



STANDARD OPERATING PROCEDURE

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LABORATORY TEST INFORMATION HANDBOOK

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LABORATORY TEST INFORMATION HANDBOOK

Services Available**Purpose:**

The National Institute for Communicable Diseases (NICD) is a communicable disease (medical microbiology/virology) surveillance facility and laboratory and falls within the control of the National Health Service (NHLS).

The NICD has been established to function as a public health oriented, laboratory-based, national facility distinct from and independent of the existing microbiology/virology laboratories attached to academic centers throughout the country. The direction the NICD takes, is that of public health orientation, rather than a patient oriented clinical diagnostic entity and this is reflected in the service commitments and research directions carried out by the organization. The NICD is, to a large extent, modeled on internationally recognized public health laboratories such as the the Centers for Disease Control & Prevention of the USA and Public Health England (former Health Protection Agency).

Scope:

To provide a guide to services offered at the NICD.

Location of the NICD

The NICD is a permanent laboratory and is located at: 1 Modderfontein Road, Sandringham, 2192.

Advice:

For medical advice contact the consultants from the relevant Centre.

For medical advice on investigation of hemorrhagic fevers contact the Medical Consultant to the Special Pathogens Unit: Diagnostic or laboratory related queries contact the Special Pathogens (contact details provided in Table)

Information Regarding Immunization:

Information regarding Immunization please contact the Epidemiology Office
Tel 011- 386-6337 or 011 386-6593

Working Hours:

The laboratories at the NICD operate Monday to Friday from 07h30 to 16h30. For after-hour service, please contact the consultant. Please see Key Contact Staff Table

Special Viral Pathogens Laboratory – for after-hour service, please contact the Medical consultant (or NICD Hotline) or the Laboratory directly (contact details provided in Table).

Results:

Results queries please contact the Results Call Centre

011 386 6404

011 386 6314

011 386 6466

Fax 011 386 6342

Abbreviations

BAL	Bronchoalveolar lavage
CMV	Cytomegalovirus
CSF	Cerebrospinal Fluid
GERMS-SA	Group for Enteric, Respiratory and Meningeal Surveillance in South Africa
HPV	Human papillomavirus
HSV	Herpes Simplex Virus
LGV	Lymphogranuloma venereum
LIMS	Laboratory Information Management System
ILI	Influenza like Illness
NICD	National Institute for Communicable Diseases
NS	Nasal swab
NPA	Nasopharyngeal aspirate
NPS	Nasopharyngea aspirate
OPA	Oropharyngeal aspirate
OPS	Oropharyngeal swab
RVPCR	Respiratory screen PCR test
SADC	Southern African Development Community
TA	Throat Aspirate
TAT	Turnaround Time
TP	<i>Treponema pallidum</i>
TS	Throat swab

TV	<i>Trichomonas vaginalis</i>
UTM	<i>Universal Transport medium</i>
URTI	<i>Upper respiratory Tract Infection</i>
VHF	Viral Hemorrhagic Fever
VTM	Viral transport medium
WHO	World Health Organization

Help Us to Help You

1. All specimens must be accompanied by the following clearly legible data:
 - a) Patient name and hospital number.
 - b) Name and address of requesting clinician.
 - c) Nature of specimen (Specimen Type)
 - d) Collection date and time (where relevant).
 - e) Tests requested.
 - f) Brief clinical history.
 - g) EPI forms to be completed for Polio and Measles surveillance.
 - h) Contact number/email for providing the laboratory report
2. Hard copies of all reports are sent to the requesting clinician by post or electronically for referred samples.
3. Reports can be telefaxed to "safe haven" fax machines on request. Please ensure that where required, this service is clearly requested and that a suitable fax number and contact person is supplied.

Complaints and Queries

1. Complaints and queries of a minor nature should be addressed to the Laboratory concerned. (See Key Contact Staff Table)
2. Complaints and queries of a serious nature should be addressed to the head of the relevant Laboratory (See Key Contact Staff Table)

Please note that the TAT (Turnaround Time) quoted in this Handbook is calculated from the sample reception at the NICD until a report is issued.

Centre for Vaccines and Immunology

The Centre for Vaccines and Immunology (CVI) has been established to provide laboratory and epidemiological support **two** viral vaccination programmes within the Expanded Programme on Immunisation – polio, measles and hepatitis, as well as to carry out appropriate research to answer public health questions related to these vaccines and to these vaccine- preventable diseases. In addition to the national and provincial Departments of Health, which are the major stakeholders, the Centre functions as regional reference laboratories for polio, measles and rubella for the WHO.

Working Groups:

Polio:

The polio laboratory supports AFP surveillance for South Africa and for for seven countries within southern Africa (SADC) for isolation of poliovirus in addition to performing confirmatory testing on samples tested from other WHO AFRO National labs, parallel testing with countries that do not meet accreditation criteria to determine accuracy of results, as well providing assistance with routine testing to labs when requested. The laboratory also performs poliovirus serology against all three poliovirus serotypes.

Measles & Rubella:

The CVI Measles group performs national measles serological surveillance and also supports ten southern African countries with re-testing for WHO EQA purposes. Molecular surveillance is performed for South Africa, the ten southern African countries and for other countries across the WHO African region to track the circulation of strains of Measles virus by means of RT-PCR, sequencing, phylogenetic analysis and genotype determination.

National Rubella surveillance has been **resumed from May 2015. All measles surveillance specimens are now tested for Measles IgM and Rubella IgM. Please note that the Rubella IgM test should not be requested.**

Pathogen Species Name (disease/syndrome)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<p>Poliovirus</p> <p>(Acute Flaccid Paralysis (AFP) surveillance)</p> <p>Note: For purposes of AFP surveillance, the Poliovirus Isolation Laboratory at NICD is the only laboratory in South Africa accredited by World Health Organization to perform this testing.</p>	<p>Two stool samples (adult thumb size) collected in universal sample containers, 24-48 hours apart and within 14 days of onset of paralysis. In the event a stool sample cannot be obtained, please forward a rectal swab as an alternative.</p>	<p>Maintenance of cold chain (2-8°C) from collection to receipt at NICD. Samples to reach laboratory within 3 days of collection.</p>	<p>Poliovirus isolation. AFP surveillance.</p>	<p>Virus Isolation</p>	<p>EPI Notification 14 days (80% of all results to be reported within 14 days of receipt in lab). Issue of LIMS report: 21 days of receipt in lab.</p>	<p>The following information is required for capture on the AFP database and should be completed on specific AFP case investigation forms:</p> <ul style="list-style-type: none"> • Epid number – unique number for epidemiology purposes • Name • Date of onset of paralysis • Date of stool collection • Date of last OPV • Province • District • Case or contact • Specimen number • Date sent from field to National Level – where applicable • Date received at National Level – where applicable • Date sent to NICD • Testing requested and clinical diagnosis to be clearly stated to prevent incorrect / unnecessary tests being performed 	<p>Poliovirus Isolation 011 555 0504 011 386 6361 011 386 6358</p>

Pathogen Species Name (disease/syndrome)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
Poliovirus	Virus isolate from stool or environmental sample, minimum 1ml. FTA Card inoculated with virus isolate	Transport frozen or at 4°C. Specimen must reach the laboratory within 3 days of dispatch. Transport at ambient temperature. Specimen must reach the laboratory within 3 days of dispatch.	Real Time RT-PCR Sequencing	Real Time ITD RT-PCR Real Time VDPV Screening RT-PCR Sequencing of VP1 Region	7 days 7 days	AFP Investigation Form with at least the following information: <ul style="list-style-type: none"> •Epid Number •Patient Name •Date of onset of paralysis •District •Case or contact •Specimen Number •Referring Laboratory specimen number •Date sent to NICD •Cell Line (L-Arm or R-Arm) Real Time PCR Results (if requesting Sequencing)	Centre for Vaccines & Immunology: Polio Molecular Laboratory 011 386 6438
Poliovirus Serology	Clotted Blood - 5ml, Sera - 0.5ml	Maintenance of cold chain (2-8°C)	Poliovirus Antibody Neutralization	Neutralization Test	21 days NB: Samples are batched for testing. This may result in TATs being exceeded if not stated as urgent.	Testing requested and clinical diagnosis to be clearly stated on request forms to prevent incorrect / unnecessary tests being performed	Poliovirus Serology 011 555 0504 011 386 6361 011 386 6358

Pathogen Species Name (disease/syndrome)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
Measles Rash-based Surveillance	5 ml Clotted Blood or EDTA Blood (red top or yellow SST tube or EDTA/heparin Blood or Serum	The blood/serum samples can be transported at room temperature to NICD, Samples should reach the lab within three days of sample collection (If transportation is delayed the samples should be refrigerated	Measles IgM	Anti-Measles IgM antibody (EIA)	7 working days	A Measles Case Investigation Form (CIF) must be completed in full and must accompany specimens. Please ensure that the following information is captured on the CIF: <ul style="list-style-type: none"> • Name, age, DOB, address of patient • Name and contact number of clinician • Symptoms marked in tick boxes • Complications marked in tick boxes • Date of onset of rash • Date seen at health facility • Date specimen collected • Medical history including measles vaccination history, number of doses and date of last measles vaccination Date of notification and response to case	CVI measles working group 011 386 6398 011 555 0534

Pathogen Species Name (disease/syndrome)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
Measles	<p>Throat swab</p> <p>Please note Once a measles outbreak is identified (a cluster of IgM-positive cases) please collect 5-10 throat swab specimens from other suspected cases in the area and place in VTM tube (Viral Transport Medium)</p> <p>The instruction to collect throat swabs will be issued by the CDCs.</p> <p>Throat swabs should not be collected from sporadic suspected cases.</p>	<p>Transport at 2°C-8°C</p> <p>Sample should reach laboratory within 3 days</p>	<p>For surveillance only</p>	<p>RT-PCR</p> <p>Sequencing</p> <p>Virus isolation</p>	<p>14 days</p> <p>14 days</p> <p>1 month</p>	<p>Surveillance only.</p> <p>Case Investigation Forms (CIF) must be completed in full and must accompany specimens.</p>	<p>CVI measles working group</p> <p>011 386 6343</p> <p>011 386 6398</p>

Centre for Tuberculosis

In 2011 the National Tuberculosis Reference Laboratory was integrated into the National Institute for Communicable Diseases and broadened its scope to become the Centre for Tuberculosis (CTB). The new CTB will serve the needs of the NHLS, the NDoH and, ultimately, the general public of South Africa and, in addition, will provide technical support for the neighbouring SADC countries. The expanded support functions of the CTB relate to policy guidelines and knowledge management, outbreak response and education and training. The core functions are the establishment of an expanded TB reference facility, conducting public health surveillance and population-based research, and fostering innovative thinking leading to the introduction of novel approaches to TB diagnostics and management.

