26. British Standards Institution (BSI). BS 5726:2005 - Microbiological safety cabinets. Information to be supplied by the purchaser and to the vendor and to the installer, and siting and use of cabinets. Recommendations and guidance. 24-3-2005. p. 1-14

27. Barber S, Lawson PJ, Grove DI. Evaluation of bacteriological transport swabs. Pathology 1998;30:179-82.

28. Baron EJ, Miller JM, Weinstein MP, Richter SS, Gilligan PH, Thomson RB, Jr., et al. A Guide to Utilization of the Microbiology Laboratory for Diagnosis of Infectious Diseases: 2013 Recommendations by the Infectious Diseases Society of America (IDSA) and the American Society for Microbiology (ASM). Clin Infect Dis 2013;57:e22-e121.

29. Rishmawi N, Ghneim R, Kattan R, Ghneim R, Zoughbi M, Abu-Diab A, et al. Survival of fastidious and nonfastidious aerobic bacteria in three bacterial transport swab systems. J Clin Microbiol 2007;45:1278-83.

30. Van Horn KG, Audette CD, Sebeck D, Tucker KA. Comparison of the Copan ESwab system with two Amies agar swab transport systems for maintenance of microorganism viability. J Clin Microbiol 2008;46:1655-8.

31. Nys S, Vijgen S, Magerman K, Cartuyvels R. Comparison of Copan eSwab with the Copan Venturi Transystem for the quantitative survival of *Escherichia coli, Streptococcus agalactiae* and *Candida albicans*. Eur J Clin Microbiol Infect Dis 2010;29:453-6.

32. Tano E, Melhus A. Evaluation of three swab transport systems for the maintenance of clinically important bacteria in simulated mono- and polymicrobial samples. APMIS 2011;119:198-203.

33. Public Health England. Laboratory Reporting to Public Health England: A Guide for Diagnostic Laboratories. 2013. p. 1-37.

34. Department of Health. Health Protection Legislation (England) Guidance. 2010. p. 1-112.

35. Scottish Government. Public Health (Scotland) Act. 2008 (as amended).

36. Scottish Government. Public Health etc. (Scotland) Act 2008. Implementation of Part 2: Notifiable Diseases, Organisms and Health Risk States. 2009.

37. The Welsh Assembly Government. Health Protection Legislation (Wales) Guidance. 2010.

38. Home Office. Public Health Act (Northern Ireland) 1967 Chapter 36. 1967 (as amended).