



**HEALTH PROTECTION AGENCY
MICROBIOLOGY SERVICES -
COLINDALE**

**DEPARTMENT OF
HEALTHCARE ASSOCIATED
INFECTION
AND ANTIBIOTIC RESISTANCE**

USER MANUAL

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Introduction

The Department of Healthcare Associated Infection and Antibiotic Resistance (DHCAIAR) is comprised of the Laboratory of Healthcare Associated Infection (LHCAI) and the Antibiotic Resistance Monitoring and Reference Laboratory (ARMRL) and is situated in the Microbiology Services Division, Colindale, which is part of the Health Protection Agency (HPA).

LHCAI is the National Reference Centre for nosocomial bacteria and receives bacterial cultures and human sera from HPA laboratories, National Health Service laboratories and other laboratories throughout the UK and abroad, including commercial laboratories serving medical, veterinary and industrial clients. LHCAI is a World Health Organisation Collaborating Centre for healthcare-associated infection and, as such, provides support for national centres throughout the world. LHCAI is also a centre for the surveillance and investigation of healthcare-associated infection and advice on this and related issues.

ARMRL is a National Reference Laboratory for the testing of antibiotic resistant bacteria and for the monitoring of their dissemination. It provides confirmation of resistances and advice on their management and on therapeutic options.

Laboratory of Healthcare Associated Infection (LHCAI)

Address:	Microbiology Services, Colindale Health Protection Agency 61 Colindale Avenue London NW9 5EQ	Hays DX address: HPA Colindale LHCAI DX 6530009 Colindale NW
Telephone:	020 8200 4400	
Fax:	020 8200 7449	
Internet:	www.hpa.org.uk/cfi/lhcai	

Antibiotic Resistance Monitoring and Reference Laboratory (ARMRL)

Address:	Microbiology Services, Colindale Health Protection Agency 61 Colindale Avenue London NW9 5EQ	Hays DX address: HPA Colindale ARMRL DX 6530012 Colindale NW
Telephone:	020 8200 4400	
Fax:	020 8327 6264	
Internet:	www.hpa.org.uk/cfi/armrl	

Laboratory of Healthcare Associated Infection

DIRECTOR	Professor B D Cookson
DEPUTY DIRECTOR	Vacant
LABORATORY MANAGER	Mrs Fiona Clode
HEAD, OPPORTUNISTIC PATHOGENS UNIT	Vacant
HEAD, STAPHYLOCOCCUS REFERENCE UNIT	Dr Angela M Kearns
HEAD, INFECTION CONTROL UNIT	Professor B D Cookson

Key Services

▪ **Identification**

Phenotypic and sequencing identification of fermenters, non-fermentative gram-negative organisms, fastidious gram-negative organisms, gram-positive rods and other bacterial organisms with no reference facility.

Key factors affecting the performance of the test:

- Lack of clinical information
- Lack of sender's test results.

Requests for work on presumptive isolates must include:

Full details of sending laboratory's results

An indication of whether isolate maybe a hazard group 3 organism

Full clinical details, including clinical and contact history

Recent travel abroad

Failure to provide necessary information on the form can result in an isolate being handled at containment level 2 instead of containment level 3, putting staff at risk. In these instances, a report of the incident has to be sent to the Health and Safety Executive.

Failure to provide necessary information on the form can result in an isolate being tested using inappropriate methods and therefore delaying reporting.

▪ **Molecular (PCR/sequence based) and/or biochemical species identification**

These techniques are available to assist with the identification of the following organisms: *Acinetobacter*, *Burkholderia*, *Enterococcus*, *Klebsiella spp.*, *Achromobacter xylosoxidans*, *Stenotrophomonas maltophilia*, *Burkholderia pseudomallei*, *Cronobacter sakazakii* and medically-important pseudomonads.

▪ **Molecular (DNA-based) typing**

For inter-strain comparative purposes, a molecular typing service is available for all the organisms listed above, plus any other species involved in suspected outbreaks of healthcare-associated infection. In addition, the following are offered:

Further characterisation of isolates of *Acinetobacter baumannii* by detection of *bla_{OXA}* carbapenemase genes, identification of isolates belonging to the major clonal lineages (international clones I, II and III), and determination of repeat numbers at Variable Number Tandem Repeat (VNTR) loci with small repeat units, that can provide discrimination within a pulsed-field gel electrophoresis (PFGE) type.

PCR identification of capsular types K1, K2, K5, K54, and K57 of *Klebsiella* spp., associated with invasive disease, and of two putative virulence factors (*rmpA* and *wcaG*).

PCR identification of epidemic strains of *Pseudomonas aeruginosa* known as the Liverpool, Midlands 1 and Manchester strains, associated with patients with cystic fibrosis.