The activities of the Centre are focusing on the following areas;

1. Reference Microbiology

Reference laboratory activities of the CTB include providing specialist diagnostic services on TB patient management, the evaluation of novel methods and advising the NDoH on their introduction into the NTBCP. The CTB also provides laboratory information of epidemiological importance to the NDoH and World Health Organization (WHO). Such information includes data on circulating strains, insights into TB transmission dynamics and drug-resistant TB. The CTB is also in the process of establishing routine genotyping and MIC testing, as well as developing a specimen bank and a repository of well-characterised TB strains from different geographical locations in South Africa. This will enable the Centre link the transmission of specific strains to associated virulence, morbidity and mortality of the disease in specific geographical locations and population groups. This information will enable the NDoH better focus its control efforts. The CTB also supports the NDoH with policy development and standardisation of diagnostic methods.

2. Public health surveillance

The CTB will collect clinical and demographic data in addition to traditional microbiological data in order to fully describe the epidemiology of TB in South Africa. The public health surveillance of TB is an important component of CTB activities, and is being conducted at four levels:

- **Ad hoc population-based surveys**, such as the nationwide **Drug Resistance Survey (DRS)** presently being conducted by the CTB and the NDoH. Data from the survey will enable the NTBCP to evaluate the quality of TB control, and provide information for planning and budgeting.

3. Population research

Population research priorities of the CTB include utilisation of surveillance and microbiological data, e.g. on the distribution and frequency of drug-resistant strains from TB laboratories in order to design and implement research relevant to TB in South Africa. The CTB collaborates with academic centres and international institutions on nationally relevant research involving CDW-generated information.

4. Innovation and development

Innovation is essential for the containment of an epidemic that has plagued humankind for thousands of years. Great strides have been made; both in the diagnostic and drug-development fields and the CTB will focus on new technologies and novel strategies, and assess their best utility in the South African context. This focus will draw on the strengths within the academic institutions, to ensure that the research conducted is translated into addressing

programmatic needs of the country. Linked to innovation is the human capital that is the driver of this process. The CTB is playing an increasingly important role in supporting NDoH training programmes, including the development of training materials on diagnostic technologies and participation in skills transfer and capacity building.

Pathogen Species Name (disease/ syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<i>Mycobacterium Tuberculosis</i>	Sputum	Cool ambient temperature Specimens should be collected in clean leak proof containers free from paraffin and other waxes or oils. Specimens should be kept cool during transportation but should not be frozen. An adequate sample should be about 5-10ml sputum.	Microscopy for acid-fast bacilli	Microscopy for acid-fast bacilli	Project dependant		Centre for TB 011 885 5321 011 885 5315

Pathogen Species Name (disease/ syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<i>Mycobacterium Tuberculosis</i>	Sputum	Specimens should be collected in clean leak proof containers free of oils. Sputum should be from deep cough avoiding saliva and secretions from nasopharynx. Specimens should be kept cool during transportation but should not be frozen. An adequate sample should be about 5-10ml sputum.	Culture	Culture	Project dependant		Centre for TB 011 885 5321 011 885 5315

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<i>Mycobacterium Tuberculosis</i>	MGIT tubes (Liquid media) LJ Slopes	Specimens should be collected in clean leak proof containers free from paraffin and other waxes or oils. Specimens should be kept cool during transportation but should not be frozen. An adequate sample should be about 5-10ml sputum.	Drug susceptibility testing	Drug susceptibility testing	3-8 weeks or Project dependant		Centre for TB 011 885 5321 011 885 5315
<i>Mycobacterium Tuberculosis</i>	Sputum and/or culture (liquid/solid)		MTBDRplus	Molecular testing methods Genotype MTBDRplus	2-7 days or Project dependant		Centre for TB 011 885 5321 011 885 5315

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<i>Mycobacterium Tuberculosis</i>	Sputum	Specimens should be collected in clean leak proof containers free from paraffin and other waxes or oils. Specimens should be kept cool during transportation but should not be frozen. An adequate sample should be about 5-10ml	Xpert MTB/RIF Assay	Molecular testing methods	2-7 days or Project dependant		Centre for TB 011 885 5321 011 885 5315

Centre for HIV and STI

The Centre for HIV & Sexually Transmitted Infections (CHIVSTI) aims to be a resource of knowledge and expertise in HIV and other regionally relevant STIs to the South African Government, to SADC countries and to the African continent at large, in order to assist in the planning of policies and programmes related to the control and effective management of HIV/STIs. The Centre also aims to be a place of academic excellence in terms of both research and teaching/training. The Centre has a strong track record in the research disciplines of HIV virology, HIV immunology, HIV/STI epidemiology, HIV/STI diagnostics and HIV-STI interactions, as well as in successful supervision of MSc and PhD students.

The CHIVSTI was created by the amalgamation of five separate NICD sections: the Virology Laboratory (Head: Professor Lynn Morris) and Cell Biology Unit (Head: Professor Caroline Tiemessen) of the former AIDS Virus Research Unit, the HIV Molecular and Serology Laboratories of the former Specialized Molecular Diagnostics Unit (Head: Professor Adrian Puren), the former STI Reference Centre and the World Health Organization-linked HPV LabNet Laboratory (Head: Professor Anna-Lise Williamson). The first four sections are based on NICD's Sandringham campus and the last section is based at the University of Cape Town.

Sections:

Sexually Transmitted Infections Sections

The STI section is responsible for providing intelligence on the aetiology of major STI syndromes, as well as antimicrobial resistance data related to gonococcal infections. Findings are communicated annually to the national and relevant provincial health departments in South Africa. The STI section also undertakes teaching and training activities, assisting with training of medical scientists, doctors, nurses and other healthcare staff. The STI section undertakes operational research relevant to public health and to that end it has established several international links with STI researchers overseas.

HIV Research Section

The HIV Research Section conducts research projects primarily on the virology and immunology of HIV. It also monitors the prevalence of anti-retroviral drug resistant HIV strains within South Africa and reports relevant findings to the National Department of Health. It also conducts validated end point assays for HIV vaccine trials.

Cell Biology Section

The Cell Biology section focuses on studies of maternal-infant HIV-1 transmission as a model for understanding protective immunity to HIV-1. Studying the immune responses and other characteristics of both mothers and their infants allows the team to address questions of protective immunity of disease progression in the HIV-1 infected mothers, and of acute infection in infants who become infected.

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HIV Molecular and Serology Section

The HIV Molecular subsection supports, research, surveillance and training. Tests undertaken include CD4 immunophenotyping, HIV DNA PCR for early infant diagnosis, HIV viral load monitoring including the use of pooling strategies as part of research and surveillance activities. The HIV Serology subsection has various 3rd and 4th generation HIV-1 ELISA platforms, Western blotting methods, HIV rapid tests in place to support various surveillance activities including HIV incidence testing. Testing for HIV can be performed on various matrices including dried blood spots where methods have been validated. The types of projects undertaken include HIV-1 vaccine endpoint studies, HIV-1 prevalence and incidence surveillance, trial intervention studies.

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
Bacterial vaginosis	Vaginal smear	Transport at ambient temperature		Gram stain		Only available for surveillance and research purposes	STI 011 555 0461 011 555 0468
<i>Candida</i> species	Vaginal smear	Transport at ambient temperature		Gram stain		Only available for surveillance and research purposes	STI 011 555 0461 011 555 0468
Herpes Simplex Type 2	Clotted Blood EDTA Blood Serum Plasma	Transport on ice		HSV2 IgG EIA	Project Dependant	Only available for Surveillance purposes and research project	STI 011 555 0461 011 555 0468
Herpes Simplex Virus Type 1 and 2	Ulcer swab	Transport on ice or frozen	HSV PCR	PCR	10 days	Only available for Surveillance purposes and research project	STI 011 555 0461 011 555 0468

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
HIV	Plasma in EDTA or ACD tube	Do not refrigerate samples if CD4 will be requested on same sample Minimum 1000µl plasma	HIV VL	Roche HIV-1 Viral Load	5 days	HIV-1 viral load is performed twice a week - Samples are batched	HIV Sero-Molecular Laboratory 011 386 6330 011 386 6439
HIV	Whole blood (EDTA or ACD Tube)	4°C to room temperature Minimum 2ml whole blood DO NOT FREEZE	HIV DNA PCR	HIV-1 DNA PCR (Whole blood)	5 days		HIV Sero-Molecular Laboratory 011 386 6330 011 386 6439
HIV	Dried Blood Spots collected on 903 Specimen Whatman collection paper	Sealed in plastic bags with desiccant and indicator to prevent moisture Minimum of three (3) full spots per card must be sent	HIV DNA PCR	HIV-1 DNA PCR (DBS)	5 days		HIV Sero-Molecular Laboratory 011 386 6330 011 386 6439
HIV	Whole blood (EDTA)	Whole blood at room temperature	CD4	CD4 (TCell lymphocyte subset)	24 – 48 hours	No cold chain transport, transport at ambient temperature	HIV Sero-Molecular Laboratory 011 386 6330 011 386 6439

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
HIV	5 ml/10ml Clotted Blood or EDTA Blood and Dried Blood Samples (DBS) collected on Whatman 903 Cards - minimum of 3 full circles of whole blood, preferably fill all 5 circles	Transport blood samples at 2°C-8°C Maintenance of cold chain is required from collection to receipt at NICD. DBS samples can be transported at RT°C (stable at RT°C for 14 days)	HIV ELISA	HIV-1/2 Antibody EIA	5 -7 working days or project dependent	Project/Survey requirements must be provided in writing by Requestor and discussed with NICD prior to testing.	HIV Sero-Molecular 011 386 6435 011 386 6437 011 386 6457

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
HIV	5 ml/10ml Clotted Blood or EDTA Blood and Dried Blood Samples (DBS) collected on Whatman 903 Cards – minimum of 3 full circles of whole blood, preferably fill all 5 circles	Transport blood samples at 2°C-8°C Maintenance of cold chain is required from collection to receipt at NICD DBS samples can be transported at RT°C (stable at RT°C for 14 days)	HIV ELISA	HIV-1/2 Antigen-Antibody EIA	5 -7 working days or project dependent	Project/Survey requirements must be provided in writing by Requestor and discussed with NICD prior to testing.	HIV Serol-Molecular 011 386 6435 011 386 6437 011 386 6457

