CITY OF MILWAUKEE
HEALTH DEPARTMENT

City of Milwaukee Health Department

Public Health Laboratory

TEST REFERENCE MANUAL

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Test Reference Manual

Acanthamoeba Culture

Methodology:	Culture
Test Code:	CXACA
CPT Code:	87081
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	2-7 days
Specimen Required:	Tissue (corneal biopsy material, brain, lung), corneal scrapings, contact lens (or solution or swab of case), eye wash, CSF.
Collection:	Tissue, cornea scrapings, contact lens: Transfer specimen into sterile container containing 5 mL of Nelson's saline. Nelson's saline available upon request. Fluid (contact lens solution, eye wash, CSF): 1 mL in sterile screw cap container
Storage and Stability:	Room temperature. Do not refrigerate or freeze.
Transport:	Room temperature
Unacceptable Conditions:	Frozen, refrigerated, formalin-fixed specimens. Dry material. Quantity not sufficient. Slides are not acceptable. Swabs are suboptimal and may result in a false negative result.
Reference Range:	Not isolated
Limitations:	N/A
Required Information:	N/A
Additional Information:	Microscopic examination of the culture plate for the presence of cysts/trophozoites confirms positive specimen.

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Aeromonas Culture

Methodology:	Culture
Test Code:	CXAER
CPT Code:	87046
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	3-7 days
Specimen Required:	Stool
Collection:	Collect stool in appropriate leak-proof container or place in enteric transport medium such as Cary-Blair, Amies, or Stuart's. Collection kit is available upon request. Stools must be collected before antibiotic treatment is initiated for greatest chance of isolation of pathogens. If antibiotic treatment has been initiated stool must not be collected until > 48 hours after treatment has ceased.
Storage and Stability:	Refrigerated: 2-8˚C.
Transport:	Refrigerate at 2-8˚C. If unpreserved stool is not transported to the laboratory within 24 hours of collection, transfer specimen to an enteric transport media before transporting to the laboratory.
Unacceptable Conditions:	Unpreserved specimens not received on ice packs or > 24 hours old. Received in transport media not recommended for bacterial isolation or expired. Specimen collected while on antibiotic therapy
Reference Range:	Not isolated
Limitations:	N/A
Required Information:	N/A
Additional Information:	While some aeromonads are agents of gastroenteritis, there is no consensus at this time that all isolates should be considered significant.

Bacterial Identification, Referred Isolate of Non-public Health Significance

Methodology:	Biochemical, 16S sequencing
Test Code:	RFCUL
CPT Code:	87153 87076 (anaerobic) 87077 (aerobic)
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	4-21 days dependent upon organism
Specimen Required:	Pure culture isolate
Collection:	Pure culture isolate on agar slant or plate
Storage and Stability:	Room temperature
Transport:	Room temperature
Unacceptable Conditions:	Isolate mixed or non-viable, specimen frozen
Reference Range:	N/A
Limitations:	N/A
Required Information:	N/A
Additional Information:	Includes identification of organisms of non-public health significance

Bacterial Identification, Referred Isolate of Public Health Significance

Methodology:	Biochemical, serological typing
Test Code:	RFBAC, RFCUL
CPT Code:	87077
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	2- 4 days
Specimen Required:	Pure culture isolate
Collection:	Pure culture isolate on agar slant or plate
Storage and Stability:	Room temperature
Transport:	Room temperature
Unacceptable Conditions:	Culture not viable or mixed, specimen frozen
Reference Range:	N/A
Limitations:	N/A
Required Information:	N/A
Additional Information:	Includes identification of *Aeromonas, Campylobacter, E. coli* 0157:H7*, Edwardsiella, Plesiomonas, Salmonella, Shigella, Vibrio, Yersinia, Listeria* and other organisms of public health significance. Serotyping performed on all referred isolates of *E. coli, Salmonella*, and *Shigella.*

Bacterial ID by Sequencing

Methodology:	16S rRNA Sequencing
Test Code:	N/A
CPT Code:	87153
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	3-7 days
Specimen Required:	Pure culture isolate
Collection:	Pick single colonies of each strain to an agar slant and incubate prior to shipment.
Storage and Stability:	Room temperature: 1 month on slant
Transport:	Room temperature
Unacceptable Conditions:	Culture not viable or mixed
Reference Range:	By report
Limitations:	Amplification and sequencing of the first 500 base pairs of the 16S ribosomal RNA gene (rDNA) only. However variations found within the first 500 base pairs of the 16S region are sufficient to identify most bacteria to the species level.
Required Information:	N/A
Additional Information:	Disclaimer: For Research Use Only, or used in conjunction with RFCUL.

Blastomyces dermatitidis Identification, DNA Probe

Methodology:	Nucleic Acid Hybridization
Test Code:	BDGEN
CPT Code:	87149
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	Pure culture on agar slant
Collection:	Viable isolate on non-blood-containing fungal medium
Storage and Stability:	Room temperature. Do not freeze.
Transport:	Room temperature
Unacceptable Conditions:	Frozen or mixed cultures, leaking containers or isolate submitted on an agar plate.
Reference Range:	Not detected
Limitations:	This test does not differentiate between *B. dermatitidis* and *Paracoccidioides brasiliensis*; both are dimorphic fungi that cause endemic systemic mycoses. This test produces a positive result with the mold *Gymnascella hyalinospora* and with *Emmonsia parva.* These organisms are rarely isolated. Results should be interpreted in conjunction with other laboratory and clinical data available to the clinician.
Required Information:	N/A
Additional Information:	*B. dermatitidis* is the causative agent of blastomycoses or North American blastomycoses and is endemic in the south-central and midwestern United States. *P. brasiliensis* causes paracoccidioidomycosis or South American blastomycoses and is found almost exclusively in South and Central America. *P. brasiliensis* may be distinguished from *B. dermatitidis* by microscopic examination in the yeast phase.

Bordetella pertussis/parapertussis PCR

Methodology:	Qualitative Real-Time Polymerase Chain Reaction
Test Code:	RTBP
CPT Code:	87798 x 3
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	Nasopharyngeal swab, BAL, respiratory aspirate, or sputum
Collection:	NP: Dacron swab in sterile tube BAL, aspirate or sputum: 2 mL in sterile container
Storage and Stability:	Room temperature: 4 hours Refrigerated: 2-8˚C: 2 days Frozen: 2 weeks
Transport:	Refrigerate at 2-8˚C.
Unacceptable Conditions:	Calcium-alginate swabs, specimens in charcoal-based media
Reference Range:	Not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	This test detects and differentiates between *B. pertussis*, *B. parapertussis* and *B. holmesii* (an uncommon respiratory pathogen of humans). Test results must be correlated with culture results and/or patient history to confirm as a case of *B. pertussis* or *B. parapertussis* infection. A negative result does not rule out infection with *B. pertussis* or *B. parapertussis.*

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Campylobacter Culture

Methodology:	Culture
Test Code:	CXCAM
CPT Code:	87046
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	3-7 days
Specimen Required:	Stool, rectal swab
Collection:	Place diarrheal stool, formed stool or rectal swab in Modified Cary-Blair transport medium and fill to indicated line per package insert.
Storage and Stability:	Refrigerated: 2-8˚C.
Transport:	Refrigerate at 2-8˚C. within 24 hours
Unacceptable Conditions:	Insufficient amount of sample; specimen > 24 hours old and not in appropriate transport media., non-sterile or leaking container, multiple specimens (more than one in 24 hours), dry swab
Reference Range:	Not isolated
Limitations:	N/A
Required Information:	N/A
Additional Information:	Identification of Campylobacter should be reported to the local or state public health agency.