Variable Number Tandem Repeat (VNTR) comparison of isolates belonging to the *Mycobacterium abscessus* complex

Key factors affecting the performance of the test:

- Poor growers
- Isolates where DNA degrades
- Autolytic enzymes
- Single isolate with no indication of what it should be compared with

▪ **Serotyping**

Capsular types K1, K2, K5, K54 and K57 of *Klebsiella* spp., associated with invasive disease and virulence, are detected by PCR using serotype specific targets.

Staphylococcus Reference Services

▪ ***spa* typing**

This technique is available for the characterisation of *Staphylococcus aureus* (MSSA and MRSA) and involves DNA sequence-based typing of part of the protein A gene of *S. aureus*. The *spa* repeat succession can often be used to infer which MLST clonal complex the isolate belongs to.

Key factors affecting the performance of the test:

- Some isolates may appear to be non-typable by *spa*; these are rare and can generally be typed using alternative PCR primers

- Some isolates may include repeat units of a “non-standard” length (e.g. 25-28bp as opposed to 24bp). These can still be typed but will include a “??” notation in the repeat succession

▪ **Fine strain typing**

PFGE-based analyses are available for inter-strain comparative purposes, including suspected outbreaks of MSSA, MRSA or CoNS in healthcare or community settings.

Key factors affecting the performance of the test:

- Poor growers
- Isolates where DNA degrades
- Autolytic enzymes

A range of PCR and DNA sequence-based techniques for the characterisation of strains of *Staphylococcus aureus* from healthcare and community-based infections is available. Please contact the relevant personnel to discuss (see list of contacts).

▪ **Toxin gene detection**

Toxin gene profiling of isolates of *S. aureus* is available, providing insights into strain virulence. We undertake PCR-based screening for 14 toxin genes: exfoliative toxins A, B and D; enterotoxins A-E and G-J; toxic shock syndrome-1 and Panton-Valentine Leukocidin.

When requesting *S. aureus* toxin gene testing, select either PVL-testing only or extended toxin gene profiling (the latter includes all 14 toxin genes listed above). Where the toxin request is NOT diagnostic we will not charge but the free text field MUST contain the relevant previous referral details of related isolates e.g. MSD, Colindale Laboratory reference numbers or details of the outbreak/diagnostic isolates etc sent previously. If this is not included then we will assume it relates to primary diagnosis and this will be charged for (please refer to latest price lists).

▪ **Identification of coagulase-negative staphylococci (CoNS)**

Phenotypic (biochemical-based) and genotypic (PCR-based) techniques are available for the identification of CoNS.

Key factors affecting the performance of these tests:

- Slow growers
- Organisms with specific growth requirements

- **Serodiagnosis**

Serodiagnostic reference services for *Streptococcus pyogenes*, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Burkholderia pseudomallei* (melioidosis). The first three assays are charged for (please refer to latest price lists).

Key factors affecting the performance of the test:

- Whole and lysed blood can affect the test (only 'pure' serum should be sent)

- **Urgent referrals**

Specialist reference services are available for urgent clinical and public health investigations, outbreaks and incident management, either healthcare- or community-based. Specimen submissions regarded by the sending laboratory as especially important or urgent should be notified to the appropriate personnel by telephone in advance (see list of contacts below) to ensure that the appropriate level of priority is accorded to these specimens immediately upon receipt.

To ensure such specimens are brought straight to the laboratory's attention, please indicate 'Urgent' clearly on the submission form, Senders are also advised to provide an appropriate telephone number for reporting results.

- **Infection Control Advice**

Information and advice on infection control problems; education and training; research and audit; disinfection and sterilisation; investigation of healthcare- and community-associated infection, aspects of laboratory safety and other related matters.

- **Bacterial Cultures**

We are happy to supply isolates from our collections (cost available on request) provided the strains have not been deposited with NCTC, in which case the request will be passed to them and their rates will apply.

- ***Staphylococcus aureus* 'phages**

From Monday October 4th 2010, a 'phage typing service for *S. aureus* will no longer be available.

The International Set of *S. aureus* 'phages, together with their propagating strains, are available from NCTC.

Antibiotic Resistance Monitoring and Reference Laboratory

DIRECTOR	Dr David Livermore
DEPUTY DIRECTOR	Dr Neil Woodford
LABORATORY MANAGER	Mrs Fiona Clode
HEAD, RESISTANCE MECHANISMS MONITORING UNIT	Dr Neil Woodford
HEAD, ANTIBIOTIC RESISTANCE & EVALUATION UNIT	Dr Robert Hill

The Antibiotic Resistance Monitoring and Reference Laboratory (ARMRL) is the national Reference Laboratory for bacterial antibiotic resistance in England and Wales. ARMRL tests c. 8500 isolates p.a., submitted for confirmation of resistance(s), or collected in various surveillance programmes and projects.