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
HIV	5 ml/10ml Clotted Blood or EDTA Blood and Dried Blood Samples (DBS) collected on Whatman 903 Cards – minimum of 3 full circles of whole blood, preferably fill all 5 circles	Transport blood samples at 2°C-8°C Maintenance of cold chain is required from collection to receipt at NICD. DBS samples can be transported at RT°C (stable at RT°C for 14 days)	HIV-1 or HIV-2 Western Blot	HIV-1 Western Blot HIV-2 Western Blot Geenius HIV ½ Confirmatory Rapid Assay (Serum, Plasma or Whole blood only)	5 -7 working days or project dependent	Project/Survey requirements must be provided in writing by Requestor and discussed with NICD prior to testing.	HIV Sero-Molecular 011 386 6435 011 386 6437 011 386 6457
HIV	5 ml/10ml Clotted Blood or EDTA Blood	Transport blood samples at 2-8°C Maintenance of cold chain is required from collection to receipt at NICD	Multispot HIV1/2 Rapid	Multispot HIV1/2 Rapid (On Request Only)	5 -7 working days or project dependent	Project/Survey requirements must be provided in writing by Requestor and discussed with NICD prior to testing.	HIV Sero-Molecular 011 386 6435 011 386 6437 011 386 6460

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
HIV	5 ml/10ml Clotted Blood or EDTA Blood and Dried Blood Samples (DBS) collected on Whatman 903 Cards – minimum of 3 full circles of whole blood, preferably fill all 5 circles	Transport blood samples at 2-8°C Maintenance of cold chain is required from collection to receipt at NICD DBS samples can be transported at Room Temperature for (stable for 14 days at RT°C after collection)	HIV Incidence Testing	Sedia HIV-1 BED Incidence EIA (Serum/Plasma only) Sedia HIV-1 LAg Avidity Incidence EIA (Serum/Plasma) Maximum HIV-1 LAg Avidity Incidence EIA (Serum/Plasma/DBS) (Research Purposes Only)	14 - 21 working days for up to 1000 samples or project dependent	Project/Survey requirements must be provided in writing by Requestor and discussed with NICD prior to testing.	HIV Serol-Molecular 011 3866475 011 386 6437
HIV-1	p24	Store at -70°C		Culture supernatants	2 months	All these tests are done for Research/Project purposes only.	Virology Research Laboratory Lab Manager J Patel 011 386 6341

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
HIV-1	Neutralization assays a) Pseudovirion assay	Store at -70°C		Serum	2 months	Whole blood received for testing to be stored at ambient temperature only	Virology Research Laboratory Lab Manager J Patel 011 386 6341
HIV-1	Drug resistance testing a) In-House assay	Store at -70°C		Plasma from EDTA blood	2 months	Can be used for diagnostic purposes in special circumstances.	Virology Research Laboratory Lab Manager J Patel 011 386 6341
HIV-1	Gag ELISA	Store at -20°C		Serum	2 months	All these tests are done for Research/Project purposes only.	Virology Research Laboratory Lab Manager J Patel 011 386 6341
HIV-1	HIV Virus isolation	LN storage		PBMC's	2 months	Whole blood received for testing to be stored at ambient temperature only	Virology Research Laboratory Lab Manager J Patel 011 386 6341

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
HIV-1	5ml/10ml Clotted blood or EDTA blood and Dried blood samples (DBS) collected on Whatman 903 Cards – minimum of 3 full circles of whole blood, preferably fill all 5 circles or frozen plasma	Transport blood samples at 2-8°C DBS samples can be transported at room temperature (stable for 14 days at RT°C after collection) Transport can be on Dry Ice and stored at -70°C	Drug resistance testing In-house assay	Plasma from EDTA blood DBS	2 Months or project dependant	Project/Survey requirements must be provided in writing by Requestor and discussed with NICD prior to testing	Virology Research Laboratory Lab Manager J Patel 011 386 6341
HIV-1	Mycoalert Mycoplasma	Store at -20°C		Cell supernatants	1 month		Virology Research Laboratory Lab Manager J Patel 011 386 6341
<i>Treponema pallidum</i>	Clotted blood or EDTA Serum Plasma	Transport on ice		RPR	Project dependant	Only available for Surveillance purposes and research projects	STI 011 555 0461 011 555 0468
<i>Treponema pallidum</i>	Clotted blood or EDTA Serum Plasma	Transport on ice		TPPA	Project dependant	Only available for Surveillance purposes and research projects	STI 011 555 0461 011 555 0468

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<i>Treponema pallidum</i>	Ulcer swab	Transport on ice or frozen	Syphilis/ <i>Treponema pallidum</i> PCR	PCR	10 days	Only available for Surveillance purposes and research projects	STI 011 555 0461 011 555 0468
<i>Treponema pallidum</i>	Ulcer swab	Transport on ice or frozen		Typing	Project dependant	Only available for Surveillance purposes and research projects	STI 011 555 0461 011 555 0468
<i>Treponema pallidum</i>	Ulcer swab	Transport on ice or frozen		Antimicrobial susceptibility testing by PCR	Project dependant	Only available for Surveillance purposes and research projects	STI 011 555 0461 011 555 0468
<i>Lympho granuloma Venereum (LGV)</i>	Ulcer swab Genital swab	Transport on ice or frozen Transport on ice or frozen		PCR	10 days	Only available for Surveillance purposes and research projects	STI 011 555 0461 011 555 0468
HPV	Genital swab	Transport on ice or frozen		PCR	Project dependent	Only available for Surveillance purposes and research project	STI 011 555 0461 011 555 0468
<i>Chlamydia trachomatis</i>	Clotted Blood EDTA Blood Serum Plasma	Transport on ice	<i>Chlamydia trachomatis</i> / LGV serology	Micro immuno fluorescence (MIF)	10 days	Only available for Surveillance purposes and research project	STI 011 555 0461 011 555 0468
<i>Chlamydia trachomatis</i>	Urine Urethral Swab Vaginal swab Endocervical swab Oropharyngeal swab Rectal swab	Transport on ice or frozen		NAAT (PCR, TMA)	10 days	Only available for Surveillance purposes and research project	STI 011 555 0461 011 555 0468

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<i>Chlamydia trachomatis</i>	Vaginal swab Urethral Swab Endocervical swab Ulcer swab	Use special transport media. Transport on ice or frozen		Culture	Project dependant	Only available for research purposes	STI 011 555 0461 011 555 0468
<i>Haemophilus. ducreyi</i>	Ulcer swab	Transport on ice or frozen		PCR	10 days	Only available for Surveillance purposes and research project	STI 011 555 0461 011 555 0468
<i>Mycoplasma genitalium</i>	Urine Urethral swab Vaginal swab Endocervical swab	Transport on ice or frozen		PCR	10 days	Only available for Surveillance purposes and research project	STI 011 555 0461 011 555 0468
<i>Neisseria gonorrhoeae</i>	Urethral swab Vaginal swab Other samples as indicated by clinical presentation Endocervical swab Rectal swab Pharyngeal swab Cultured strains	Use special transport media (Amies Stuarts). Transport at 4°C to reach lab within 48 hours.		Culture and Antimicrobial susceptibility testing	7 days	Only available for Surveillance purposes and research project	STI 011 555 0461 011 555 0468
<i>Neisseria gonorrhoeae</i>	Urine Urethral swab Vaginal swab Endocervical swab Penile swab Rectal swab Pharyngeal swab	Transport on ice or frozen		NAAT (PCR, TMA)	10 days	Only available for Surveillance purposes and research project	STI 011 555 0461 011 555 0468

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<i>Neisseria gonorrhoeae</i>	Urethral swab Vaginal swab Other samples as indicated by clinical presentation Endocervical swab Rectal swab Pharyngeal swab Cultured strains	Transport on ice or frozen Except for cultured strains at ambient temperature		Typing by PCR	Project dependent	Only available for Surveillance purposes and research project	STI 011 555 0461 011 555 0468
<i>Neisseria gonorrhoeae</i>	Urethral swab Vaginal swab Other samples as indicated by clinical presentation Endocervical swab Rectal swab Pharyngeal swab Cultured strains	Transport on ice or frozen Except for cultured strains at ambient temperature		Antimicrobial susceptibility testing by PCR	Project dependent	Only available for Surveillance purposes and research project	STI 011 555 0461 011 555 0468
<i>Trichomonas vaginalis</i>	Urine Urethral swab Vaginal swab Endocervical swab	Transport on ice or frozen		PCR	10 days	Only available for Surveillance purposes and research project	STI 011 555 0461 011 555 0468

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<i>Trichomonas vaginalis</i>	Urethral swab Vaginal swab	Use special transport media. Transport at ambient temperature to reach lab within 24 hrs		Culture		Only available for research purposes	
<i>Ureaplasma parvum</i>	Urine Urethral swab Vaginal swab Endocervical swab	Transport on ice or frozen		PCR	Project dependant	Only available for Surveillance purposes and research project	STI 011 555 0461 011 555 0468
<i>Ureaplasma urealyticum</i>	Urine Urethral swab Vaginal swab Endocervical swab	Transport on ice or frozen		PCR	Project dependant	Only available for Surveillance purposes and research project	STI 011 555 0461 011 555 0468

Centre for Emerging and Zoonotic Diseases

New zoonoses (pathogens derived from animals) are emerging and known zoonoses are re-emerging in animal and human populations at alarming rates throughout the world. These pathogens represent a serious concern for medical and veterinary public health authorities, as well as for the authorities concerned with regulating biosafety and biosecurity at national and international levels. The confluence of people, animals (wild and domestic) and animal products is unprecedented, largely due to the ease of traversing large distances rapidly, afforded by the aviation industry.

The Centre for Emerging Zoonotic Diseases (CEZD) aims to be a national and international centre of excellence for emerging and re-emerging zoonotic diseases. CEZD aims to function as a resource for knowledge and expertise to the South African government, the SADC countries and the African continent, in order to assist in the planning of relevant policies and programmes and to harness innovation in science and technology to support surveillance, detection and outbreak response systems. In observing this goal the CEZD supports South Africa's commitment to the International Health Regulations.

For outbreak, clinical advice or public health queries:

NICD Clinical Advice Hotline +27 82 883 9920

Electron Microscope Laboratory

Diagnostic screening of any sample type for viral pathogens is done using negative staining. This is not a primary diagnostic service. Identification is possible to the Family level, infrequently to the Sub-family level. Biopsy and autopsy tissues/fluids can also be processed for resin-embedding and the ultrathin sections examined for the presence of pathogens, though the ultrastructure of the pathogen dictates the specificity of the identification. All samples to be refrigerated but not frozen. If possible, tissues should be fixed immediately in 2.5% buffered glutaraldehyde before transportation. For non-viral pathogens, particularly microsporidia, it is also possible to process wax-embedded tissues and sections on glass slides.

For further information contact the Electron Microscopy Laboratory. Samples should be marked "attention: Electron Microscopy Laboratory", and submitted to the Special Viral Pathogens Reference Laboratory, CEZD.