Chlamydia trachomatis Culture

Methodology:	Cell Culture, Immunofluorescence
Test Code:	CTRAC
CPT Code:	87110, 87140
Requisition Required:	Microbiology
Performed:	Tuesday and Friday
Turnaround Time:	3-5 days
Specimen Required:	Cervical, urethral, rectal, throat or conjunctival swabs
Collection:	Place swabs in *Chlamydia* transport media; refrigerate immediately, Viral Transport Media (VTM) acceptable as well (M4, M4RT, M6)
Storage and Stability:	Refrigerated: 2-8˚C. for 3 days
Transport:	Refrigerate at 2-8˚C.
Unacceptable Conditions:	Dry swabs or swabs with calcium alginate or wood shafts, specimens that are insufficient, leaking, not refrigerated or not labeled
Reference Range:	Not isolated
Limitations:	Amplified DNA testing is recommended for detection of *Chlamydia trachomatis* from endocervical and urethral specimens.
Required Information:	N/A
Additional Information:	Culture is recommended for *Chlamydia trachomatis* detection in suspected sexual abuse.

Chlamydia trachomatis and Neisseria gonorrhoeae Molecular Detection Combination

Methodology:	Target Amplification Nucleic Acid Probe
Test Code:	CTAMP, GCAMP
CPT Code:	87491, 87591
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1- 2 days
Specimen Required:	Urine; endocervical, vaginal, male urethral, throat or rectal swabs
Collection:	Collect first-catch urine sample or swab and transfer to appropriate APTIMA Combo 2 Assay transport tubes. Swabs and transport tubes are available upon request.
Storage and Stability:	Urine (unpreserved): Room temperature for 24 hours Urine in transport tube: Store at 2-30˚C for 30 days Swabs in transport tube: Store at 2-30˚C for 60 days or frozen for 12 months
Transport:	Refrigerate at 2-8˚C. or room temperature
Unacceptable Conditions:	Any urine specimen transport tube with volumes above or below allowable levels, and any swab specimen transport tube with no swab, two swabs, or a swab not provided by manufacturer.
Reference Range:	Not detected
Limitations:	Excess mucus should be removed to ensure collection of columnar epithelial cells lining the endocervix. If excess mucus is not removed, sampling of these cells is not ensured. Assay is not intended for the evaluation of suspected sexual abuse or for other medico-legal indications.
Required Information:	N/A
Additional Information:	Patient should not have urinated for at least 1 hour prior to sample collection. Culture is recommended for *Chlamydia trachomatis* and *Neisseria gonorrhoeae* detection in suspected cases of sexual abuse. Assay results should be interpreted in conjunction with other laboratory and clinical data available to the clinician.

Clostridium difficile PCR

Methodology:	Qualitative Real-Time Polymerase Chain Reaction
Test Code:	RTCD
CPT Code:	87493
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	Stool
Collection:	5 mL stool in sterile, leak-proof container
Storage and Stability:	Room temperature: 24 hours Refrigerated at 2-8° C: 5 days
Transport:	Refrigerate at 2-8° C.
Unacceptable Conditions:	Non-sterile or leaking containers, dry specimen, stool in PVA or formalin, multiple specimens (more than one in 24 hours), or formed stools.
Reference Range:	Not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	This assay detects and differentiates the NAP-1 (Ribotype 027), *C. difficile* toxin B and binary toxins.

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Coccidioides immitis Identification, DNA Probe

Methodology:	Nucleic Acid Hybridization
Test Code:	CIGEN
CPT Code:	87149
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	Pure culture on agar slant of non-blood-containing medium, such as Sabouraud Dextrose, Brain Heart Infusion, Mycobiotic (Mycosel), Inhibitory Mold Agar, Cottonseed Agar or Yeast Nitrogen Base Agar.
Collection:	Viable isolate on non-blood-containing fungal medium
Storage and Stability:	Room temperature. Do not freeze.
Transport:	Room temperature
Unacceptable Conditions:	Frozen, mixed cultures, leaking containers or isolate submitted on an agar plate.
Reference Range:	Not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	Results should be interpreted in conjunction with other laboratory and clinical data available to the clinician.

Cryptosporidium/Giardia Antigen Detection

Methodology:	DFA Stain, Fluorescent Microscopy
Test Code:	FACRY
CPT Code:	87272, 87269
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-3 days
Specimen Required:	Stool
Collection:	Preserved stool: Place in 10% formalin, sodium acetate-acetic acid-formalin (SAF) or ECOFIX within 1 hour of collection. O&P collection kit available upon request. Unpreserved stool: Must be received by the laboratory within 1 hour of collection. Patients should not have been given barium, bismuth, laxatives, anti-diarrheal agents or antibiotic treatment at least 1 week prior to collection.
Storage and Stability:	Preserved stool: Room temperature Unpreserved stool: Refrigerate at 2-8˚C and must be received by the laboratory within 1 hour of collection.
Transport:	Preserved stool: Room temperature Unpreserved stool: Refrigerate at 2-8˚C. Must be received by the laboratory within 1 hour of collection.
Unacceptable Conditions:	Stool preserved in PVA, MF/MIF or any other preservative other than those listed above are not suitable for use. Rectal swabs and unpreserved stool received >1 hour after collection cannot be tested.
Reference Range:	Not detected
Limitations:	This test is for the detection of *Cryptosporidium* oocysts and *Giardia* cysts only. A negative test does not rule out the possibility of other parasitic infections. If other parasitic organisms are suspected, routine ova and parasite examination(s) are suggested. Multiple specimens, collected every other day for up to 10 days, may need to be tested before ruling out *Cryptosporidium* or *Giardia* species infection.
Required Information:	N/A
Additional Information:	The presence of *Cryptosporidium* oocysts and Giardia cysts in a stool specimen does not preclude the possibility of either other parasites being present in the stool or the presence of another condition which may be causing gastrointestinal illness.

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Cyclospora Detection

Methodology:	Modified Acid Fast Stain and Microscopy
Test Code:	EXMAF
CPT Code:	87015, 87207
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-3 days
Specimen Required:	Stool
Collection:	Unpreserved stool: Collect and place in a clean and leak proof collection vial. Preserved Stool: Collect in vial containing 10% Formalin within 1 hour of collection.
Storage and Stability:	Unpreserved: Refrigerate at 2-8˚C. Must be transported and received by the lab within 24 hours of collection. Preserved: Room temperature
Transport	Unpreserved stool: Refrigerate at 2-8˚C. (within 24 hours of collection) Preserved stool: Room temperature
Unacceptable Conditions:	Dry specimens, leaking containers, specimens contaminated with oil, barium or urine, multiple specimens (more than one in 24 hours), unpreserved specimens received >1 hour after collection, rectal swabs Frozen: Unacceptable
Reference Range:	Not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	Identification of Cyclospora is considered significant and should be reported to the local or state public health agency. If other parasitic organisms are suspected, a routine ova and parasite stool examination should be considered. Also see *Cryptosporidium/Giardia* Antigen Detection and Microsporidium Detection.