Key Services

Confirmation of unusual resistances

ARMRL investigates isolates found by diagnostic laboratories to have unusual resistances, aiming to identify (i) treatment options (ii) emerging resistance of public health importance (iii) underlying resistance mechanisms. We work closely with LHCAI in cases where clonal spread of resistant strains is suspected. We have the capacity to determine the activity of most antibiotics available in the UK. Please state your requirements clearly on the request form.

Whilst ARMRL staff are willing to examine a wide range of resistance phenotypes for customers, we would view the following combinations of organism and resistance as exceptional and to always warrant referral of the isolate:

Organism	Resistance Phenotype
<i>S. aureus</i>	Any of: MICs of oxacillin between 2 and 8, vancomycin, teicoplanin, linezolid, quinupristin/dalfopristin, clindamycin-R when erythromycin-S, daptomycin, tigecycline
Coagulase-negative staphylococci	Any of: vancomycin, linezolid, quinupristin/dalfopristin, daptomycin, tigecycline
<i>Corynebacterium jeikeium</i> .	Any of: vancomycin, teicoplanin, linezolid, quinupristin/dalfopristin

Organism	Resistance Phenotype
<i>S. pneumoniae</i>	Any of: meropenem, vancomycin, teicoplanin, linezolid, quinupristin/dalfopristin, tigecycline, penicillin (MICs >4 mg/L), cefotaxime (MICs >2 mg/L), moxifloxacin
Group A, B, C, G β -haemolytic streptococci	Any of: penicillin, vancomycin, teicoplanin, linezolid, quinupristin/dalfopristin, quinolones, tigecycline
Enterococci	Any of linezolid, daptomycin (MICs >4 mg/L), tigecycline. Also any isolates resistant to both ampicillin and quinupristin/dalfopristin or to teicoplanin, but not vancomycin.
Enterobacteriaceae, including members of the genera <i>Enterobacter</i> , <i>Escherichia</i> , <i>Citrobacter</i> , <i>Serratia</i> , <i>Proteus</i> , <i>Providencia</i> , <i>Klebsiella</i> , <i>Morganella</i> , <i>Salmonella</i> #, <i>Shigella</i> #	Ertapenem, meropenem, doripenem, imipenem (except <i>Proteus</i> spp. resistant at low level to imipenem only), colistin (except <i>Serratia</i> spp., <i>Proteus</i> spp., <i>Morganella</i> spp.). Also, for <i>E. coli</i> only, tigecycline.
<i>Acinetobacter</i> spp.	Colistin
<i>Pseudomonas aeruginosa</i>	Colistin; MBL-test +ve
<i>H. influenzae</i>	Any third-generation cephalosporin, or carbapenem
<i>M. catarrhalis</i>	Ciprofloxacin, any third-generation cephalosporin

We are happy to examine other unusual combinations of resistance(s) and organism(s) and cases where the sender has obtained conflicting results by different methods (e.g. where an automated system identifies an isolate as having a particular resistance but this cannot be confirmed by classical methodology. We do **not** however seek the routine submission of (i) penicillin-resistant pneumococci unless penicillin MICs are >4 mg/L; (ii) vancomycin-resistant enterococci; (iii) ESBL producers

Determination of minimum inhibitory concentrations (MICs) for referred or survey isolates is undertaken by the Antibiotic Resistance and Evaluation Unit (AREU) and is largely done by agar dilution and occasionally by E-test. Interpretative reading of these antibiograms allows assessment of the likely underlying mechanisms.

For the correct interpretation of susceptibilities, use of appropriate breakpoints and interpretation of mechanisms, isolates must be correctly identified to species level. You will be charged if unidentified 'coliform/gram-negative rod' isolates are submitted, unless also formally sent for reference identification (not done by ARMRL). If an isolate is submitted for 'confirmation of results', please be aware that we can only comment if the results requiring confirmation are stated!

If you have a query about a report, please telephone the validator, whose contact details are listed in the final pages of this manual and on our reports.

Key factors affecting the performance of the test:

- Slow growers
- Organisms with specific growth requirements
- Organisms which have not been identified

▪ **Therapeutic guidance**

By determining MICs of appropriate antibiotics on submitted isolates, AREU aims to elucidate the most suitable options for treatment. To evaluate susceptibility, we use published clinical breakpoints or, in their absence, advise on the best evidence for any potential antibiotic treatment. Where multiply-resistant isolates are submitted for therapeutic guidance, susceptibilities already established by the sender should be recorded on the submission form, along with appropriate clinical details. Any significant resistance mechanisms relevant to treatment will be interpreted from MIC profiles and reported. Resistances may be further investigated by the molecular unit within ARMRL (RMMU). Molecular investigations may lead to revisions in data and/or advice. We also undertake interpretation of hospital laboratory data on the telephone to help in urgencies. For urgent referrals, please see below.