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<p>Arbovirus</p> <p>(Chikungunya, Dengue, West Nile, Rift Valley fever, Sindbis)</p> <p>ICD-10 code for unspecified arthropod borne viral fever, A94</p>	<p>Clotted blood or serum, minimum of 1.0 ml</p> <p>Highly recommended to submit repeat specimens, preferably acute and convalescent specimens</p>	<p>Tubes in sealed in plastic bags. Label clearly as biohazardous. Adhere to national and international regulations for transportation of hazardous biological goods as required.</p> <p>Address to Center for Emerging and Zoonotic Diseases, Arbovirus, cold transport on ice packs Contact Laboratory or NICD Hotline for consult on urgent cases</p>	<p>Arbovirus</p> <p>(Routine arbo screen, include serology for Chikungunya, West Nile, Sindbis, Rift Valley fever)</p> <p>Dengue for patient with travel history. PCR/Isolation for Acute cases only</p>	<p><u>Serology:</u> (HAI is performed as initial screen; any positive results are followed up with IgM ELISA or IFA to confirm recent infection. Testing of acute and convalescent specimens to indicate seroconversion by four fold rise in IgG titre is highly recommended or IgM seroconversion)</p>	<p>HAI: 5 days</p> <p>HAI + IgM ELISA/IFA: 7 days</p> <p>IgM ELISA/IFA: 2-4 days</p>	<p>Rash or arthralgia syndromes with fever which may be linked to travel history, insect bites. Some cases develop encephalitis.</p> <p>Refer to Arbovirus Diagnostic Guide or Outbreak specific guidelines available from www.nicd.ac.za Highly recommended to submit repeat specimens, preferably acute and convalescent specimens. Submit Case investigation form</p>	<p>Arbovirus Reference Laboratory Dr P Jansen van Vuren 011 555 0503 082 908 8045 Ms C le Roux 011 386 6424 011 386 6391</p> <p>NICD Hotline</p>

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
	<p>Alternative/additional specimens for PCR and isolation:</p> <p>CSF <i>(for encephalitic cases only, requires at least 500 µl)</i></p> <p>Liver biopsies <i>(for post mortem confirmation only, contact Laboratory)</i></p>	See above	<p>Arbovirus PCR <i>(specify which arbovirus, for example "Dengue PCR")</i></p> <p>Arbovirus isolation</p>	<p>RT-PCR</p> <p>Virus isolation</p>	<p>24-48 hours</p> <p>18 days</p>	<p>See above. Should be requested in addition to the Arbovirus routine screen only. Only useful for specimens collected within 7 days of onset of illness or acutely ill patients.</p> <p>See above. Should be requested in addition to the Arbovirus routine screen only. Only useful for specimens collected within 7 days of onset of illness or acutely ill patients</p>	See above

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<i>Bacillus anthracis</i> (anthrax)	<p><u>Cutaneous Vesicular stage:</u> Soak 2x sterile dry swabs in vesicular fluid from a previously unopened vesicle.</p> <p><u>Eschar stage:</u> Rotate 2x sterile dry swabs for 2-3s beneath the edge of eschar without removing it.</p> <p><u>Biopsy of lesion:</u> Fresh Tissue in PBS/saline <i>Please note:</i> Do not send preserved tissue</p>	Transport at room temperature	Anthrax (ANTHR)	Microscopy, culture and special identification	5 days	<p>Safety precautions should be taken when handling/collecting samples</p> <p>Samples should be taken prior to antibiotic treatment and should reach laboratory as quickly as possible</p> <p><u>Important</u> Please notify laboratory prior to sending specimens</p>	Special Bacterial Pathogens Reference Laboratory 011 555 0331 011 555 0306

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
	<p><u>Inhalation</u> Pleural fluid or sputum (>1 ml) collected in sterile container</p> <p>Blood culture <u>plus</u> 1 tube clotted blood and 1 tube whole blood (EDTA tube)</p>	<p>Transport at 2-8°C</p> <p>Transport blood culture at room temperature and blood tubes at 2-8°C</p>					
	<p><u>Gastrointestinal</u> Stool or rectal swab</p> <p>Blood culture <u>plus</u> 1 tube clotted blood and 1 tube whole blood (EDTA tube)</p>	<p>Transport at 2-8°C</p> <p>Transport blood culture at room temperature and blood tubes at 2-8°C</p>					

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
	<u>Meningitis</u> CSF in sterile container Blood culture <u>plus</u> 1 tube clotted blood and 1 tube whole blood (EDTA tube)	Transport at 2-8°C Transport blood culture at room temperature and blood tubes at 2-8°C					
<i>Bartonella</i> species	1 tube EDTA blood	Transport between 2-8°C within 3 days of collection	<i>Bartonella</i> culture and PCR	culture and PCR	21 days	<u>Please attach relevant clinical history form</u>	Special Bacterial Pathogens Reference Laboratory 011 555 0331 011 555 0306
<i>Clostridium botulinum</i> (botulism)	20 to 30 ml clotted blood or 10 to 15 ml serum 25 to 50 g of stool Gastric washing Vomitus Suspected food	Transport at 2-8°C	Botulinum	Mouse neutralization assay, Anaerobic culture and confirmation	4 weeks	<u>Important</u> Please notify laboratory prior to sending specimens	Special Bacterial Pathogens Reference Laboratory 011 555 0331 011 555 0306

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
Rabies	Clotted blood or serum, minimum of 0.5 ml	Specimen containers must be sealed in plastic bags. Adhere to national and international transportation of biological goods. Address to Centre for Emerging and Zoonotic Diseases, Special Viral Pathogens, cold transport on ice packs.	Rabies immunity	Serology: Rabies IgG	24-48 hours	Only for post vaccinal immunity screening. Usually for high risk occupational groups such as veterinarians or animal handlers or laboratory workers in laboratories that handle rabies virus	Special Viral Pathogens Laboratory Dr J Weyer 011 386 6376 082 903 9131

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<p>Rabies</p> <p>(Rabies and rabies-related lyssaviruses)</p> <p>ICD-10 code is A82.9</p>	<p>Antemortem:</p> <p>Saliva, minimum of 0.5 ml</p> <p>CSF, minimum of 0.5 ml</p> <p>Nuchal biopsies, single biopsy collected with dermatological punch from nape of neck</p> <p><i>Post mortem:</i></p> <p>Brain. Brainstem is most sensitive specimen.</p> <p>Whole, half or cubes of representative regions of brain submitted in 50 % glycerol saline in plastic screw top containers.</p> <p>Brain biopsies collected via the supraorbital fissure (contact laboratory for instructions). Do not submit in formalin. If no saline available freeze fresh.</p>	<p>Specimen containers must be sealed in plastic bags. Labelled as biohazardous and suspected rabies.</p> <p>Adhere to national and international regulations for transportation of hazardous biological goods as required.</p> <p>Address to Center for Emerging and Zoonotic Diseases, Arbovirus, cold transport on ice packs</p> <p>Contact Laboratory or NICD Hotline for consult on urgent cases</p>	Rabies	<p><i>Antemortem:</i></p> <p>RT-PCR (performed on saliva, CSF and biopsy)</p> <p>Serology (Rabies IgG/IgM) (performed on CSF and blood/serum)</p> <p><i>Post mortem:</i></p> <p>Rabies fluorescent antibody test (DFA or FAT)</p>	<p>24-48 hrs</p> <p>24-48 hours</p> <p>24-48 hours</p>	<p>For antemortem investigation of suspected rabies cases. Encephalitis with rapid progression, hydrophobia, dementia, hallucinations, lucid periods usually present. Suggested that all specimens should be co-submitted for rule out of rabies. At least 3 consecutively collected salivas (on different days if possible) should be submitted. Post mortem investigation is most conclusive. Contact Laboratory/NICD Hotline for advice</p>	<p>Special Viral Pathogens Laboratory</p> <p>Dr J Weyer 011 386 6376 082 903 9131</p> <p>NICD Hotline</p>

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<i>Leptospira spp.</i> (Leptospirosis)	1 Tube of clotted blood or serum <i>Please note:</i> Tests not done on urine, plasma, haemolysed, icteric or lipeamic blood.	Transport at 2-8°C Sample should reach laboratory within 3 days.	Leptospirosis (LEPTO)	Serology: IgM ELISA	4 days		Special Bacterial Pathogens Reference Laboratory 011 555 0331 011 555 0306

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
Viral haemorrhagic fevers (Crimean-Congo haemorrhagic fever, Ebola, Marburg, Lassa, Hanta and Yellow fever) ICD-10 code for unspecified viral haemorrhagic fever, A99	Clotted blood or serum, minimum of 1.0 ml	Tubes in sealed in plastic bags. Label clearly as biohazardous and suspected VHF. Adhere to national and international regulations for transportation of hazardous biological goods as required. Address to Center for Emerging and Zoonotic Diseases, Special pathogens, cold transport on ice packs Contact Laboratory and/or NICD Hotline	VHF	Serology (Fluorescent antibody test: IgG and IgM ELISA: IgG and IgM) RT-PCR Virus isolation	24-48 hrs 24-48 hrs 21 days	Fever, Rash Headache, Arthralgia, Myalgia, Haemorrhagic manifestations, Gastrointestinal symptoms, Pathology indicators, Travel history or other exposure events Contact Laboratory and/or NICD Hotline Submission of repeat specimen critical to confirm or exclude VHF Full battery of tests (serology, PCR and isolation) recommended for most conclusive testing)	Special Viral Pathogens Laboratory Dr J Weyer 011 386 6376 082 903 9131 Contact NICD Hotline

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<i>Yersinia pestis</i> (Plague)	<u>Bubonic</u> Bubo aspirate in PBS in sterile container <u>plus</u> 2x swabs (absorb a few drops of sample on a sterile swab and place into Cary Blair transport medium)	Transport at 2-8°C or room temperature.	Plague (PLAGE)	Microscopy (Gram, Wayson & DFA), culture and confirmation	5 days	Safety precautions should be taken when handling/collecting samples Samples should be taken prior to antibiotic treatment and should reach laboratory as quickly as possible <u>Important</u> Please notify laboratory prior to sending specimens	Special Bacterial Pathogens Reference Laboratory 011 555 0331 011 555 0306
	<u>Pneumonic</u> Sputum in sterile container <u>plus</u> 2x swabs (rotate swab in sputum sample and place into Cary Blair transport medium)	Transport at 2-8°C or room temperature.					
	<u>Septicemic</u> Blood culture bottle	Transport at room temperature					
	1 tube clotted blood or serum <i>Please note:</i> Paired serum taken 2-3 weeks apart is required for confirmation	Transport at 2-8°C	Plague serology (PLAGE)	Serology: ELISA	2 days		
	<u>Surveillance</u> Clotted animal blood e.g. rodent, dog	Transport at 2-8°C	Plague surveillance (RATS)	Serology	4 weeks		

Centre for Enteric Diseases

The Centre for Enteric Diseases (CED) aims to provide specialized diagnostics, relevant data and expertise in diarrhoeal diseases

Working Groups:

Bacteriology Division

The bacteriology division was established in 1997 and is the reference centre in South Africa for human infections involving bacterial enteric pathogens including diarrhoeagenic *Escherichia coli*, *Salmonella* species, *Shigella* *Campylobacter* species and *Vibrio cholerae*. The division participates in national laboratory-based surveillance for enteric bacterial pathogens. Isolates are voluntarily submitted to the bacterial division from ~200 clinical microbiology laboratories and data is collected on patients presenting throughout South Africa with both invasive and non-invasive disease. In order to make these data representative and reflective of disease burden in each province, all diagnostic laboratories are actively motivated to voluntarily submit limited demographic details and isolates. **Cumulative stats of commonly circulating serotypes including limited antimicrobial susceptibility results are compiled and circulated to participating laboratories. Data is also published in the annual NICD report.** The division routinely performs genotypic characterization (DNA fingerprinting) on all outbreak/epidemic-prone pathogens including *Salmonella* Typhi, *Shigella dysenteriae* type 1, *V. cholerae* O1 and Shiga-toxin producing *E. coli* (including the enterohaemorrhagic *E. coli*). **In addition** the division assist in outbreak investigations and performs genotyping and strain characterization of any enteric bacterial pathogens involved.