Cystoisospora Detection (formerly known as Isospora)

Methodology:	Modified Acid Fast Stain , Light Microscopy
Test Code:	EXMAF
CPT Code:	87015, 87207
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	Within 3 days
Specimen Required:	Stool
Collection:	Preserve each stool collection in 10% formalin or SAF within one hour of collection.
Storage and Stability:	Preserved stool: Room temperature; Unpreserved stool: Refrigerated; Frozen: Unacceptable
Transport:	Fresh stool specimen: Refrigerated (within 1 hour) Stool preserved in 10% formalin or SAF: Room temperature
Unacceptable Conditions:	Dry specimens, leaking containers, specimens contaminated with oil, barium or urine, multiple specimens (more than one in 24 hours), unpreserved specimens received >1 hour after collection, rectal swabs
Reference Range:	Not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	A negative test does not rule out the possibility of other parasitic infections. If other parasitic organisms are suspected, routine ova and parasite examination(s) are required. For detection of *Cryptosporidium* and *Giardia*, see *Cryptospridium/Giardia* Antigen Detection. For detection of Microsporidium, see Microsporidium Detection

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E. coli O157:H7 Culture

Methodology:	Culture, serological typing
Test Code:	CX157
CPT Code:	87046
Requisition Required:	Microbiology
Performed:	Monday-Friday Outbreak investigations may include testing outside these routine test dates.
Turnaround Time:	3-7 days
Specimen Required:	Stool
Collection:	Collect stool in appropriate leak-proof container or place in enteric transport medium such as Cary-Blair, Amies, or Stuart's. Collection kit is available upon request. Stools must be collected before antibiotic treatment is initiated for greatest chance of isolation of pathogens. If antibiotic treatment has been initiated stool must not be collected until > 48 hours after treatment has ceased.
Storage and Stability:	Refrigerated: 2-8˚C.
Transport:	Refrigerate at 2-8˚C. If unpreserved stool is not transported to the laboratory within 24 hours of collection, transfer specimen to an enteric transport media before transporting to the laboratory.
Unacceptable Conditions:	Unpreserved specimens not received on ice packs or > 24 hours old. Received in transport media not recommended for bacterial isolation or expired transport media. Specimen collected while on antibiotic therapy
Reference Range:	No *E. coli* O157:H7 detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	*E. coli* O157:H7 is considered significant and should be reported to the local or state public health agency.

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Enteric Pathogens, Stool Culture

Methodology:	Culture, Shiga-toxin EIA, serological typing
Test Code:	CXENT, SHIGA
CPT Code:	87045, 87046 x 4
Requisition Required:	Microbiology
Performed:	Monday-Friday Outbreak investigations may include testing outside these routine test dates.
Turnaround Time:	3-7 days
Specimen Required:	Stool
Collection:	Collect stool in appropriate leak-proof container or place in enteric transport medium such as Cary-Blair, Amies, or Stuart's. Collection kit is available upon request. Stools must be collected before antibiotic treatment is initiated for greatest chance of isolation of pathogens. If antibiotic treatment has been initiated stool must not be collected until > 48 hours after treatment has ceased.
Storage and Stability:	Refrigerated: 2-8˚C.
Transport:	Refrigerate at 2-8˚C. If unpreserved stool is not transported to the laboratory within 24 hours of collection, transfer specimen to an enteric transport media before transporting to the laboratory.
Unacceptable Conditions:	Unpreserved specimens not received on ice packs or > 24 hours old. Received in transport media not recommended for bacterial isolation or expired transport media. Specimen collected while on antibiotic therapy
Reference Range:	No *Salmonella, Shigella, Yersinia, Campylobacter* or *E. coli* O157:H7 isolated. Shiga Toxin not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	Stool culture for isolation of *Salmonella, Shigella, Campylobacter, Yersinia, Enterotoxigenic E. coli, E. coli* O157:H7 is performed by MHDL in outbreak situations through MHD-DCPD (Disease control and prevention division) department only. Identification of *Salmonella* species*, Shigella* species*, E. coli O157:H7,* Shiga toxin producing *E. coli* (STEC)*; Campylobacter species, Vibrio species, Yersinia enterocolitica, Aeromonas* species are considered significant and should be reported to the local or state public health agency. Significance of other enteric organisms should be determined based on clinical information.

Enterovirus PCR

Methodology:	Qualitative Real-Time Reverse Transcription Polymerase Chain Reaction
Test Code:	RTENT
CPT Code:	87498
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	CSF, throat swab , stool or rectal swabs in Viral Transport Media (VTM)
Collection:	CSF: 1 mL in a sterile container. Stool: Collect at least 1 mL stool in a sterile, unpreserved container Swabs: Place swabs into VTM
Storage and Stability:	Refrigerated: 2-8˚C. for 7 days
Transport:	Viral Transport Media collection tubes (M4, M4RT, M6), Refrigerated at 2-8˚C.
Unacceptable Conditions:	Swabs with calcium alginate, cotton tips, or wood shafts, specimens that are insufficient, leaking, not refrigerated or not labeled
Reference Range:	Not detected
Limitations:	Assay detects human enteroviruses does not differentiate enterovirus serotypes. Weak cross-reactivity may occur with some strains of rhinovirus.
Required Information:	N/A
Additional Information:	Enteroviruses detected by culture will be specifically serotyped.

Fungal Culture (Dermatophyte), Hair, Skin or Nails

Methodology:	Culture and Microscopy
Test Code:	CXDER
CPT Code:	87101
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	Within 6 weeks
Specimen Required:	Hair, skin scrapings, nail
Collection:	Hair: Epilate 10-12 hairs. Specify the source of the specimen and include any pertinent clinical information. Skin and nails: Cleanse the area with 70% alcohol prior to specimen collection. Nail scrapings should be from a subsurface portion of the infected nail. Skin should be taken from the active border of the lesion.
Storage and Stability:	Room temperature
Transport:	Skin scrapings, nail and hair clippings should be transported dry at room temperature in a sterile Petri dish.
Unacceptable Conditions:	Specimens received frozen, in formalin, or in culture medium will be rejected. Swabs are discouraged unless the only specimen available; submit swabs in 5 mL sterile saline.
Reference Range:	Not isolated
Limitations:	Delay in transport of specimen could compromise isolation of organism.
Required Information:	N/A
Additional Information:	Drug susceptibility testing on these fungus isolates not available.

Fungal Culture (Non-Dermatophyte), Other than Hair, Skin or Nails

Methodology:	Culture and Microscopy
Test Code:	CXFUN
CPT Code:	87102
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	Within 6 weeks
Specimen Required:	2 mL sputum or other fluids (1 mL), tissue biopsy. Blood or CSF not acceptable.
Collection:	2 mL sputum or 1 mL other fluids in sterile container. Add small amount of saline to biopsy and soft tissue specimens.
Storage and Stability:	Room temperature for 72 hours.
Transport:	Refrigerated at 2-8˚C.
Unacceptable Conditions:	Specimens received frozen, in formalin, or in culture medium will be rejected. Swabs are discouraged unless the only specimen available; submit swabs in 5 mL sterile saline.
Reference Range:	Not isolated
Limitations:	Delay in transport of specimen could compromise isolation of organism.
Required Information:	N/A
Additional Information:	Drug susceptibility testing on these fungus isolates not available.

Fungal Identification, Mold, Referred Isolate

Methodology:	Morphological procedure for identification; DNA probes or D2 region of the LSU rDNA gene sequencing
Test Code:	RFFUN
CPT Code:	87107, 87153
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	Within 4 weeks (slow growers may take longer to identify)
Specimen Required:	Pure culture on slant
Collection:	Viable mold in pure culture on agar slant.
Storage and Stability:	Room temperature
Transport:	Room temperature
Unacceptable Conditions:	Non-viable organisms, mixed cultures, isolates from environmental sources, organisms submitted on an agar plate.
Reference Range:	Culture negative for fungus
Limitations:	N/A
Required Information:	N/A
Additional Information:	N/A

Fungal Identification, Yeast, Referred Isolate

Methodology:	Morphological and biochemical procedure for identification; or sequencing
Test Code:	RFYST
CPT Code:	87106, 87153
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	Within 4 weeks (slow growers may take longer to identify)
Specimen Required:	Pure culture on slant
Collection:	Viable yeast organism in pure culture on agar slant.
Storage and Stability:	Room temperature
Transport:	Room temperature
Unacceptable Conditions:	Non-viable organisms, mixed cultures, isolates from environmental sources, organisms submitted on an agar plate.
Reference Range:	N/A
Limitations:	N/A
Required Information:	N/A
Additional Information:	N/A