▪ **Urgent referrals**

MIC and interpretive services are available for urgent clinical and public health investigations. Urgent MICs are done by E-test and may be treated as preliminary data if the purity of culture is not absolutely confirmed. Specimen submissions regarded by the sending laboratory as especially important or urgent should be notified to the appropriate personnel by telephone in advance (see list of contacts below) to ensure that the appropriate level of priority is accorded to these specimens immediately upon receipt.

To ensure such specimens are brought straight to the laboratory's attention, please indicate 'Urgent' clearly on the submission form, Senders are also advised to provide an appropriate telephone number for reporting results.

▪ **Endocarditis**

AREU determines MICs for endocarditis isolates to provide therapeutic guidance, as some laboratories choose not to maintain MIC testing capacity. Since this work does not entail investigating exceptional resistance it is charged To maximise the speed of our response, submission forms must be clearly marked 'ENDOCARDITIS' and the appropriate telephone number for reporting the results must be given.

- **Molecular investigation of resistance**

Investigation of resistance mechanisms is undertaken by the Resistance Mechanisms Monitoring Unit (RMMU). Genes and mutations sought as an uncharged reference service are those that confer resistance to agents of last resort, including carbapenems, quinupristin/dalfopristin and linezolid, as resistance to these agents is of public health concern.

Services currently offered by RMMU include detection of:

- *mecA* in referred *S. aureus* with borderline methicillin / oxacillin resistance (i.e. suspect MRSA giving equivocal results in phenotypic tests). (Charged)
- *mupA* in mupirocin-resistant *S.aureus*; this gene confers high level, clinically-significant resistance. (Charged)
- 23S rRNA mutations responsible for linezolid resistance in enterococci, staphylococci or streptococci. ([PubMed link](#))
- Genes conferring quinupristin/dalfopristin resistance in enterococci or staphylococci. ([PubMed link](#))
- Genes encoding carbapenemases in *Acinetobacter*, Enterobacteriaceae or *Pseudomonas* spp. ([PubMed link 1](#); [PubMed link 2](#)).
- Genes encoding acquired (plasmid-mediated) AmpC β -lactamases in *E. coli* and *Klebsiella* spp. resistant to cephalosporins, but with no synergy with clavulanic acid. ([PubMed link](#))

- **New antibiotics**

ARMRL liaises with pharmaceutical companies to test new antibiotics against representative or unusually resistant referred isolates, possibly revealing new treatment options.

- **Surveys of resistance**

Point prevalence surveys of antibiotic resistance are undertaken, giving measures of the extent and nature of critical resistance problems.

- **Bacterial cultures**

We are happy to supply isolates from our collection (cost available on request) provided the strains have not been deposited with NCTC, in which case the request will be passed to them and their rates will apply.

- **Other useful Information relevant to ARMRL services**

ARMRL homepage (www.hpa.org.uk/cfi/armrl)

BSAC Site (www.bsac.org.uk)

BSAC Survey Site (www.bsacsurv.org.uk)

How to Obtain Services

Laboratory opening times

The Department of Healthcare Associated Infection and Antibiotic Resistance (DHCAIAR) is staffed for routine services between the hours of 9:00 a.m. until 5:30 p.m. Monday to Friday. During these hours, clinical advice and interpretation of data may be sought from the relevant personnel (see list of contacts).

Specimens arriving outside working hours are kept in the fridge. For urgent specimens, please see "Emergency Situations" below.

What information to send

Clinical and epidemiological data are essential parts of any request for service. Please complete our forms in full. These are available on our web-site.

LHCAI: www.hpa.org.uk/cfi/lhcai

ARMRL: www.hpa.org.uk/cfi/armrl/testing.htm

Instructions on the correct completion of our request forms are available from http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1204100445572

What specimens to send

CULTURE: Pure culture on agar slopes (not universals, plates or swabs)

SERUM: Not less than 200 µl in 2 ml micro-tubes

Special instructions

Please send specimens packaged according to the current Transport Regulations. Where possible, please use small containers such as bijoux for cultures and 1.5 ml serum bottles for sera.

Please telephone in advance if you are sending for *Burkholderia pseudomallei* culture identification or serum for serodiagnosis.

The minimum acceptance criteria, for specimens referred to us, are outlined towards the end of this manual.