Virology Division

The virology division was established in May 2006 to expand the range of diarrhoeal pathogens under investigation to include viruses associated with gastroenteritis. The division participates in a sentinel surveillance program at five sites around South Africa to monitor rotavirus epidemiology, genotype distribution and the impact of the rotavirus vaccine introduced into the expanded program on immunization (EPI) in August 2009. The division is also involved in investigating methods to improve vaccine safety and efficacy in developing countries. Furthermore, the division monitors the incidence, seasonality and molecular character of additional enteric viruses including, but not limited to, norovirus, sapovirus, adenovirus, astrovirus, bocavirus in children less than five years of age. The division also provides diagnostic support to the outbreak investigation unit.

Pathogen Species Name (disease/ syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<i>Campylobacter</i> sps	Laboratory-confirmed isolate from any body site	Inoculated Dorset slopes incubated at 37°C overnight at source laboratory, prior to submission to CED-Bacteriology. Transwabs /Dorset slope to be kept at room temperature upon receipt at NICD.	Enteric surveillance	Phenotypic: Identification Genotypic: Real time PCR for detection of <i>Campylobacter jejuni</i> and <i>Campylobacter coli</i>	7 Working days 3 days	Copy of laboratory report including patient details	CED Bacteriology 011 386 6235 011 555 0348 011 555 0334 011 555 0360

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<p>Diarrhoeagenic <i>Escherichia coli</i></p> <p>Watery or bloody diarrhoea, abdominal cramps, with or without fever</p>	<p>Laboratory-confirmed isolate from stool or rectal swab only.</p> <p>Laboratory confirmed isolate from all body sites for suspect EHEC/<i>E. coli</i> O157.</p> <p>Environmental isolates in water or food-borne disease outbreaks only.</p>	<p>Inoculated Dorset slopes incubated at 37°C overnight at source laboratory, prior to submission to CED-Bacteriology. Dorset slope to be kept at room temperature upon receipt at NICD.</p>	<p>Enteric surveillance/<i>E. coli</i> characterization</p>	<p>Phenotypic: Identification</p> <p>Serotyping O-antigen</p> <p>Genotypic: Virulence gene detection by multiplex-PCR.</p> <p>DNA fingerprinting of strains by PFGE analysis</p>	<p>*3 months 3 Working days</p> <p>7 days</p> <p>3 days</p> <p>4 days</p>	<p>*Batch testing for surveillance isolates.</p> <p>Attach stool isolate form obtainable from CED-Bacteriology or copy of laboratory report including patient details.</p>	<p>CED Bacteriology 011 386 6235 011 555 0348 011 555 0334 011 555 0360</p>

Pathogen Species Name (disease/ syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<p><i>Vibrio cholerae</i> O1 and non-O1 (non-cholera <i>Vibrio</i> species)</p> <p>Acute watery diarrhoea</p>	<p>Laboratory-confirmed cultured isolate from all body sites.</p> <p>Environmental isolates in water or food-borne disease outbreaks only.</p>	<p>Bacterial isolates sub-cultured onto Dorset transport medium.</p> <p>Inoculated dorsets incubated at 37°C overnight at source laboratory, prior to submission to CED Bacteriology.</p> <p>Dorset slope to be kept at room temperature upon receipt at NICD.</p>	Enteric surveillance/ <i>Vibrio</i> species characterization	<p>Phenotypic:</p> <p>Identification</p> <p>Serotyping</p> <p>Antimicrobial susceptibility testing. Screening of ESBL</p> <p>Genotypic:</p> <p>Cholera enterotoxin detection by real-time PCR.</p> <p>DNA fingerprinting of strains by PFGE analysis</p>	<p>#1 month</p> <p>3 days</p> <p>3 days</p> <p>4 days</p> <p>1 day</p> <p>4 days</p>	<p>#Batch testing for surveillance isolates.</p> <p>Attach stool isolate form obtainable from CED-Bacteriology or copy of laboratory report including patient details.</p>	<p>CED</p> <p>Bacteriology</p> <p>011 386 6235</p> <p>011 555 0348</p> <p>011 555 0334</p> <p>011 555 0360</p>

Pathogen Species Name (disease/ syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<p><i>Salmonella</i> Typhi and non-typhoidal <i>Salmonella</i> species</p> <p><i>Shigella</i> species</p> <p>Diarrhoea, fever, cramps, dysentery</p>	<p>Laboratory-confirmed cultured isolates from all body sites.</p> <p>Environmental isolates in water or food-borne disease outbreaks only.</p>	<p>Bacterial isolates sub-cultured onto Dorset transport medium.</p> <p>Inoculated dorsets incubated at 37°C overnight at source laboratory, prior to submission to CED Bacteriology.</p> <p>Dorset slope to be kept at room temperature upon receipt at NICD</p>	<p>Enteric surveillance/<i>Salmonella</i> species characterization</p> <p>Enteric surveillance/<i>Shigella</i> species characterization</p>	<p>Phenotypic: Serotyping: <i>Salmonella</i> <i>Shigella</i></p> <p>Antimicrobial susceptibility testing. Screening of ESBL</p> <p>Genotypic: PFGE analysis: MLVA analysis:</p>	<p>*3 months</p> <p>12 Working days</p> <p>5 days</p> <p>4 days</p> <p>4 days</p> <p>3 days</p>	<p>*Batch testing for surveillance isolates.</p> <p>Attach stool isolate form, obtainable from CED-Bacteriology or a copy of laboratory report including patient details.</p>	<p>CED Bacteriology 011 386 6235 011 555 0348 011 555 0334 011 555 0360</p>
<p>Adenovirus Gastroenteritis:</p>	<p>Specimen: Stool</p>	<p>Maintenance of cold chain from</p>			5 days	Specimen containers	<p>CED Virology 011 555 0370</p>

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
Diarrhoea, vomiting, fever	Unsuitable Specimen: Rectal swab in VTM	collection to receipt at NICD. Store and transport at 4°C.	Enteric Adenovirus detection	Real-time PCR (Enteric adenovirus)		closed tightly and sealed in plastic bag accompanied with date of specimen collection and date of birth	
Astrovirus Gastroenteritis: Diarrhoea, vomiting, fever	Specimen: Stool Unsuitable Specimen: Rectal swab in VTM	Maintenance of cold chain from collection to receipt at NICD. Store and transport at 4°C.	Astrovirus detection	Real-time PCR	5 days	Specimen containers closed tightly and sealed in plastic bag accompanied with date of specimen collection and date of birth	CED Virology 011 555 0370
Sapovirus Gastroenteritis: Diarrhoea, vomiting, fever	Specimen: Stool Unsuitable Specimen: Rectal swab in VTM	Maintenance of cold chain from collection to receipt at NICD. Store and transport at 4°C.	Sapovirus detection	Real-time PCR	5 days	Specimen containers closed tightly and sealed in plastic bag accompanied with date of specimen collection and date of birth	CED Virology 011 555 0370

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
Norovirus Gastroenteritis: Diarrhoea, vomiting, fever	Specimen: Stool Unsuitable Specimen: Rectal swab in VTM	Maintenance of cold chain from collection to receipt at NICD. Store and transport at 4°C.	Norovirus detection	Real-time PCR	5 days	Specimen containers closed tightly and sealed in plastic bag accompanied with date of specimen collection and date of birth	CED Virology 011 555 0370
Rotavirus Gastroenteritis: Diarrhoea, vomiting, fever	Specimen: Stool Unsuitable Specimen: Rectal swab in VTM	Maintenance of cold chain from collection to receipt at NICD. Store and transport at 4°C.	Rotavirus detection	ELISA	5 days	Specimen containers closed tightly and sealed in plastic bag accompanied with date of specimen collection and date of birth as well as vaccination history (where possible)	CED Virology 011 555 0370
			Rotavirus genotyping	RT-PCR genotyping			

Centre for Opportunistic, Tropical and Hospital Infections

The Centre for Opportunistic, Tropical and Hospital Infections aims to prevent and control opportunistic, tropical and hospital infections in South Africa by providing:

- Strategic information obtained through surveillance and research to the Department of Health and other major stakeholders
- Technical support for public health programmes such as the malaria control programme and the cryptococcal screening programme
- Reference laboratory services in the fields of parasitology, mycology, entomology and bacteriology
- Laboratory support for outbreak response
- Training for clinical, laboratory and public health personnel to ensure optimal diagnosis and control of diseases

The Centre focuses its efforts on opportunistic infections, particularly those that are HIV-related; tropical infections, especially malaria and its vectors; and nosocomial infections, concentrating on antimicrobial resistance in the hospital setting.

Working Groups:

Parasitology

The group provides a specialised parasitology reference service for routine diagnostic medical laboratories. Specialised parasitological diagnostic and confirmatory tests are offered by the laboratory. In addition, certain important pathogens form the focus of its surveillance, research and teaching activities. Surveillance is currently being done on the unconventional opportunistic pathogen *Pneumocystis jirovecii* that causes the important AIDS-defining infection, *Pneumocystis* pneumonia (PcP). The estimation of the burden of parasites in children less than 5 years of age presenting with diarrhoea, is the aim of another surveillance project carried out at sentinel sites in South Africa. Surveillance of drug-resistant malaria in South Africa is underway. Research and development of new identification techniques for human parasites is on-going and currently includes projects on opportunistic diseases such as microsporidiosis, toxoplasmosis, and free-living amoeba infections.

Vector Control

Malaria is the major vector-borne disease in Africa, killing close to 1 million people annually, most of them children under the age of five. In South Africa, malaria transmission is confined to the low-lying border areas in the northeast of the country where approximately 5 000 cases were reported in 2009. The Vector Control Reference Laboratory (VCRL) focuses on the anopheline mosquitoes responsible for malaria transmission. The Unit houses a unique collection of live mosquito colonies of the three most important vector species in Africa, *Anopheles gambiae*, *An. arabiensis* and *An. funestus*, plus the minor vector *An. merus*, and the non-vector species of the *An. gambiae* complex, *An. quadriannulatus*. Three colonies of *An. funestus* from Mozambique and Angola continue to provide us with a unique resource for research into insecticide resistance in this important malaria vector. This places the VCRL in a unique position to offer collaboration with international institutions investigating similar problems and to play a role in influencing policy decisions on vector control strategies in the region.