Gastrointestinal Pathogen Panel

Methodology:	Multiplex nucleic acid amplification
Test Code:	RTGPP
CPT Code:	87507
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	Rectal swabs, diarrhea or other fecal material
Collection:	Transport rectal swabs or fecal material in a clean tube or vessel.
Storage and Stability:	Viral Transport Media collection tubes (M4, M4RT, M6), Refrigerated: 2-8˚C. for 7 days
Transport:	Refrigerate at 2-8˚C.
Unacceptable Conditions:	Swabs with calcium alginate, cotton tips, or wood shafts, specimens that are insufficient, leaking, not refrigerated or not labeled.
Reference Range:	Not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	Detects **bacteria** (*Campylobacter jejuni*, *Salmonella* spp., *Shigella* spp., enterotoxigenic *Escherichia coli* [ETEC], Shiga toxin-producing *E. coli* [STEC], *E. coli* O157:H7, *Vibrio cholerae*, *Yersinia enterocolitica*, and toxigenic *Clostridium difficile*), **parasites** (*Giardia lamblia*, *Cryptosporidium*spp., and *Entamoeba histolytica*), and **viruses** (norovirus GI and GII, adenovirus 40/41, and rotavirus A)

Herpes Simplex Virus (HSV) Type 1 and 2 PCR

Methodology:	Qualitative Real-Time Polymerase Chain Reaction
Test Code:	RTHSV
CPT Code:	87529 x 2
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	Vesicle swab, oral or genital
Collection:	Vesicle swab: Collect and place in Viral Transport Media collection tubes (M4, M4RT, M6),
Storage and Stability:	Refrigerated: 2-8˚C. for 7 days
Transport:	Refrigerate at 2-8˚C.
Unacceptable Conditions:	Swabs with calcium alginate or cotton tips, wood shaft, specimens that are insufficient and not refrigerated or not labeled
Reference Range:	Not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	This assay detects and differentiates HSV-1 and HSV-2

Histoplasma capsulatum Identification, DNA Probe

Methodology:	Nucleic Acid Hybridization
Test Code:	HCGEN
CPT Code:	87149
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	Pure culture on slant
Collection:	Viable isolate on non-blood-containing fungal medium
Storage and Stability:	Room temperature. Do not freeze.
Transport:	Room temperature
Unacceptable Conditions:	Frozen or mixed cultures, leaking containers or isolate submitted on an agar plate.
Reference Range:	Not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	Results should be interpreted in conjunction with other laboratory and clinical data available to the clinician.

Human Immunodeficiency Virus (HIV), Ag/Ab Screen

Methodology:	Chemiluminescent microparticle immunoassay (CMIA)
Test Code:	HIVC
CPT Code:	87389
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-3 days
Specimen Required:	Serum, plasma
Collection:	3-8 ml of whole blood with no anticoagulants
Storage and Stability:	Specimens may be stored on or off the clot or red blood cells for up to 14 days refrigerated at 2-8°C. If testing will be delayed more than 14 days, remove serum or plasma from the clot, separator, or red blood cells and store frozen at -20°C or colder
Transport:	Refrigerate at 2-8°C
Unacceptable Conditions:	Excessively hemolyzed, grossly contaminated with bacteria, or otherwise extremely turbid
Reference Range:	Non-Reactive
Limitations:	This test is intended for screening only, and requires appropriate confirmatory testing. A non-reactive result does not rule out a new HIV infection.
Required Information:	Patient name with date of birth/collection date & time
Additional Information:	For HIV infection confirmation testing – Specimen reflexes to HIV Geenius Assay

Geenius™ HIV 1/2 Supplemental Assay

Methodology:	immunochromatographic assay for the confirmation and differentiation of individual antibodies to Human Immunodeficiency Virus
Test Code:	GHIV
CPT Code:	87389
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-3 days
Specimen Required:	Serum, plasma
Collection:	3-8 ml of whole blood with no anticoagulants
Storage and Stability:	Specimens may be stored on or off the clot or red blood cells for up to 14 days refrigerated at 2-8°C. If testing will be delayed more than 14 days, remove serum or plasma from the clot, separator, or red blood cells and store frozen at -20°C or colder
Transport:	Serum, and plasma specimens can be shipped at ambient conditions (18-30°C) for up to 2 days or samples can be shipped refrigerated with cold packs or wet ice.
Unacceptable Conditions:	Excessively hemolyzed, grossly contaminated with bacteria, or otherwise extremely turbid
Reference Range:	Negative
Limitations:	This test is intended for screening only, and requires appropriate confirmatory testing. A non-reactive result does not rule out a new HIV infection.
Required Information:	Patient name with date of birth/collection date & time
Additional Information:	For HIV infection confirmation testing – Specimen reflexes to HIV Geenius Assay

Influenza Type A and B PCR

Methodology:	Qualitative Real-Time Reverse Transcription Polymerase Chain Reaction
Test Code:	RTFLU
CPT Code:	87502
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	Throat or NP swabs, or combined throat and NP swabs
Collection:	Collect swab(s) and place in Viral Transport Media collection tubes (M4, M4RT, M6),
Storage and Stability:	Refrigerated: 2-8˚C. for 7 days
Transport:	Refrigerate at 2-8˚C.
Unacceptable Conditions:	Dry swabs, swabs with calcium alginate or cotton tips, wood shaft, and not refrigerated or not labeled
Reference Range:	Not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	This assay detects and differentiates seasonal H1, H3, 2009 H1N1, H5 influenza as well as influenza B.

Legionella Culture

Methodology:	Culture
Test Code:	CXOLG
CPT Code:	87081
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	3-14 days
Specimen Required:	Lung Tissue; Pleural Fluid; Sputum; Bronchial Washings or lavage;
Collection:	Collect bronchial washings using sterile water instead of saline
Storage and Stability:	Refrigerated: 2-8˚C.
Transport:	Refrigerated: 2-8˚C.
Unacceptable Conditions:	Dry specimens, non-sterile or leaking containers, or specimens submitted in saline, formalin, or Viral Transport Media (VTM).
Reference Range:	Not isolated.
Limitations:	N/A
Required Information:	N/A
Additional Information:	Identification of *Legionella spp*. is considered significant and should be reported to the local or state public health agency.

Legionella Culture and *L. pneumophila* DFA Detection

Methodology:	Culture and Direct Fluorescent Antibody (DFA) Stain
Test Code:	CXLEG
CPT Code:	87081, 87278
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	Culture: 3-14 days DFA: 1-2 days
Specimen Required:	Lung tissue: Pleural fluid; Sputum; Bronchial washings or lavage
Collection:	Collect bronchial washings using sterile water instead of saline
Storage and Stability:	Refrigerated: 2-8˚C.
Transport:	Refrigerated: 2-8˚C.
Unacceptable Conditions:	Dry specimens, nonsterile or leaking containers, or specimens submitted in saline, formalin, or viral transport medium.
Reference Range:	Culture negative for *Legionella* species and No *Legionella pneumophila* detected by DFA
Limitations:	N/A
Required Information:	N/A
Additional Information:	Direct Immunofluorescent Antibody Test (DFA) conjugates are commercially available for a limited number of serogroups. The combination of low sensitivity and false-positive tests in a low-prevalence environment indicates that this test should not be performed without culture. Identification of Legionella spp. is considered significant and should be reported to the local or state public health agency.