Emergency situations

For cultures or sera requiring urgent attention, please telephone and ask for the appropriate staff member (see list of contacts). If outside of normal working hours, telephone the Centre for Infections site number (020 8200 4400).

Infection control advice

Write to, telephone, or E-mail the relevant person (see list of contacts).

Level of service

<i>Average turnaround times</i>	Turnaround Time ^a	Optimal day for receipt
Bacterial Tests		
<i>B. cepacia</i> PCR	18-24 days	Any
Enterococcal PCR	15-20 days	Wednesday
PCR characterisation of <i>Klebsiella</i>	14-21 days	Any
<i>Acinetobacter</i> routine	15-21 days	Any
Coagulase-negative Staph identification	11 days	Monday
<i>S. aureus spa</i> typing ^b	1-6 days	Any
<i>S. aureus</i> PVL-testing only ^b	1-6 days	Any
<i>S. aureus</i> extended toxin gene detection (incl PVL)	7 days	Any
Staphylococcal molecular comparison (PFGE)	15 days	Any
Phenotypic identification ^c	23-28 days	Any
DNA sequencing identification ^c	28 days	Any
Molecular comparison (PFGE/VNTR)	21-28 days	Any
Antibiotic susceptibility testing ^d	12 days	Friday
<i>mecA</i> , <i>mupA</i> PCR ^{d,e}	9 days	Tuesday
Resistance mechanisms: other services ^{d,e}	14 days	Friday
Serodiagnostic Tests		
<i>Streptococcus pyogenes</i>	12days	Friday
<i>Staphylococcus aureus</i>	12 days	Friday
<i>Pseudomonas aeruginosa</i>	7-10 days	Friday
<i>Burkholderia pseudomallei</i> (melioidosis)	2-7 days	Friday
Infection Control Advice		
Written request	2-7 days	
Telephone and E-mail requests	Immediate - 2 days	as appropriate

^a Turnaround times are based on averages of monthly figures for processing 75% of specimens received. Turnaround times may be affected by: mixed cultures or slow growing organisms, postal strikes or other delivery problems, failure of plant or equipment, or unplanned staff absences.

^b Depending on the nature of the enquiry and the complexity of the investigation, specimens can be "fast-tracked" to provide *spa* typing or PVL test results in 24hrs of receipt of a pure culture. Telephone SRU in advance of submission to discuss (020 8327 7227).

- ^c These isolates can be problematic. Customers are informed of progress.
- ^d ARMRL processes most reference specimens in once-weekly batches. Users should always phone the appropriate Unit Head (see list of contacts) to discuss clinically urgent specimens, so that we may 'fast-track' testing whenever possible. Mixed cultures, wrong ID, slow growers and reflex investigations are outwith normal turnaround times, which will depend on the circumstances.
- ^e When bacteria are referred for investigation of resistance mechanisms other than *mecA* and *mupA* detection (see ARMRL key services), we first seek to confirm the sender's phenotypic susceptibility results. Interpretative reading of our extended antibiogram is used to prompt appropriate molecular investigations. Hence these 'investigative' services typically have longer turnaround times than e.g. *mecA* / *mupA* detection in staphylococci (but see footnote 'd').

Exceptions

The above times for cultures are based on the receipt of pure cultures. Cultures that require purification, increase turnaround times significantly, as may very large batches of specimens. Fresh cultures may be requested when mixed cultures have been received by LHCAI or ARMRL.

Specialist reference services are available for **urgent public health investigations**, outbreaks and incident management, either healthcare- or community-based. Specimen submissions regarded by the sending laboratory as especially important or urgent should be notified to the Staphylococcus Reference Unit by telephone (020 8327 7227) to ensure that the appropriate level of priority is accorded to these specimens immediately upon receipt.

Retention of Original Specimens

The table below indicates the minimum retention times for original specimens. If further testing is required on original specimens, then the request needs to be made before the time limit of the specimen concerned. These times cannot be applied to cultures sent in on plates, swabs or cooked meat broth.

Service	Specimen	Retention Time
LHCAI		
Staphylococcus Reference Unit	<i>S. aureus</i>	1 year
	Coagulase-negative Staphylococci	3 months
Identification	Various bacterial species	3 months
PCR Identification	CF isolates	3 months
	Enterococci	3 months
Gram Positive Serodiagnosis	Serum	2 years
Gram Negative Serodiagnosis	Serum	2 years

ARMRL

Antibiotic Resistance and Evaluation Unit	Various bacterial species	3 months
Resistance Mechanisms Monitoring Unit	<i>S. aureus</i>	3 months

Complaints

Please telephone, fax, E-mail or write to the appropriate key contact member of staff (see list of contacts), who will initiate our internal complaints procedure.