In addition, the VCRU houses the largest museum collection of African arthropods of medical importance in Africa, the third largest such collection in the world. The high level of expertise in the Unit has been recognised within the University of the Witwatersrand as a research Unit called the Malaria Entomology Research Unit (MERU).

Services and Courses:

Insecticide and Repellent Testing

The VCRL has the expertise and resources necessary to conduct insecticide testing, especially insecticides used in mosquito control. We are able to conduct scientific tests in order to determine the effectiveness of the insecticides applied to nets or solid surfaces.

Forensic Entomology

The VCRL has been involved in assisting the South African Police Service with identifications of insects found on corpses and at the sites where corpses have been discovered. Results have correlated well with forensic pathology estimates of post-mortem intervals.

Diagnostic Services

The VCRL provides an identification service of medically important arthropods for entomologists, medical practitioners and health workers.

Mycology

The mycology working group focuses on laboratory-based surveillance for two fungal diseases of public health importance in South Africa: cryptococcal meningitis and candidaemia. In collaboration with the Department of Health and other partners, the group is also leading efforts to implement and monitor a laboratory-driven cryptococcal screening programme at ± 500 clinics in Gauteng and the Free State (phase 1) – this programme aims to prevent deaths associated with cryptococcal meningitis. Development of clinical guidelines for management of fungal infections is an important activity – members of the group continue to participate in development of South African and WHO guidelines for HIV-associated cryptococcal meningitis. A specialised mycology reference service is provided to routine diagnostic medical laboratories – including phenotypic and sequence-based identification of unusual or difficult-to-identify fungi and antifungal susceptibility testing. Research activities are focused on developing and validating new diagnostic assays and defining risk factors for fungal disease and antifungal drug resistance. The reference laboratory also holds a large collection of pathogenic fungi.

Antimicrobial Resistance

The group is responsible for laboratory-based surveillance of nosocomial infections caused by ESCAPE (*Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa* and *Enterobacter* spp) organisms. Sentinel sites surveillance was piloted with *Staphylococcus aureus* and *Klebsiella pneumoniae* for two years and replaced with *Pseudomonas aeruginosa*. The antimicrobial resistance laboratory confirm resistance genes on organisms sent from diagnostic medical laboratories..

We also perform enhanced surveillance for *Staphylococcus aureus* (SA) bacteraemia at two provinces. SA is an important cause of skin and soft tissue infections, pneumonia, arthritis, endocarditis, osteomyelitis, foreign-body infections and sepsis; these can range from mild to severe and potentially fatal. However, risk groups include newborn infants, breast feeding women and individuals with chronic comorbid conditions such as diabetes, cancer, vascular disease and lung disease. We aimed to identify risk factors for SA mortality and for developing resistance.

Hospitalized patients are at risk of acquiring infection through invasive medical devices such as ventilators, intravenous catheters, etc., *Pseudomonas aeruginosa* is seen as one of the important cause of these infections.

Enterobacteriaceae including *K. pneumoniae* can cause different types of healthcare-associated infections, including pneumonia, bloodstream infections, urinary tract infections, wound or surgical site infections, and meningitis. These organisms commonly develop resistance to almost all antimicrobial agents including carbapenems. To determine extent of carbapenems resistant Enterobacteriaceae (CPEs) we introduced sentinel sites surveillance.

Surveillance for antimicrobial resistance is fundamental component for antimicrobial stewardship programs.

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
Parasitology							
<u>Parasite -</u> <i>Borrelia duttoni</i> or <i>B. recurrentis</i> (Relapsing fever)	Unclotted, EDTA blood or blood films. <i>Clotted blood is unsuitable.</i>	Transport at ambient temperature.	Relapsing fever borrelia (DISA test code: PMIC)	Staining and microscopy	1 day		Parasitology Reference Laboratory 011 555-0304 011 555-0311
<u>Parasite -</u> <i>Babesia</i> species (Babesiosis)	Unclotted, EDTA blood or blood films. <i>Clotted blood is unsuitable.</i>	Transport at ambient temperature.	Babesia (DISA test code: PMIC)	Staining and microscopy	1 day		Parasitology Reference Laboratory 011 555-0304 011 555-0311
<u>Parasite -</u> <i>Plasmodium</i> species (Malaria)	Unclotted, EDTA blood or blood films. <i>Clotted blood is unsuitable.</i>	Transport at ambient temperature. Blood should be transported to the laboratory as quickly as possible.	Malaria investigation (DISA test code: MALAG)	Staining and microscopy	1 day		Parasitology Reference Laboratory 011 555-0304 011 555-0311

Pathogen Species Name (disease/ syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<u>Parasite - Plasmodium</u> species (Malaria)	Unclotted, EDTA blood. Blood spots or blood films may be used in exceptional circumstances. <i>Clotted blood is unsuitable.</i>	Transport at ambient temperature. Blood should be transported to the laboratory as quickly as possible.	Malaria PCR (DISA test code: PCRML)	Malaria PCR	2 days	Only request PCR test when: <ul style="list-style-type: none"> ■ the malaria microscopy and RDT (rapid diagnostic test) results do not correlate ■ the malaria microscopy and/or RDT results are negative and malaria is still suspected ■ malaria species confirmation is needed ■ the patient has already been treated for malaria but routine tests are either not done or negative 	Parasitology Reference Laboratory 011 555-0304 011 555-0311
<u>Parasite - Plasmodium falciparum</u> (Malaria)	Unclotted, EDTA blood. <i>Clotted blood is unsuitable.</i>	Transport at ambient temperature.	Antigen test for <i>Plasmodium falciparum</i> (DISA test code: MALAG)	Antigen test for <i>Plasmodium falciparum</i>	1 day		Parasitology Reference Laboratory 011 555-0304 011 555-0311

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<u>Parasite -</u> Microfilaria species (<i>W. bancrofti</i> , <i>L. loa</i> , <i>M. perstans</i> etc)	Unclotted, EDTA blood or blood films. Blood sampling should be performed at the correct times depending on the suspected filarial species.*	Transport at ambient temperature.	Microfilaria investigation (DISA test code: MFIL)	Staining and microscopy	1 day	*For <i>W. bancrofti</i> sample after 8pm, for <i>L. loa</i> at ~12pm and others at anytime.	Parasitology Reference Laboratory 011 555-0304 011 555-0311
<u>Parasite -</u> <i>Wuchereria bancrofti</i> (Lymphatic filariasis or elephantiasis)	EDTA Blood or serum.	Transport at ambient temperature.	<i>W. bancrofti</i> antigen test (DISA test code: MFIL)	Antigen test for <i>Wuchereria bancrofti</i>	1 day		Parasitology Reference Laboratory 011 555-0304 011 555-0311
<u>Parasite -</u> <i>Trypanosoma</i> species (Sleeping sickness or trypanosomiasis)	Unclotted, EDTA blood, blood films or fresh CSF (1ml). <i>Clotted blood is unsuitable.</i>	Transport at ambient temperature. Ideally CSF specimens must reach laboratory within 30 minutes of sampling.	Trypanosome investigation (DISA test code: TRYP)	Staining and microscopy	1 day		Parasitology Reference Laboratory 011 555-0304 011 555-0311

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<u>Parasite</u> -Human protozoa including: <i>Cryptosporidium</i> species, <i>Isospora belli</i> , <i>Cyclospora cayetanensis</i> , <i>Giardia lamblia</i> , <i>Entamoeba coli</i> , <i>Blastocystis hominis</i>	Stool or duodenal aspirate/string test. Specimens, that may take longer than a day to reach the laboratory, should ideally be preserved in an equal quantity of 10% formalin.	Transport at ambient temperature.	Stool parasites (specify suspected parasite, if applicable) (DISA test code: PARA)	Microscopic identification of all human protozoa	1 day		Parasitology Reference Laboratory 011 555-0304 011 555-0311
<u>Parasite</u> - <i>Entamoeba histolytica</i> (Amoebiasis)	Stool, liver abscess fluid or cyst fluid. Minimum volume is 1ml.	Transport at ambient temperature. Don't add preservative. Ideally specimen must reach laboratory within 30 minutes of sampling.	Amoebiasis (DISA test code: PARA)	Microscopy	1 day		Parasitology Reference Laboratory 011 555-0304 011 555-0311

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<u>Parasite</u> -Human nematodes including: <i>Ascaris lumbricoides</i> (common roundworm), hookworms (<i>Ancylostoma duodenale/ Necator americanus</i>), <i>Trichuris trichiura</i> (whipworm), <i>Strongyloides stercoralis</i>	Stool or worm/s. Specimens that may take longer than a day to reach the laboratory should ideally be preserved in an equal quantity of 10% formalin.	Transport at ambient temperature.	Stool parasites (specify suspected parasite, if applicable) (DISA test code: PARA)	Macroscopic and/or microscopic identification.	1 day		Parasitology Reference Laboratory 011 555-0304 011 555-0311
<u>Parasite</u> - <i>Enterobius vermicularis</i> (pinworm)	Early morning sticky tape swab is the optimal specimen.	Transport at ambient temperature.	<i>Enterobius vermicularis/</i> (pinworm) (DISA test code: PARA)	Microscopy	1 day	Eggs may be infective – handle with care.	Parasitology Reference Laboratory 011 555-0304 011 555-0311
<u>Parasite</u> - <i>Strongyloides stercoralis</i>	Sputum, urine or CSF. Minimum volume is 1ml. Larvae may be infective – handle with care.	Transport at ambient temperature.	<i>Strongyloides stercoralis</i> (DISA test code: PARA)	Microscopy for larvae of <i>Strongyloides stercoralis</i> .	1 day	For disseminated infections.	Parasitology Reference Laboratory 011 555-0304 011 555-0311

