DEPARTMENT OF PATHOLOGY
US ARMY MEDDAC
EVANS ARMY COMMUNITY HOSPITAL
FORT CARSON, COLORADO

LABORATORY SERVICES AND SPECIMEN COLLECTION MANUAL

Revised 8 October 2013

NOTE: To get the most current and/or additional information on Laboratory Tests, look in CHCS under "Lab Test Information" (LTI)

TABLE OF CONTENTS

SECTION I – GENERAL INFORMATION **5**

SECTON II – LABORATORY SERVICES **6**
Main Laboratory Hours of Operation 6
Premier Army Health Clinic Laboratory Hours of Operation 6
Ward Round Collection 6
Outpatient Collection 6
Inpatient Specimen Processing 6
Shipping 6
Reference Laboratory Information 7
Point of Care Testing 7
Paternity Testing 7
Legal Blood Alcohol Testing (LBAT) 8
Legal Drug Testing 8
Reporting of Laboratory Results 8
Critical Values 8

SECTION III – REQUESTING LABORATORY TESTS **10**
Requesting Laboratory Test Criteria 10
Special Requests 10
Special Laboratory Tests 10
Order Comments 10
CHCS Order Sets 10
Order Expiration Date 11
Verbal Orders 11
Testing Priorities 11
Testing Priorities 11
Continuity of Operations Plan 11

SECTION IV – SPECIMEN COLLECTION, LABELING AND REJECTION CRITERIA **13**
Specimen Labeling Criteria 13
Specimen Primary Container 13
Inpatient Specimen Collection 13
Outpatient Specimen Collection 13
Blood Collection 14
Blood Volume 14
Patient Collected Specimens 14
Microbiology Specimens 14
Cytology Specimens 14
General Rejection Criteria 15
No CHCS Order or Request Form 15
Notification for Unacceptable Specimens 15
Microbiology Specimen Rejection Criteria 16

Cytology Specimen Rejection Criteria 16

SECTION V – BLOOD BANK 17
General Information 17
Regulations 17
Allogeneic Blood Requests 17
Required Paperwork for Transfusion Request (TS or TC) 17
Typenex Identification System 17
Autologous Blood Requests 17
Type and Screen versus Type and Crossmatch 17
Requests for Type and Screen or Type and Crossmatch 18
Available Blood Component Products 19
Procedure for Issuing Blood 19
Transfusion Process 20
Autologous Transfusions 20
Return of Blood Products from Wards 20
Return of Blood Products from the OR 21
RhoGam (RhIG) Administration 21
Transfusion Reaction 22

SECTION VI – CHEMISTRY 23
Specimen Collection Instructions 23
- 24-Hour Urine Analysis
- Fasting

Therapeutic Drug Monitoring 23
Chemistry Profiles 23
Panel Availability 23

SECTION VII – HEMATOLOGY & COAGULATION 24
Specimen Collection Instructions 24
Anticoagulants 24
Routine Urinalysis 24

SECTION VIII – MICROBIOLOGY & IMMUNOLOGY 25
Specimen Collection Instructions 25
Culture Incubation Time 25
Antibiotic Sensitivity Studies 25
Parasitology Specimens 26
Mycology Specimens (Fungus) 26
Acid Fast Cultures (AFB), Mycobacteria, and Tuberculosis 26
Virology Specimens 27
Blood Cultures 27
CSF and Sterile Body Fluid Cultures 27
Ear and Eye Cultures 27
Mastoid/Sinus Cultures 27
Sputum Cultures 27

Stool and Rectal Cultures 27
Throat Cultures 28
Urethral/Vaginal Cultures 28
Urine Cultures 28
Wound and Tissue Cultures 28
Anaerobic Cultures 28
Stains 29
Parasitology 29
Chlamydia & Neisseria gonnorrhoeae 29
Semen Analysis 29
Immunology 30

SECTION IX – ANATOMIC PATHOLOGY 31
General Information 31
Histopathology 31
Requests for Tissue Examination 31
Submission of Surgical Specimens 31
Frozen Sections 32
Requests for Unusual or Non-routine Tissue Analysis 32
Tissue Chromosome Analysis 32
Muscle and Nerve Biopsies 32
Histopathology Reports 32
Cytopathology 32
Preparing Request for Cytologic Evaluation 33
Collection and Preparation of Pap Smears 33
Collection of Non-Gynecological Specimens 33
Breast Smears and Aspirations 33
Requests for Fine Needle Aspiration (FNA) 34
Miscellaneous 34
Prioritizing of Specimens 34

SECTION X – MORGUE OPERATIONS 35
General Information 35
Autopsy Request 35

APPENDICES
Appendix A – Pathology Contact Information and Telephone Listing 36
Appendix B - Reference Laboratories Utilized by USA MEDDAC 37
Appendix C – Laboratory Critical Values 38
Appendix D – STAT & ASAP Available Tests 40
Appendix E – Therapeutic Drug Monitoring (TDM) Information 41
Appendix F – Chemistry Profiles 42
Appendix G – Urine Drug of Abuse Screen Cut-off Values 43
Appendix H – Listing of Clinical Laboratory Procedures 44

REFERENCES 67

SECTION I – GENERAL INFORMATION

Purpose: Information contained within this manual is provided as a reference to assist you in the use of available laboratory services. During the performance of any/all specific clinical procedures mentioned within this manual, the attending Healthcare Provider should always reference those respective established clinical SOPs and procedures for that procedure. This document is meant only to supplement the established existing regulations, procedural policies, SOPs and guidelines as set forth within the Evans Healthcare System, TJC, CAP, AABB and the FDA.