Advice/Follow up

Key contact staff are listed below.

If you are unable to make the appropriate contact, please leave a message with the Laboratory Secretary.

Minimum acceptance criteria for specimens referred to DHCAIAR

- Sending laboratory should include at least two identifiers e.g. name and reference number. Where this is not possible, a laboratory reference number will suffice.
- Sending laboratory's address must be given
- Specimen container must be labelled with identifiers.
- Information on request form must match that on the specimen container.
- Specimens must arrive intact.
- Request form must include the test(s) required.
- For therapeutic guidance (Antibiotics), relevant clinical details must be given.

- Specimens must be in suitable receptacles for transportation and reference laboratory processing (e.g. screw-cap bottles or vials). If this is not possible, please contact relevant laboratory, in advance, to discuss.

-

Specimens will be rejected if:

- **Information on request form does not match that on the specimen container.**
- **Specimen container is unlabelled.**
- **Specimens are in unsuitable receptacles for reference laboratory processing, and may put staff at risk.**
- **Specimen is unsuitable or has deteriorated, for example lysed blood instead of serum.**

General Points

Please note that the above outlines the minimum acceptance criteria. We request that you always complete our request forms as fully as possible. Failure to do so may result in delays, while we contact you for missing information.

Some specimens may have to be rejected if lack of information could expose staff to “high risk” pathogens at the incorrect containment level, e.g. those sent in for identification.

EQA Statement

Quality assurance in LHCAI and ARMRL: participation in EQA and IQA schemes

Since April 2004 ARMRL has participated in the UKNEQAS for Antimicrobial Susceptibility. This Scheme consists of distributions of two bacterial isolates per month. Results are returned to the Quality Assurance Laboratory, Colindale and performance is rated and compared with national UK average. Prior to April 2004, ARMRL participated in the UKNEQAS General Bacteriology Scheme, but tested only those specimens requiring antimicrobial susceptibility determination. ARMRL also participates in various European schemes (often on demand) where susceptibility testing is required.

In 2008 LHCAI began to participate in the UKNEQAS Microbiology Quality Assessment for Diagnostic Serology, which consists of two distributions per year, and deals specifically with anti-streptococcal antibody detection. Results are returned to the Quality Assurance Laboratory, Colindale and performance is rated and compared with national UK average.

Currently, there are no accredited EQA schemes suitable for assessing other services offered by LHCAI or for the molecular services offered by ARMRL. This reflects the highly specialised nature of the services offered (e.g. molecular typing of nosocomial isolates and detection of specific resistance genes), many of which are not available elsewhere. In all cases, our reference services are thoroughly evaluated prior to launch; they are either designed and developed 'in-house' (and will usually have been published by us), or are taken from published literature.

The quality of most of our reference services is constantly checked by our IQA scheme. This requires selection of referred isolates / samples for 'blinded' testing. After processing, the results for IQA samples are assessed against the results originally reported to the sending laboratories. Any discrepancies are investigated fully and corrective actions are implemented if required. The results of our IQA and EQA performance are assessed at our annual Management Review Meeting, where annual targets and suggestions for improvement are set. The services included in the IQA scheme include :

- Antimicrobial susceptibility testing:
- Resistance mechanism (gene) detection
- *S. aureus* phage typing (replaced by *spa* typing from 4th October 2010)
- *S. aureus* PFGE
- *S. aureus* toxin gene detection
- CoNS identification
- CoNS PFGE
- *S. aureus* serology
- Group A Strep serology
- Gram-negative typing services
- Enterococcal identification
- Bacterial identification service
- Opportunistic pathogen PFGE
- *B. cepacia* PCR
- *B. pseudomallei* serology
- *P. aeruginosa* serology

Fiona Clode; IQA assessor, DHCAIAR

Neil Woodford; EQA assessor, DHCAIAR

MSD, Colindale recognition of Caldicott recommendations

The recommendations of the Caldicott Report (1997) have been adopted by the HPA as by the National Health Service as a whole. These recommendations relate to the security of patient identifying data (PID) and the uses to which they are put. The Centre for Infections (Cfi) observes Caldicott guidance in handling PID and has appointed its own Caldicott Guardian who advises the Director, MSD, Colindale, on confidentiality issues and is responsible for monitoring the physical security of PID in all parts of MSD, Colindale. This also applies to the transfer of results of investigations to and from MSD, Colindale whether by mail services, telephone or fax. The value of 'safe haven' arrangements or other means of the sender and receiver of information identifying themselves to each other before data is transferred is emphasised (see attached MSD, Colindale Policy on faxing and e-mailing reports containing patients' data).