Pathogen Species Name (disease/ syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<u>Parasite</u> -Human trematodes including: <i>Schistosoma mansoni</i> / <i>haematobium</i> (Bilharzia, schistosomiasis)	Stool. Specimens, that may take longer than a day to reach the laboratory, should ideally be preserved in an equal quantity of 10% formalin.	Transport at ambient temperature.	Stool parasites (specify suspected parasite, if applicable) (DISA test code: PARA)	Microscopic identification of all human trematodes.	1 day		Parasitology Reference Laboratory 011 555-0304 011 555-0311
<u>Parasite</u> - <i>Schistosoma haematobium</i> (Schistosomiasis , bilharzia)	Urine, minimum volume is 5ml.	Transport at ambient temperature.	<i>Schistosoma haematobium</i> (DISA test code: BILH)	Microscopy	1 day		Parasitology Reference Laboratory 011 555-0304 011 555-0311
<u>Parasite</u> -Human cestodes (tapeworms) including: <i>Taenia saginata</i> , <i>T. solium</i> , <i>H. nana</i> , <i>H. diminuta</i> and <i>D. latum</i>	Stool Specimens, that may take longer than a day to reach the laboratory, should ideally be preserved in an equal quantity of 10% formalin.	Transport at ambient temperature.	Stool parasites (specify suspected parasite, if applicable) (DISA test code: PARA)	Microscopic identification of all human cestodes/ tapeworms.	1 day		Parasitology Reference Laboratory 011 555-0304 011 555-0311
<u>Parasite</u> - Tapeworm (adult) identification	Worm or proglottid (tapeworm segment). Submit proglottids in saline.	Transport at ambient temperature.	Tapeworm identification (DISA test code: PMIC)	Macroscopic and/or microscopic identification.	1-2 days	Proglottids may be infective – handle with care.	Parasitology Reference Laboratory 011 555-0304 011 555-0311

Pathogen Species Name (disease/ syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<u>Parasite -</u> <i>Echinococcus</i> species (Echinococcosis, hydatid disease)	Cyst tissue, cyst fluid or sputum, minimum volume is 1ml.	Transport at ambient temperature, if transport is expected to take longer than 2 days it is best to transport at 4°C.	Echinococcus (DISA test code: PMIC)	Microscopic examination for hydatid hooklets and scolices of <i>Echinococcus</i> species.	1 day	May be infective – handle with care.	Parasitology Reference Laboratory 011 555-0304 011 555-0311
<u>Parasite -</u> <i>Acanthamoeba</i> spp. (<i>Acanthamoeba</i> keratitis)	Corneal scrapings or biopsy, or contact lenses, cases and solutions. Send tissue in saline.	Transport at ambient temperature.	Acanthamoeba (DISA test code: PARAX)	Culture, Staining	2 weeks (Prov. result sent day 2)		Parasitology Reference Laboratory 011 555-0304 011 555-0311
<u>Parasite -</u> <i>Leishmania</i> species (Leishmaniasis)	Bone marrow, liver biopsy, skin biopsy/impression smears. Submit skin biopsy in saline.	Transport at ambient temperature.	Leishmania investigation (DISA test code: PMIC)	Staining and microscopy	1 day		Parasitology Reference Laboratory 011 555-0304 011 555-0311

Pathogen Species Name (disease/ syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<u>Parasite -</u> <i>Pneumocystis jirovecii</i> (<i>Pneumocystis</i> pneumonia, PCP)	Respiratory specimens including: induced sputum, tracheal aspirates, bronchial washings, bronchoalveolar lavage (BAL) or gastric wash. Random sputum is not an optimal specimen. Minimum volume is 1ml.	Transport at ambient temperature.	<i>Pneumocystis jirovecii</i> PCR (DISA test code: PCRPJ)	PCR	2 days	Please send a respiratory specimen (induced or expectorated sputum, BAL etc.) for this test when PCP is suspected clinically/ radiologically, but the routine lab test (IFA) is negative.	Parasitology Reference Laboratory 011 555-0304 011 555-0311
Vector Control							
Arthropods/ Insects	Morphological identification (by VCRL)		Undamaged. Alive or preserved on silica	Insects Arthropods	3 days	Anopheline mosquitoes, spiders, scorpions – VCRL Culicine mosquitoes and ticks - SPU-Arbovirology	Vector Control Reference Laboratory 011 386 6484

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
Mycology							
<u>Fungal pathogen from clinical sources which cannot be identified by academic/referral laboratories</u>	Unidentified fungal pathogen from clinical source should be inoculated into an agar slope (screwtop) bottle such as Dorset transport medium or potato dextrose medium	Room temperature; inform Mycology Reference Laboratory if suspected dimorphic fungus which needs to be processed in a BSL-3 facility	Identification of fungal pathogen; Antifungal susceptibility testing	Phenotypic and genotypic identification (where required) of unidentified fungal pathogens from clinical sources; Antifungal susceptibility testing	10 days (unless very slow-growing organism)	Complete case report form (can be obtained from the Mycology Reference Laboratory)	Mycology Reference Laboratory 011 555 0323 011 555 0325 011 555 0353
<u>Cryptococcus (surveillance)</u>	Cryptococcal isolate should be inoculated into an agar slope (screwtop) bottle such as Dorset transport medium	Room temperature	Cryptococcal surveillance	Identification by phenotypic and genotypic methods; antifungal susceptibility testing	N/A	Complete GERMS case report or attach final lab report; Submission requested from GERMS-SA enhanced surveillance sites; private labs and NHLS labs in KZN	Mycology Reference Laboratory 011 555 0325 011 555 0381
<u>Candida (surveillance)</u>	Candida isolate should be inoculated into an agar slope (screwtop) bottle such as Dorset transport medium	Room temperature	Candida surveillance	Identification by phenotypic and genotypic methods; antifungal susceptibility testing	N/A	Complete GERMS case report or attach final lab report; Submission requested from participating GERMS-SA labs	Mycology Reference Laboratory 011 555 0325 011 555 0381

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
Antimicrobial Resistance							
<u>Staphylococcus aureus and Gram-positive organisms</u>	Blood culture positive, sub-cultured on Dorset slopes and submitted to AMRL-CC	Cultures on Dorset slopes viable for up to one month at room temperature	Cultures on Dorset slopes viable for up to one month at room temperature	ID, MIC and molecular characterization of resistance mechanisms	30-60 days from receipt of culture	Patients with bacteremia 48 h after admission in the hospital (Surveillance only)	MEQARL 0115550344 0115550342
<u>Gram-negative organisms</u>	Blood culture positive, sub-cultured on Dorset slopes and submitted to AMRL-CC	Cultures on Dorset slopes viable for up to one month at room temperature	Cultures on Dorset slopes viable for up to one month at room temperature	ID, MIC and molecular characterization of resistance mechanisms	30-60 days from receipt of culture	Patients with bacteraemia 48h after admission in the hospital (Surveillance only)	AMRL-CC 0115550344 0115550342
<u>Multi-resistant Enterobacteriaceae</u>	Cultures on Dorset slopes or other media viable for up to one month at room temperature	Clinically relevant sites and environmental samples	Cultures on Dorset slopes viable for up to one month at room temperature	ID, MIC and molecular characterization of resistance mechanisms	2 weeks from receipt of culture	Highly resistant nosocomial infections	AMRL-CC 0115550344 0115550342

Centre for Respiratory Diseases and Meningitis

The Centre for Respiratory Diseases and Meningitis (CRDM) is a resource of surveillance, diagnostics, expertise and research in the field of communicable respiratory diseases and meningitis for South Africa and the African continent. The centre generates data and provides expertise related to respiratory diseases and meningitis of public health importance to the South African National Department of Health, health care providers, regional and international collaborators, to assist with the planning of public health policies and programmes and response to respiratory disease and meningitis outbreaks. The CRDM is also a source of capacity building and formal training within South Africa and the African region.

Objectives of CRDM

1. To conduct surveillance for respiratory diseases and meningitis within South Africa in order to provide data on the burden, severity and seasonality.
2. To characterise (phenotypically and genotypically) pathogens contributing to respiratory diseases and meningitis in order to understand strain relatedness (molecular epidemiology) and guide vaccine development treatment and prevention policy.
3. To monitor trends in antiviral and antibacterial drug resistance in respiratory and meningeal pathogens in order to inform empiric treatment guidelines
4. To monitor the impact and effectiveness of interventions to reduce respiratory diseases and meningitis
5. To provide reference laboratory functions for specialised organism characterisation and identification related to respiratory communicable diseases and pathogens causing meningitis nationally and regionally.
6. To identify and characterise novel respiratory and meningeal pathogens with potential to cause outbreaks and to assist with response to respiratory disease outbreaks.
7. To be a source of local and regional expertise on respiratory diseases and meningitis.
8. To engage in directed and relevant research to answer questions related to regional respiratory disease and meningitis communicable disease problems and their surveillance and management
9. To build local and regional capacity in epidemiology and laboratory diagnostics for respiratory disease and meningitis

*For abbreviations used please see abbreviation table at beginning of this document

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
Adenovirus	Any respiratory sample (e.g. NPA, OPA, TS, NS, NPS, OPS, TA, Sputum, Biopsies, autopsies etc.) Swabs should be placed in UTM/VTM, Samples can be combined in same UTM/VTM.	Transport at 4°C Sample should reach laboratory within 72hrs	RVPCR	Real-Time PCR	72 hrs	Respiratory Infection, ; URTI; ILI	CRDM Virology 011 386 6412 011 555 0488 011 386 6373
Influenza A and Influenza B virus.	Any respiratory sample (e.g. NPA, OPA, TS, NS, NPS, OPS, TA, Sputum, Biopsies, autopsies, Tissue culture fluids etc.) Swabs should be placed in UTM/VTM. Samples can be combined in same UTM/VTM.	Transport at 4°C Sample should reach laboratory within 72hrs	RVPCR	Real-Time PCR	72 hrs	Respiratory Infection; URTI; ILI	CRDM Virology 011 386 6412 011 555 0488 011 386 6373
Avian Influenza (H5, H7, H9)	Nasopharyngeal and/or oropharyngeal aspirates or combined nasopharyngeal and oropharyngeal swabs in UTM/VTM, BAL and Biopsies of respiratory tissues. Other respiratory samples - to be discussed with Dr. on call.	Transport at 4°C Sample should reach laboratory within 72hrs transported as Infectious substance (packaging instruction 602 of IATA).	Suspected Avian influenza	Real-Time PCR	24 hrs	Clinical features consistent with AI infection PLUS meets epidemiological criteria as outlined in AI Case Investigation Document (Contact Epidemiologist)	CRDM Virology 011 386 6390 011 386 6412 011 555 0488 011 386 6373 Hotline-Dr on call: 082 883 9920

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
Parainfluenza virus types 1, 2 and 3	Any respiratory sample (e.g. NPA, OPA, TS, NS, NPS, OPS, TA, Sputum, Biopsies, autopsies etc.) Swabs should be placed in UTM/VTM. Samples can be combined in same UTM/VTM.	Transport at 4°C Sample should reach laboratory within 72hrs	RVPCR	Real-Time PCR	72 hrs	Respiratory Infection, ; URTI; ILI	CRDM Virology 011 386 6412 011 555 0488 011 386 6373
Rhinovirus	Any respiratory sample (e.g. NPA, OPA, TS, NS, NPS, OPS, TA, Sputum, Biopsies, autopsies etc.) Swabs should be placed in UTM/VTM. Samples can be combined in same UTM/VTM.	Transport at 4°C Sample should reach laboratory within 72hrs	RVPCR	Real-Time PCR	72 hrs	Respiratory Infection, ; URTI; ILI	CRDM Virology 011 555 0488 011 386 6412 011 386 3730
Human Metapneumovirus (hMPV)	Any respiratory sample (e.g. NPA, OPA, TS, NS, NPS, OPS, TA, Sputum, Biopsies, autopsies etc.) Swabs should be placed in UTM/VTM. Samples can be combined in same UTM/VTM.	Transport at 4°C Sample should reach laboratory within 72hrs	RVPCR	Real-Time PCR	72 hrs	Respiratory Infection; URTI; ILI	CRDM Virology 011 555 0488 011 386 6373 011 386 6412 011 386 3730