Legionella PCR

Methodology:	Qualitative Real-Time Polymerase Chain Reaction
Test Code:	RTLEG
CPT Code:	87541; 87798
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	Broncheoalveolar lavage, tracheal aspirate, sputum, bronchoscopy specimens, pleural fluid, lung tissue, serum, urine, nasopharyngeal or oropharyngeal washes or swabs.
Collection:	NP: Dacron swab in sterile tube BAL, aspirate or sputum: 2 mL in sterile container Collect bronchial washings using sterile water instead of saline.
Storage and Stability:	Room temperature: 4 hours Refrigerated: 2-8˚C: 7 days Frozen: 6 weeks
Transport:	Refrigerate at 2-8˚C
Unacceptable Conditions:	Calcium alginate swab, inappropriate collection and labeling
Reference Range:	Not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	This assay detects and differentiates between *Legionella pneumophila* and non-pneumophila Legionella spp DNA in clinical specimens. It was developed at CDC and validated at MHDL. A negative result does not rule out infection with *Legionella pneumophila* or *Legionella* species. *Legionella* culture and DFA also available.

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Measles Virus (Rubeola) PCR

Methodology:	Qualitative Real-Time Reverse Transcription Polymerase Chain Reaction
Test Code:	RTMEA
CPT Code:	87798
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	Combined Throat and NP swabs ; Urine (minimum volume: 10mL)
Collection:	Specimens should be collected within the first 3 days of illness, but no later than 10 days after onset of rash. Swabs: Place into one vial of Viral Transport Media (M4, M4RT, M6), Urine: Collect 10-15 mL in a sterile container. First-voided morning urine usually contains the highest concentration of infected cells.
Storage and Stability:	Refrigerated: 2-8˚C. for 7 days
Transport:	Refrigerate at 2-8˚C.
Unacceptable Conditions:	Swabs with calcium alginate, cotton tips, or wood shafts. Specimens that are insufficient, leaking, not refrigerated or not labeled.
Reference Range:	Not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	N/A

Measles (Rubeola) Virus IgG Antibody

Methodology:	Enzyme-Linked Immunosorbent Assay (ELISA)
Test Code:	MEIGG
CPT Code:	86765
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	1 mL serum (minimum volume: 0.5mL)
Collection:	Collect in a sterile transfer tube or Serum Separator Tube (SST)
Storage and Stability:	Refrigerated: 2-8˚C for up to 7 days. If a delay in transport is anticipated, store at -20˚C.
Transport:	Refrigerate at 2-8˚C.
Unacceptable Conditions:	Icteric, lipemic, hemolyzed or heat inactivated serum
Reference Range:	Interpretation — Index Value Negative — ≤ 0.90 Equivocal — 0.91-1.09 Positive — ≥ 1.10
Limitations:	IgG testing of a single serum should not be used for diagnostic purposes. Samples collected too early in the course of infection may not have detectable levels of IgG. A second sample may be collected after 2-7 weeks to detect seroconversion.
Required Information:	N/A
Additional Information:	The presence of IgG indicates the level of antibody detected can usually be considered protective. Equivocal indicates an insufficient level for protection. Absent indicates the patient is susceptible to infection.

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Microsporidia Detection

Methodology:	Modified Trichrome Stain, Light Microscopy
Test Code:	EXMSP
CPT Code:	87015, 87207
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	2-3 days
Specimen Required:	Stool
Collection:	Preserve each stool collection in 10% formalin within one hour of collection.
Storage and Stability:	Preserved stool: Room temperature
Transport:	Fresh stool: Refrigerated (within 1 hour) Preserved stool in 10% formalin: Ambient
Unacceptable Conditions:	Dry specimens, leaking containers, specimens contaminated with oil, barium or urine, multiple specimens (more than one in 24 hours), unpreserved specimens received >1 hour after collection, rectal swabs. Frozen: Unacceptable
Reference Range:	No Microsporidia spores seen
Limitations:	N/A
Required Information:	N/A
Additional Information:	A negative test indicates no visible parasites consistent with Microsporidia and does not rule out the possibility of other parasitic infections.

Mumps Virus PCR

Methodology:	Qualitative Real-Time Reverse Transcription Polymerase Chain Reaction
Test Code:	RTMUM
CPT Code:	87798
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	Buccal/oral swab and urine
Collection:	Urine: Collect 10-15 mL in a sterile container (minimum volume: 10 mL) Buccal/Oral swab: Collect and place in Viral Transport Media collection tubes (M4, M4RT, M6),
Storage and Stability:	Refrigerated: 2-8˚C. for up to 7 days
Transport:	Refrigerate at 2-8˚C.
Unacceptable Conditions:	Swabs with calcium alginate, cotton tips, or wood shafts. Specimens that are insufficient, leaking, not refrigerated or not labeled.
Reference Range:	Not detected
Limitations:	Mumps virus may not be detectable in urine samples for up to 4 days following onset of symptoms.
Required Information:	N/A
Additional Information:	Buccal/oral swabs should be collected 3-5 days from the time symptoms are evident. Urine specimens may be collected at 3-5 days post onset of symptoms. Collection after 5 days may be more advantageous because virus shedding in urine appears to lag behind the appearance in buccal/oral swabs, but continues longer.

Mumps Virus IgG Antibody

Methodology:	Enzyme-Linked Immunosorbent Assay (ELISA)
Test Code:	MUIGG
CPT Code:	86735
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	1 mL serum (minimum volume: 0.5mL)
Collection:	Collect in a sterile transfer tube or Serum Separator Tube (SST)
Storage and Stability:	Refrigerated: 2-8˚C. for up to 7 days. If a delay in transport is anticipated, store at -20˚C.
Transport:	Refrigerate at 2-8˚C.
Unacceptable Conditions:	Icteric, lipemic, hemolyzed or heat inactivated serum.
Reference Range:	Interpretation / Index Value Negative / ≤ 0.90 Equivocal / 0.91-1.09 Positive / ≥ 1.10 The presence of IgG indicates the level of antibody detected can usually be considered protective. Equivocal indicates an insufficient level for protection. Absent indicates the patient is susceptible to infection.
Limitations:	IgG testing of a single serum should not be used for diagnostic purposes. Positive IgG results in neonates must be interpreted with caution since maternal antibody is transferred from the mother to the fetus before birth.
Required Information:	N/A
Additional Information:	N/A

Mycobacteria Smear and Culture

Methodology:	Acid fast stain, culture, DNA probes, and biochemical testing
Test Code:	CXAFB
CPT Code:	87015, 87206,87116, 87118, 87555
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	6 weeks
Specimen Required:	Sputum; Tissue; Exudate; Urine; Stool; Blood; Body Fluids
Collection:	Sputum (early morning; deep productive cough): 5-7 mL in sterile container, collected in a series of 3 specimens over 3-5 days submitted on day of collection. Other respiratory specimens (BAL, bronchial wash, etc.): 5-10mL in sterile container Stool: 1 g in sterile container Tissue Biopsy: 1 g in sterile container Urine: 40 mL, first-morning, clean catch in sterile container (24-hour pooled specimens are unacceptable) collected in a series of 3 specimens over 3-5 days submitted on day of collection.
Storage and Stability:	Refrigerate at 2-8˚C. Ambient: Blood
Transport:	Transport specimen as soon as possible. If transport is delayed over one hour, refrigerate specimen, unless blood.
Unacceptable Conditions:	Specimens received frozen, in formalin, or in culture medium; Swabs; Saliva; Gastric specimens not neutralized prior to transport; Refrigerated blood specimens, Blood in EDTA
Reference Range:	No acid fast bacilli present
Limitations:	Delay in transport of specimen could compromise isolation of organism. Negative results obtained from specimens submitted on swabs are not reliable. A negative test result does not rule out infection with mycobacteria. Improper specimen collection and handling may compromise assay performance. The extent of identification of Mycobacteria other than tuberculosis (MOTT) is dependent on the clinical significance of the isolate.
Required Information:	N/A
Additional Information:	Susceptibility testing is performed on all initial M. tuberculosis isolates. Identification of *Mycobacterium tuberculosis* complex is considered a significant finding and should be reported to the local or state public health agency.