MSD, Colindale is anxious to audit the security of its PID in collaboration with its customers. Customers are invited to review our arrangements in conjunction with individual Laboratory Directors and/or the MSD, Colindale Caldicott Guardian. Customers are also asked to draw to the MSD, Colindale Caldicott Guardian's attention any instances where PID security has been threatened or has broken down. Uses that PID are put to outside clinical diagnostic services generally allow patient identifiers to have been removed before hand, and when PID is used for research purposes the proposals are considered first by the appropriate Ethics Committee. All enquiries about the security and use of PID should be addressed to the MSD, Colindale Caldicott Guardian, Fortune Ncube.

MSD, Colindale policy on faxing and e-mailing reports containing patients' data

The following guidelines are consistent with the Department of Health (DoH) and Caldicott recommendations.

Results can only be e-mailed if they are encrypted and, if possible, reference numbers should be used instead of patient names.

If it is necessary to send a result by fax, the following conditions must be adhered to and reference made to the document "Cfl recognition of Caldicott recommendations":

The report must be sent to a "safe-haven" fax machine. This means that, if the location is in general use, consideration must be given to ensuring that unauthorised personnel are unable to read reports, accidentally or otherwise. Also, the room housing the fax machine must be a secure location, which is locked if it is likely to be unattended at the time the fax is sent.

Assurance must be sought from the intended recipient of the faxed report, preferably in writing, that the receiving fax machine is a safe-haven. Neither ARMRL or LHCAI have a "safe-haven" fax machine. If it is essential to fax patient identifiable information, please speak to the Laboratory Manager who will arrange for someone to receive the fax.

Measures must be taken to minimise the risk of misdialling, either by double-checking numbers or having frequently used numbers available on the fax machines memory dial facility.

Confirmation must always be sought from the intended recipient that the fax is expected and has been received.

Compliance with the Human Tissue Act

Submitting tissue samples from deceased people

The Centre for Infections is licensed by the Human Tissue Authority (HTA) (Licence number 12459) to store tissues from deceased people for scheduled purposes. Post mortem samples are submitted to MSD, Colindale by coroners or pathologists for examination to help them determine the cause of death.

Obtaining consent to remove, store and use human tissues for a scheduled purpose is one of the underlying principles of the Human Tissue Act. MSD, Colindale receives post-mortem samples from Coroners' post-mortems or from NHS establishments across the UK and therefore we are performing the examination under the authority of the coroner. Unless consent has been obtained or the coroner has requested that samples are retained for further testing, samples are disposed of within three months of the initial test being performed.

When tissue samples from deceased people are received at the Centre for Infections they are retained securely and confidentiality is maintained in compliance with [Caldicott principles](#) as are all samples received at this centre. It is normal practice for tissue samples from the deceased to be disposed of in the same way that all other clinical samples we receive at MSD, Colindale are disposed of. However, we will adhere to any specific requirements regarding disposal or returning tissue samples if requested by the sending coroner or pathologist.

List of contacts

MSD, Colindale SWITCHBOARD: 020 8200 4400
LHCAI FAX: 020 8200 7449
ARMRL FAX: 020 8327 6264
DIRECT LINES: 020 8327 + ext. no.
E-MAIL ADDRESSES: firstname.surname@hpa.org.uk

Antibiotic Resistance Monitoring and Reference Laboratory (ARMRL)		
	First contact	Second contact
Antibiotic Resistance Evaluation		
MIC service	Robert Hill x7237	David Livermore x7223
New antimicrobials	David Livermore x7223	Robert Hill x7237
MIC service & susceptibility testing	Rachel Pike x7208	Robert Hill x7237
Beta-lactamases	David Livermore x7223	Neil Woodford x7255
Endocarditis	Robert Hill x7237	David Livermore x7223
Antibiotic Resistance Mechanisms		
Molecular detection of resistance	Neil Woodford x7255	David Livermore x7223
Resistance in <i>Pseudomonas</i>	David Livermore x7223	Neil Woodford x7255
Resistance in <i>Acinetobacter</i>	David Livermore x7223	Neil Woodford x7255
Resistance in Enterococci	Neil Woodford x7255	David Livermore x7223
Resistance glycopeptides, streptogramins & oxazolidinones	Neil Woodford x7255	David Livermore x7223
Extended spectrum beta-lactamases (ESBLs) and carbapenem resistance	Neil Woodford x7255	David Livermore x7223
Antibiotic Resistance Surveys		
European Antibiotic Resistance Surveillance Scheme (EARSS)	Robert Hill x7237	David Livermore x7223
Surveillance of resistance	Russell Hope x6493	David Livermore x7223
General		
Antibiotic advice	David Livermore x7223	Robert Hill x7237
Molecular resistance to antibiotics	Neil Woodford x7255	David Livermore x7223