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
RSV	Any respiratory sample (e.g. NPA, OPA, TS, NS, NPS, OPS, TA, Sputum, Biopsies, autopsies etc.) Swabs should be placed in UTM/VTM. Samples can be combined in same UTM/VTM.	Transport at 4°C Sample should reach laboratory within 72hrs	RVPCR	Real-Time PCR	72 hrs	Respiratory Infection; URTI; ILI	CRDM Virology 011 386 6412 011 555 0488 011386 6373
Human Corona viruses (229E, OC43, NL63, HKU1)	Any respiratory sample (e.g. NPA, OPA, TS, NS, NPS, OPS, TA, Sputum, Biopsies, autopsies etc.) Swabs should be placed in UTM/VTM. Samples can be combined in same UTM/VTM.	Transport at 4°C Sample should reach laboratory within 72hrs	Human coronaviruses	Real-Time PCR	72 hrs	Respiratory Infection ; URTI; ILI	CRDM Virology 011 386 6392 011 386 6390 011 555 0488 011 386 6373 011 386 6412
MERS-Coronavirus (MERS-CoV)	Induced sputum, lung aspirates, combined nasopharyngeal and oropharyngeal or swabs or nasopharyngeal aspirates in UTM/VTM, BAL and Biopsies of respiratory tract tissues. Other samples - to be discussed with Dr. on call.	Transport at 4°C Sample should reach laboratory within 72hrs Transported as infectious substance (packaging instruction 602 of IATA).	Suspected MERS corona virus	Real-Time PCR	24 hrs	Clinical features consistent with SARI infection PLUS meets epidemiological criteria as outlined by WHO (Contact Epidemiologist)	CRDM Virology 011 386 6412 011 555 0488 011 386 6373 Hotline-Dr on call: 082 883 9920

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
Human Boca virus	Nasopharyngeal and/or oropharyngeal aspirates or combined nasopharyngeal and oropharyngeal swabs in UTM/VTM, BAL and Biopsies of respiratory tissues	Transport at 4°C Sample should reach laboratory within 72hrs	Human bocaviruses	Real-Time PCR	72 hrs	Respiratory Infection ; URTI; ILI	CRDM Virology 011 555 0488 011 386 6412 011 386 6373
<i>N. meningitidis</i> , <i>H. influenzae</i> and <i>S. pneumoniae</i>	Normally sterile site specimen (mostly blood or cerebrospinal fluid [CSF] or other fluids e.g. pleural, peritoneal, synovial)	Isolates on Dorset transport medium inoculated as per NIC0184. No refrigeration required. Do not batch as isolates will lose viability.	National surveillance (GERMS-SA)	Identification of <i>S. pneumoniae</i> , <i>N. meningitidis</i> and <i>H. influenzae</i> Serotyping/ Serogrouping Antimicrobial susceptibility testing (disc and minimum inhibitory concentration - MIC)	2 months	Isolates submitted to NICD for national surveillance (GERMS-SA) with sterile Isolate form or LIS report	CRDM Bacteriology 011 555 0315 011 555 0317
<i>N. meningitidis</i> , <i>H. influenzae</i> and <i>S. pneumoniae</i>	Normally sterile site specimen (mostly blood or cerebrospinal fluid [CSF] or other fluids e.g. pleural, peritoneal, synovial)	Isolates on Dorset transport medium inoculated as per NIC0184. No refrigeration required. Do not batch as isolates will lose viability.	Multilocus sequence typing (MLST)	Outbreak investigation/ molecular epidemiology/ surveillance	1 week outbreak Variable (for special projects)	Outbreak investigation or special projects	CRDM Bacteriology 011 555 0315 011 555 0317

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<i>Neisseria</i> species, <i>Haemophilus</i> species and <i>Streptococcus</i> species	Normally sterile site specimen (mostly blood or cerebrospinal fluid [CSF] or other fluids e.g. pleural, peritoneal, synovial)	Isolates on Dorset transport medium inoculated as per NIC0184. No refrigeration required. Do not batch as isolates will lose viability.	Identification of <i>Neisseria</i> species, <i>Haemophilus</i> species or <i>Streptococcus</i> species		2-5 days	As part of national surveillance or to confirm results with sterile isolate form or LIS report	CRDM Bacteriology 011 555 0315 011 555 0317
<i>N. meningitidis</i> , <i>H. influenzae</i> and <i>S. pneumoniae</i>	Normally sterile site specimen (mostly blood or cerebrospinal fluid [CSF] or other fluids e.g. pleural, peritoneal, synovial)	Minimum of 200µl whole or clotted blood (serum), unclotted EDTA blood, CSF. Refrigeration preferred but not essential	Antigen detection Polymerase chain reaction (PCR) for identification PCR for serotyping/grouping		Urgent 1 day Non-urgent 4 days	Culture-negative specimens/specimens for diagnosis/confirmation with sterile Isolate form or LIS report	CRDM Bacteriology 011 555 0315 011 555 0317

Pathogen Species Name (disease/syndrome, ICD-code)	Samples Collection (E.g. Sample source, type amount, specimen container, transport medium, type of swab)	Specimen Transportation Requirements (Temperature requirements, Stability, Minimum time to reach laboratory)	Tests To Request	Available Tests (Methodology)	Turn-around time	Special Instructions (Case investigations forms to be completed, guidelines, other relevant info)	Department and Contact telephone no's
<i>Mycoplasma pneumoniae</i> , <i>Chlamydia pneumoniae</i> , <i>Legionella spp.</i> , <i>Bordetella spp.</i>	Sputum (expectorated or induced) in a sterile container, and/or nasopharyngeal- oropharyngeal aspirate or combined flocked swabs in universal transport medium or Primestore. For culture, swabs should be placed in Regan Lowe	Sputum to be frozen immediately and transported on dry-ice UTM to be stored and transported refrigerated	Polymerase chain reaction (PCR) for identification	PCR for identification of atypical pneumonia-causing bacteria (<i>M. pneumoniae</i> , <i>C. pneumoniae</i> and <i>Legionella spp.</i>) PCR for identification of <i>B. pertussis</i> and <i>B. parapertussis</i>	PCR Urgent- 1 day Non-urgent 4 days Culture 7-10 days	Specimens submitted as part of syndromic pneumonia surveillance (SARI) or for diagnostic purposes	CRDM Bacteriology 011 555 0315 011 555 0317
<i>S. pneumoniae</i> , <i>Legionella pneumophila serogroup 1</i>	Urine in sterile, leak-proof container (minimum of 5 ml)	Stored and transported refrigerated	Urinary antigen test for identification	Binax NOW for <i>S. pneumoniae</i> (all serotypes) Binax NOW for <i>Legionella pneumophila</i> (serogroup 1)	1 day - PCR Culture 7-10 days	Specimens submitted as part of syndromic pneumonia surveillance (SARI) or for diagnostic purposes	CRDM Bacteriology 011 555 0315 011 555 0317

PUBLIC HEALTH, SURVEILLANCE AND RESPONSE

The Public Health Surveillance and Response Division includes the Outbreak Unit, the GERMS-SA surveillance programme, Travel Health and the Communications Unit. The division facilitates communication and data sharing between the national and provincial health departments and the NICD and the public and provides epidemiological input to other NICD units through collaborative projects and support of surveillance and epidemiological activities and outbreak responses.

OUTBREAK RESPONSE UNIT

The Outbreak Response Unit (ORU) provides technical support for all aspects of communicable disease outbreaks and control in South Africa. Through close collaboration with provincial and national health departments and other stakeholders, together with systems for early detection and improved reporting of epidemic-prone communicable diseases, the ORU functions as a source of intelligence for outbreak detection and facilitates comprehensive outbreak response activities. In addition, close partnerships with NHLS diagnostic laboratories and NICD centres provide appropriate laboratory diagnostic services during outbreaks and specialised diagnostic testing as required.

Public Health Services

The ORU's role in outbreaks may include, but is not limited to, the following: outbreak detection and reporting, field investigation, development of clinical and laboratory guidelines, management of laboratory data and interpretation of results, and recommendations for prevention and control.

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GERMS-SA

Surveillance/Diagnostic Services

GERMS-SA is a laboratory-based surveillance programme for diseases of public health importance. It is coordinated by the National Microbiology Surveillance Unit (NMSU) and spans many of the centres at the NICD. The laboratory surveillance pathogens include: *Candida spp*, *Salmonella enterica*, *Shigella spp.*, *Vibrio cholerae*, *Campylobacter spp*, *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Neisseria meningitidis*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Cryptococcus spp*. GERMS-SA is an active surveillance programme and relies not only on participating laboratories to submit isolates but also makes use of the NHLS Corporate Data Warehouse to ensure that all cases meeting the case definition are included in the database.

The aim of GERMS-SA is to use the data to inform and guide public health policy makers in their decisions. The objectives include estimating the burden of both community- and hospital-acquired infectious diseases under surveillance, monitoring antimicrobial susceptibility trends, monitoring the impact of the HIV/AIDS Comprehensive Care, Management and Treatment Programme in SA on HIV-associated opportunistic infections, and evaluating the impact of vaccines included in the Expanded Programme of Immunisation (EPI). The work carried out by the GERMS-SA team has significantly contributed to the development of clinical guidelines for pneumonia, meningococcal disease, cholera, cryptococcosis, typhoid fever, contributed to the situational analysis of antibiotic resistance in South Africa, and the introduction of pneumococcal conjugate vaccine as well as a booster dose for *Haemophilus influenzae* type b into the EPI. Data emanating from the GERMS-SA activities have also contributed to the DoH roll out of the cryptococcal antigen screening programme to facilitate the early diagnosis, and hence treatment, of cryptococcal meningitis.

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Travel Health:

Travel Health was established in 2008 with the aim of being a centre for travel health-related activities and consulting on international health matters. This working group provides pre- and post-travel health advice and consultations for travel health practitioners, as well as for staff of the NHLS and NICD for work related field activities. Regular expert consultations are provided both locally and internationally to international focal points, institutes and health practitioners for South African travellers presenting with infectious diseases after travel within southern Africa and further abroad. These include diseases in travellers such as trypanosomiasis, severe malaria and rickettsial disease (tick bite fever). Consultation is also provided for the elimination of malaria in South Africa and other countries within southern Africa.

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