Mycobacterium tuberculosis Complex and Rifampicin resistance detection PCR

Methodology:	Qualitative Real-Time Polymerase Chain Reaction
Test Code:	TBRIF
CPT Code:	87556
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	24 hours
Specimen Required:	Sputum
Collection:	Collect in sterile, leak-proof container with lid secured tightly and place in sealed biohazard bag for transport.
Storage and Stability:	Refrigerated at 2-8˚C.
Transport:	Refrigerate at 2-8˚C.
Unacceptable Conditions:	Saliva
Reference Range:	Not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	This assay detects TB complex and rifampicin resistance but does not differentiate DNA from all members of the *M. tuberculosis* Complex (*M. tuberculosis, M. bovis, M. bovis* BCG*, M. africanum, M. microti,* and *M. canetti*).

Mycoplasma genitalium Molecular Detection

Methodology:	Target Amplification Nucleic Acid Probe
Test Code:	MGAMP
CPT Code:	87491
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1- 2 days
Specimen Required:	Urine; vaginal swab, urethral swab
Collection:	Collect first-catch urine sample or swab and transfer to appropriate APTIMA Combo 2 Assay transport tubes. Swabs and transport tubes are available upon request.
Storage and Stability:	Urine (unpreserved): Room temperature for 24 hours Urine in transport tube: Store at 2-30˚C. for 30 days Swabs in transport tube: Store at 2-30˚C. for 60 days or frozen for 12 months
Transport:	Refrigerate at 2-8˚C. or room temperature
Unacceptable Conditions:	Any urine specimen transport tube with volumes above or below allowable levels, and any swab specimen transport tube with no swab, two swabs, or a swab not provided by manufacturer.
Reference Range:	Not detected
Limitations:	Assay is not intended for the evaluation of suspected sexual abuse or for other medico-legal indications.
Required Information:	N/A
Additional Information:	Patient should not have urinated for at least 1 hour prior to sample collection. Assay results should be interpreted in conjunction with other laboratory and clinical data available to the clinician.

Mycoplasma hominis Culture

Methodology:	Culture
Test Code:	CXMH
CPT Code:	87109
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	2-7 days
Specimen Required:	Urine, urethral or cervical swab, semen
Collection:	Place specimen into M4 or appropriate media for Mycoplasma transport.
Storage and Stability:	Room temperature: 8 hours Refrigerated: 2-8°C. for 48 hours in transport media Frozen: 1 month (-70°C)
Transport:	Refrigerate at 2-8°C. If transport time will exceed 24 hours, freeze specimen and transport on dry ice.
Unacceptable Conditions:	M4-RT, swabs in culturettes, and dry swabs
Reference Range:	No *Mycoplasma hominis* isolated
Limitations:	N/A
Required Information:	N/A
Additional Information:	Specimens are cultured using agar-broth technique. Confirmation is by microscopy.

Neisseria gonorrhoeae culture w/AST

Methodology:	Biochemicals, Etest
Test Code:	CXGC (STD clinic) /CXGCO (non-STD clinic)
CPT Code:	87081, 87181
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	Within 4-7 days
Specimen Required:	Urethral, Endocervical, Rectal, or Throat swab
Collection:	Submit specimen in eSwab transport and collection kit, InTray GC, chocolate agar slant or Thayer-Martin Improved plate inside CO2 transport bag.
Storage or Stability:	eSwab: Room temperature, refrigerate if longer than 2 hours Chocolate agar slant or MTM plates: Incubate in CO_2 incubator when available at 37°C overnight InTray: Incubate in regular incubator when available at 37°C overnight
Transport:	Ambient eSwabs: Within 24 hours, refrigerate if more than 2 hours delay
Unacceptable Conditions:	Refrigerated specimen other than eSwab; isolate on plated agar medium that has been transported/submitted WITHOUT CO2 Jar/Bag (unless the subculture is ≥ one day old)
Reference Range:	Culture negative for *Neisseria gonorrhoeae*, Isolate identified as: Neisseria (indicate species)
Limitations:	N/A
Required Information:	N/A
Additional Information:	Sentinel surveillance to monitor antimicrobial resistance in *N. gonorrhoeae* in the United States is sponsored by the Centers for Disease Control and Prevention (CDC) in collaboration with local and state health departments. MHDL also participates in this program and performs antimicrobial susceptibility testing for Azithromycin, Cefixime, and Ceftriaxone. Identification of *Neisseria gonorrhoeae* is considered significant and should be reported to the local or state public health agency.

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Neisseria gonorrhoeae Identification, Referred Isolate

Methodology:	Biochemicals
Test Code:	RFGC
CPT Code:	87077, 87184
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	Within 4 days
Specimen Required:	Pure isolate of oxidase-positive, Gram-negative diplococci
Collection:	Submit pure isolate on chocolate agar slant or plate, or Thayer-Martin Improved plate, inside CO2 transport bag.
Storage or Stability:	No longer than 2 days from most recent subculture of the isolate
Transport:	Ambient
Unacceptable Conditions:	Refrigerated specimen; isolate on plated agar medium that has been transported/submitted WITHOUT CO2 Jar/Bag (unless the subculture is ≥ one day old)
Reference Range:	Culture negative for *Neisseria gonorrhoeae*, Isolate identified as: Neisseria (indicate species)
Limitations:	N/A
Required Information:	N/A
Additional Information:	Sentinel surveillance to monitor antimicrobial resistance in *N. gonorrhoeae* in the United States is sponsored by the Centers for Disease Control and Prevention (CDC) in collaboration with local and state health departments. MHDL also participates in this program and performs antimicrobial susceptibility testing for Azithromycin, Cefixime, and Ceftriaxone. Identification of *Neisseria gonorrhoeae* is considered significant and should be reported to the local or state public health agency.

Norovirus PCR

Methodology:	Qualitative Real-Time Reverse Transcription Polymerase Chain Reaction
Test Code:	RTNOR
CPT Code:	87798 x 2
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	Stool or vomitus
Collection:	Collect at least 1 mL stool or vomitus in a sterile, stool transport vial without preservatives
Storage and Stability:	Refrigerated: 2-8˚C. for up to 7 days
Transport:	Refrigerate at 2-8˚C.
Unacceptable Conditions:	Stool samples preserved in formalin or PVA; quantity not sufficient, broken or leaking tube.
Reference Range:	Not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	The assay detects and differentiates Norovirus Genogroups I and II. Norovirus sequencing (CaliciNet) is performed only for epidemiological investigation and public health surveillance purposes.

Ova & Parasite Examination, Intestinal

Methodology:	Concentration, Light Microscopy, Trichrome Stain and *Cryptosporidium/Giardia* DFA Stain
Test Code:	EXSTO
CPT Code:	87177, 87209, 87272, 87269
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	Within 2 days
Specimen Required:	Stool
Collection:	Preserve each stool collection in 10% formalin and modified PVA within one hour of collection. Recommended collection: Three separate stool specimens at least 24 hours apart. An individual requisition must be submitted for each specimen. Collection kit available upon request.
Storage or Stability:	Preserved stool: Ambient: 9 months;
Transport:	Fresh stool specimen: Ambient (within 1 hour) Stool preserved in 10% formalin and modified PVA: Ambient
Unacceptable Conditions:	Dry specimens, leaking containers, specimens contaminated with oil, barium or urine, multiple specimens (more than one in 24 hours), unpreserved specimens received >1 hour after collection, rectal swabs. Refrigerated or frozen.
Reference Range:	No ova or parasites seen
Limitations:	The ova and parasite exam does not include a test to specifically detect *Cyclospora, Isospora* or *Microsporidium.* For *Cyclospora* and *Isospora*, refer to Cyclospora or Isospora Detection. For *Microsporidium*, refer to Microsporidium Detection.
Required Information:	N/A
Additional Information:	Travel history, compromised immune status, clinical symptoms, previous parasitic infection, contact with either infected individuals or contaminated food/ water source or linked to a possible or known outbreak. Identification of *Cryptosporidium* spp. is considered significant and should be reported to the local or state public health agency.