Laboratory of Healthcare Associated Infection (LHCAI)		
	First contact	Second contact
Typing (opportunistic pathogens)		
<i>Acinetobacter</i> spp.	Jane Turton x7224	Unit Head – currently vacant

Laboratory of Healthcare Associated Infection		
(LHCAI)	First contact	Second contact
<i>Burkholderia cepacia</i> (& identification)	Jane Turton x7224	Dervla Kenna x7276
<i>Enterobacter</i> spp.	Jane Turton x7224	Unit Head – currently vacant
<i>Enterococcus</i> spp. (& species identification)	Jane Turton x7224	Unit Head – currently vacant
<i>Klebsiella</i> spp.	Jane Turton x7224	Unit Head – currently vacant
<i>Pseudomonas aeruginosa</i>	Jane Turton x7224	Dervla Kenna x7276
<i>Serratia</i> spp.	Jane Turton x7224	Unit Head – currently vacant
<i>Stenotrophomonas maltophilia</i>	Jane Turton x7224	Unit Head – currently vacant
Other opportunistic pathogens	Jane Turton x7224	Unit Head – currently vacant
Identification		
<i>Burkholderia pseudomallei</i>	Henry Malnick x7233	Dervla Kenna x7276
Gram-negative bacteria non fermenter & fastidious organisms	Henry Malnick x7233	Jayesh Shah x7010
Gram-positive bacteria (except <i>C. diphtheriae</i>)	Henry Malnick x7233	Jayesh Shah x7010
Serodiagnosis		
<i>Burkholderia pseudomallei</i>	Dervla Kenna x7276	Serodiagnosis laboratory x7010
<i>Pseudomonas aeruginosa</i>	Dervla Kenna x7276	Serodiagnosis laboratory x7010
<i>Staphylococcus aureus</i>	Angela Kearns x7227	Mark Ganner x7228
<i>Streptococcus pyogenes</i>	Angela Kearns x7227	Mark Ganner x7228
Staphylococci		
Coagulase negative Staphylococci (identification & typing)	Angela Kearns x7227	Mark Ganner x7228
<i>Staphylococcus aureus</i> (<i>spa</i> typing)	Angela Kearns x7227	Mark Ganner x7228
<i>Staphylococcus aureus</i> (molecular characterisation)	Angela Kearns x7227	Mark Ganner x7228
<i>Staphylococcus aureus</i> (toxin gene detection)	Angela Kearns x7227	Mark Ganner x7228

Laboratory of Healthcare Associated Infection**(LHCAI)****First contact****Second contact****Infection control**

Antibiotic Prescribing Policy and Control Processes	Barry Cookson x7249	leave a message with Directors PA x7221
Infection control policies	Barry Cookson/Peter Hoffman x7332	leave a message with Directors PA x7221
Audit of infection control activity	Barry Cookson x7332	leave a message with Directors PA x7221
Surveillance of HAI	Barry Cookson x7332	leave a message with Directors PA x7221
Outbreaks of HAI (investigation)	Peter Hoffman x7332	leave a message with Directors PA x7221
Infection control	Peter Hoffman x7274	leave a message with Directors PA x7221
Infection transmission: mechanisms and prevention	Peter Hoffman x7274	leave a message with Directors PA x7221
Decontamination of laboratory equipment	Peter Hoffman x7274	leave a message with Directors PA x7221
Disinfection	Peter Hoffman x7274	leave a message with Directors PA x7221
Laundry decontamination	Peter Hoffman x7274	leave a message with Directors PA x7221
Sterilisation	Peter Hoffman x7274	leave a message with Directors PA x7221
Ventilation assessment	Peter Hoffman x7274	leave a message with Directors PA x7221
Isolation rooms	Peter Hoffman x7274	leave a message with Directors PA x7221
Endoscope decontamination	Peter Hoffman x7274	leave a message with Directors PA x7221

Summary of Revisions

Details of Revision
<p>Front page: Change from Centre for Infections to Microbiology services, Colindale. Changes in name throughout document</p> <p>LHCAI Services: Changes under toxin gene detection and urgent referrals. Some changes to the molecular typing repertoire.</p> <p>ARMRL Services: Changes under Resistance Phenotype, Therapeutic Guidance, Urgent Referrals</p> <p>Level of Service: Inclusion of <i>S. aureus</i> PVL testing only. Change in turnaround time for extended toxin gene detection.</p> <p>^b New comment re <i>S. aureus</i> services. Exceptions - New comment re <i>S. aureus</i> services</p> <p>Minimum acceptance criteria for specimen referrals: Circumstances when specimens will be rejected have been included.</p> <p>EQA Statement: Change in name of IQA Assessor</p>