Human Parechovirus PCR

Methodology:	Qualitative Real-Time Reverse Transcription Polymerase Chain Reaction
Test Code:	RTPEV
CPT Code:	87798
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	CSF, throat swabs, or stool
Collection:	Place specimen into Viral Transport Media (VTM: M4, M4RT, M6).
Storage and Stability:	Refrigerated: 2-8˚C. for 7 days
Transport:	Refrigerate at 2-8˚C.
Unacceptable Conditions:	Swabs with calcium alginate, cotton tips, or wood shafts, specimens that are insufficient, leaking, not refrigerated or not labeled
Reference Range:	Not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	Echovirus 21 & 22 have been reclassified as Parechovirus 1 & 2. Disclaimer: For Research Use Only.

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Plesiomonas Culture

Methodology:	Culture
Test Code:	CXPLE
CPT Code:	87046
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	3-7 days
Specimen Required:	Stool
Collection:	Collect stool in appropriate leak-proof container or place in enteric transport medium such as Cary-Blair, Amies, or Stuart's. Collection kit is available upon request. Stools must be collected before antibiotic treatment is initiated for greatest chance of isolation of pathogens. If antibiotic treatment has been initiated stool must not be collected until > 48 hours after treatment has ceased.
Storage and Stability:	Refrigerated: 2-8˚C.
Transport:	Refrigerate at 2-8˚C. If unpreserved stool is not transported to the laboratory within 24 hours of collection, transfer specimen to an enteric transport media before transporting to the laboratory.
Unacceptable Conditions:	Unpreserved specimens not received on ice packs or > 24 hours old. Received in transport media not recommended for bacterial isolation or expired transport media. Specimen collected while on antibiotic therapy
Reference Range:	Not isolated
Limitations:	N/A
Required Information:	N/A
Additional Information:	*P. shigelloides* has been implicated as a cause of gastroenteritis, which has been associated with drinking untreated water, eating raw seafood or travel to tropical countries.

Respiratory Pathogen Panel

Methodology:	Multiplex nucleic acid amplification
Test Code:	RTRPP
CPT Code:	87633
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	NP and/or throat swabs
Collection:	Place swabs in Viral Transport Media (VTM: M4, M4RT, M6).
Storage and Stability:	Refrigerated: 2-8˚C. for 7 days
Transport:	Refrigerate at 2-8˚C.
Unacceptable Conditions:	Swabs with calcium alginate, cotton tips, or wood shafts, specimens that are insufficient, leaking, not refrigerated or not labeled.
Reference Range:	Not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	Detects Influenza A and B; Parainfluenza virus 1, 2, 3, 4a and 4b; Adenovirus subgroups B, C and E; RSV subtypes A and B; Human rhinovirus/enterovirus; Human metapneumovirus; Coronavirus NL63, OC43 and 229E; Mycoplasma pneumoniae and Chlamydia pneumoniae.

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Rubella Virus PCR

Methodology:	Qualitative Real-Time Reverse Transcription Polymerase Chain Reaction
Test Code:	RTRUB
CPT Code:	87798
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	Combined Throat and NP swabs; Urine
Collection:	Urine: Collect 10-15 mL in a sterile container (minimum volume: 10 mL) Throat and NP swabs: Collect and place in Viral Transport Media (VTM: M4, M4RT, M6).
Storage and Stability:	Refrigerated: 2-8˚C. for 7 days
Transport:	Refrigerate at 2-8˚C.
Unacceptable Conditions:	Swabs with calcium alginate, cotton tips, or wood shafts, specimens that are insufficient, leaking, not refrigerated or not labeled.
Reference Range:	Not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	N/A

Salmonella Culture

Methodology:	Culture, serological typing (conventional and/or molecular)
Test Code:	CXSAL
CPT Code:	87045
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	3-7 days
Specimen Required:	Stool
Collection:	Collect stool in appropriate leak-proof container or place in enteric transport medium such as Cary-Blair, Amies, or Stuart's. Collection kit is available upon request. Stools must be collected before antibiotic treatment is initiated for greatest chance of isolation of pathogens. If antibiotic treatment has been initiated stool must be collected after 48 hours
Storage and Stability:	Refrigerated: 2-8˚C
Transport:	Refrigerate at 2-8˚C. If unpreserved stool is not transported to the laboratory within 24 hours of collection, place specimen in enteric transport media.
Unacceptable Conditions:	Unpreserved specimens not refrigerated, > 24 hours from time of collection, inappropriate or expired transport media, or collected while on antibiotic therapy
Reference Range:	No Salmonella isolated
Limitations:	N/A
Required Information:	N/A
Additional Information:	Identification of *Salmonella* spp. is considered significant and should be reported to the local or state public health department immediately.

Select Agents of Public Health Significance: Screening and Confirmation

Methodology:	Culture, serological, real-time PCR, Time-resolved Fluorescence
Test Code:	N/A
CPT Code:	N/A
Requisition Required:	Microbiology
Performed:	Monday-Friday, with notification Saturday and Sunday
Turnaround Time:	Preliminary screening report: 1-2 days; Confirmation: 3- 7 days
Specimen Required:	Call the laboratory
Collection:	Call the laboratory
Storage and Stability:	Room temperature
Transport:	Call the laboratory
Unacceptable Conditions:	N/A
Reference Range:	N/A
Limitations:	N/A
Required Information:	N/A
Additional Information:	Select agents may include: *Francisella* spp., *Bacillus anthracis, Brucella* spp., *Yersinia* spp., and *Burkholderia* spp. Contact the laboratory for identification of organisms not on this list.

Shiga Toxin EIA

Methodology:	Enzyme Immuno-assay
Test Code:	SHIGA
CPT Code:	87045, 87046 x 4
Requisition Required:	Microbiology
Performed:	Monday-Friday Outbreak investigations may include testing outside these routine test dates.
Turnaround Time:	1-2 days
Specimen Required:	Stool, GN broth, Culture
Collection:	Collect stool in appropriate leak-proof container or place in enteric transport medium such as Cary-Blair, Amies, or Stuart's. Collection kit is available upon request.
Storage and Stability:	Refrigerated: 2-8˚C.
Transport:	Refrigerate at 2-8˚C and transported to the laboratory within 24 hours of collection.
Unacceptable Conditions:	
Reference Range:	Shiga Toxin not detected
Limitations:	Limit of detection for SLT-I and SLT-II are approximately 7 and 15pg/well respectively.
Required Information:	N/A
Additional Information:	Detection of Shiga toxin is performed by MHDL in outbreak situations through MHD-DCPD (Disease control and prevention division) department only. Identification of Shiga toxin producing *E. coli* (STEC) is considered significant and should be reported to the local or state public health agency.

Shigella Culture

Methodology:	Culture, serological typing
Test Code:	CXSHI
CPT Code:	87045
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	2-5 days
Specimen Required:	Stool
Collection:	Collect stool in appropriate leak-proof container or place in enteric transport medium such as Cary-Blair, Amies, or Stuart's. Collection kit is available upon request. Stools must be collected before antibiotic treatment is initiated for greatest chance of isolation of pathogens. If antibiotic treatment has been initiated stool must be collected after 48 hours
Storage and Stability:	Refrigerated: 2-8˚C
Transport:	Refrigerate at 2-8˚C. If unpreserved stool is not transported to the laboratory within 24 hours of collection, place specimen in enteric transport media.
Unacceptable Conditions:	Unpreserved specimens not refrigerated, > 24 hours from time of collection, inappropriate or expired transport media, or collected while on antibiotic therapy
Reference Range:	No Shigella isolated
Limitations:	N/A
Required Information:	
Additional Information:	Identification of *Shigella* spp. is considered significant and should be reported to the local or state public health agency.

Syphilis, TP-PA

Methodology:	Passive Particle Agglutination
Test Code:	TPPA
CPT Code:	86780
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	2-3 days
Specimen Required:	1-3 ml serum
Collection:	3-7 ml whole blood in serum separator tube
Storage and Stability:	Refrigerated: 2-8°C up to 7 days
Transport:	Refrigerate at 2-8°C within 48 hours of collection
Unacceptable Conditions:	CSF or other body fluids
Reference Range:	Nonreactive
Limitations:	The TP-PA test may be reactive in persons from areas where yaws or pinta was, or is, endemic. Samples from patients with HIV, Leprosy, Toxoplasmosis, H. pylori, or drug addiction may react, on occasion, with either the sensitized or the unsensitized particles, causing false-positive or inconclusive results. A reactive TP-PA test will remain reactive following treponemal infection; they should not be used to evaluate response to therapy.
Required Information:	N/A
Additional Information:	Test results should always be interpreted in conjunction with additional treponemal and/or non-treponemal serologic test results (as appropriate), the patient's clinical symptoms, medical history, and other clinical and/or laboratory findings to produce a diagnosis of syphilis by disease stage.

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Syphilis Screen, EIA

Methodology:	Chemiluminescent microparticle immunoassay (CMIA)
Test Code:	SEIA
CPT Code:	86592
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-3 days
Specimen Required:	Serum, plasma
Collection:	5-10 ml of whole blood in tube with separator (serum) or dipotassium EDTA (plasma)
Storage and Stability:	Refrigerated: 2-8°C up to 7 days
Transport:	Refrigerate at 2-8°C
Unacceptable Conditions:	Excessively hemolyzed, grossly contaminated with bacteria, or otherwise extremely turbid
Reference Range:	Nonreactive
Limitations:	This test is intended for screening only, and requires appropriate confirmatory testing. A non-reactive result does not rule out a new syphilis infection.
Required Information:	Patient name with date of birth/collection date & time
Additional Information:	For a weakly reactive or reactive result, a reflex test for confirmation and titer will be added.

Trichomonas vaginalis Molecular Detection

Methodology:	Target Amplification Nucleic Acid Probe
Test Code:	TVAMP
CPT Code:	87491
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1- 2 days
Specimen Required:	Urine; vaginal swab
Collection:	Collect first-catch urine sample or swab and transfer to appropriate APTIMA Combo 2 Assay transport tubes. Swabs and transport tubes are available upon request.
Storage and Stability:	Urine (unpreserved): Room temperature for 24 hours Urine in transport tube: Store at 2-30˚C. for 30 days Swabs in transport tube: Store at 2-30˚C. for 60 days or frozen for 12 months
Transport:	Refrigerate at 2-8˚C. or room temperature
Unacceptable Conditions:	Any urine specimen transport tube with volumes above or below allowable levels, and any swab specimen transport tube with no swab, two swabs, or a swab not provided by manufacturer.
Reference Range:	Not detected
Limitations:	Assay is not intended for the evaluation of suspected sexual abuse or for other medico-legal indications.
Required Information:	N/A
Additional Information:	Patient should not have urinated for at least 1 hour prior to sample collection. Assay results should be interpreted in conjunction with other laboratory and clinical data available to the clinician.

Ureaplasma urealyticum Culture

Methodology:	Culture
Test Code:	CXUU
CPT Code:	87109
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	2-7 days
Specimen Required:	Urethral or cervical swab preferred, urine, semen.
Collection:	Place specimen into M4 or appropriate media for Mycoplasma transport
Storage and Stability:	Room temperature: 8 hours; Refrigerated: 48 hours in transport media; Frozen: 1 month (-70°C)
Transport:	Refrigerated. If transport time will exceed 24 hours, freeze specimen and transport on dry ice. Place each specimen in a separate, individually sealed bag.
Unacceptable Conditions:	M4-RT, swabs in culturettes, and dry swabs
Reference Range:	Not isolated
Limitations:	N/A
Required Information:	N/A
Additional Information:	Specimens are cultured using agar-broth technique. Confirmation is by microscopy.

Varicella-Zoster Virus (VZV) PCR

Methodology:	Qualitative Real-Time Polymerase Chain Reaction
Test Code:	RTVZV
CPT Code:	87798
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	1-2 days
Specimen Required:	CSF or vesicle swab
Collection:	CSF: 1 mL in a sterile container. Vesicle swab: Collect and place in Viral Transport Media (VTM: M4, M4RT, M6).
Storage and Stability:	Refrigerated: 2-8˚C for 7 days
Transport:	Refrigerate at 2-8˚C.
Unacceptable Conditions:	Swabs with calcium alginate, cotton tips, or wood shafts, specimens that are insufficient, leaking, not refrigerated or not labeled
Reference Range:	Not detected
Limitations:	N/A
Required Information:	N/A
Additional Information:	This assay may be useful in distinguishing VZV infection from the vesicles or rashes associated with herpes simplex virus (HSV), measles, rubella, pox viruses and other causes. HSV, measles, and rubella RT-PCRs are also available.

Virus Isolation and Identification

Methodology:	Cell Culture
Test Code:	VIRUS
CPT Code:	87252, 87253
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	2- 14 days
Specimen Required:	Collect appropriate specimen, e.g. NP and/or throat swabs, stools or rectal swabs, genital swab, CSF, whole blood
Collection:	Urine: Collect 10-15 mL in a sterile container (minimum volume: 10 mL) Swabs, Biopsy/tissue specimens: Collect and place in Viral Transport Media (VTM: M4, M4RT, M6) Bronchial washes, BALs, or CSF: 1 ml in VTM Liquid stool (1 ml) or marble size solid stool collect and place in VTM Whole blood: 2 ml in tube containing EDTA or heparin
Storage and Stability:	Refrigerated: 2-8˚C for 7 days
Transport:	Refrigerate at 2-8˚C.
Unacceptable Conditions:	Dry swabs, wooden swabs, calcium alginate swabs, and swabs in gel transports; Rectal swabs or stool preserved in formalin, SAF, or PVA; Specimens in bacterial transport media; non-sterile or leaking containers
Reference Range:	Not isolated
Limitations:	Several viruses, such as Norovirus are not culturable. These viruses are best detected by nucleic acid amplification tests (NAATs).
Required Information:	N/A
Additional Information:	Multiple cell lines are used to isolate and identify viruses

Yersinia Culture

Methodology:	Culture
Test Code:	CXYER
CPT Code:	87046
Requisition Required:	Microbiology
Performed:	Monday-Friday
Turnaround Time:	3-7 days
Specimen Required:	Stool
Collection:	Collect stool in appropriate leak-proof container or place in enteric transport medium such as Cary-Blair, Amies, or Stuart's. Collection kit is available upon request. Stools must be collected before antibiotic treatment is initiated for greatest chance of isolation of pathogens. If antibiotic treatment has been initiated stool must not be collected until > 48 hours after treatment has ceased.
Storage and Stability:	Refrigerated: 2-8˚C
Transport:	Refrigerate at 2-8˚C. If unpreserved stool is not transported to the laboratory within 24 hours of collection, transfer specimen to an enteric transport media before transporting to the laboratory.
Unacceptable Conditions:	Unpreserved specimens not received on ice packs or > 24 hours old. Received in transport media not recommended for bacterial isolation or expired transport media. Specimen collected while on antibiotic therapy
Reference Range:	Not isolated
Limitations:	N/A
Required Information:	N/A
Additional Information:	Identification of *Y. pestis* is considered significant and should be reported to the local or state public health department immediately.

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