Responsibilities: The Department of Pathology is responsible for the performance of all laboratory procedures, which are required to support the medical mission of USA MEDDAC. Requests for laboratory procedures beyond the capabilities of the Department of Pathology will be supported to the fullest extent possible. Appropriate specimens will be collected and routed to the appropriate referral laboratory for analysis. The procedures and technical information in this pamphlet applies to all MEDDAC personnel who utilize the services of the Department of Pathology.

Information Availability: This manual is available on the Pathology link from the EACH SharePoint Homepage. Requests for general information, lab services offered, test methods and performance specifications utilized for analysis may be made by calling the respective section, NCOIC or the Laboratory Manager.

Accreditation: The Department of Pathology is accredited by the College of American Pathologists (CAP), The Joint Commission, and the American Association of Blood Banks (AABB). The Blood Bank is a registered site on the license issued to the US Army by the Food & Drug Administration.

Personnel Certification: The Chief, Department of Pathology is board certified by the American Board of Pathology. While not required, many Medical Technologists and Medical Laboratory Technicians, Cytotechnologists and Histotechnicians employed at USA MEDDAC have passed the renowned Board of Registry certification by the American Society of Clinical Pathologists (ASCP). Other personnel hold certification from the National Certification Agency for Medical Laboratory Personnel (NCA), American Medical Technologists (AMT) or government agencies.

Mailing Address:

Evans Army Community Hospital,
Department of Pathology, ATTN: Xxxx,
1650 Cochrane Circle,
Fort Carson, Colorado 80913-4604.

Contact Information and Telephone Numbers: See Appendix A.

SECTION II – LABORATORY SERVICES

Main Laboratory Hours of Operation

- Main Laboratory: Normal duty hours are 0700 to 1630 hours, Monday through Friday. Routine services are offered during these hours. The Specimen Procurement Section is responsible for outpatient phlebotomy, specimen receiving and processing, and shipping samples to reference laboratories. Limited staffing and services are available during non-duty hours, weekends, and Federal holidays.

- Clinical laboratory services are offered 24 hours a day, 7 days a week. When laboratory testing is required after normal duty hours, the specimen is to be collected by the requesting location and transported to the laboratory for processing and testing.

Premier Army Health Clinic Laboratory Hours

- Normal duty hours are 0730 - 1130 and 1300 - 1600 hours, Monday through Friday. Patients will not be seen after 1550 hours. Specimens collected by other clinics and/or by patients must be dropped off to the laboratory no later than 1550 hours, otherwise they will not be accepted. No STAT or ASAP specimens will be collected or received at this location. The laboratory is closed on weekends and Federal holidays.

Ward Round Collection: Ward rounds begin at 0500 hours Monday through Friday, excluding weekends and Federal holidays. Lab orders must be received by the laboratory no later than 0400 hours for that day. **Only routine blood specimens will be collected by ward round phlebotomy staff**. The ward is responsible for collecting and delivering STATs and ASAP specimens to the laboratory. If the phlebotomist is unable to collect the specimen because of the condition or pediatric nature of the patient, the nursing supervisor will be notified. Arrangements will then be made for the attending physician or his/her designee to obtain the blood.

Outpatient Collection: Outpatients may report to the Outpatient Phlebotomy Room for routine specimen collection between the hours of 0700 to 1630 hours Monday through Friday, excluding weekends and Federal holidays. No STAT or ASAP specimens will be collected here. STAT or ASAP specimens will be collected and transported to the laboratory by the requesting clinic/ward.

Inpatient Specimen Processing: Specimen processing is staffed 24 hours a day, 7 days a week. This service supports the processing of inpatient/outpatient samples that have been collected by the ward/clinic personnel and delivered to the laboratory.

Shipping

- The laboratory contracts and ships specimens to a variety of military and commercial laboratory services for contingency and specialized tests not performed in-house. Turn-around times for results may vary, but will generally range from 7 to 10 days. Normal hours

of operation are 0630 to 1600 hours Monday through Friday, excluding weekends and Federal holidays.

- For same day shipping or specimen shipping after normal duty hours contact the laboratory.

Reference Laboratory Information

- The laboratory is obligated to utilize military reference laboratories for testing not performed at USA MEDDAC. When a military laboratory does not provide the required testing, or the turn-around time for receiving results is unacceptable, commercial reference labs will be used. Clinicians must submit all testing through the laboratory. Any arrangements made with commercial laboratories without the knowledge or approval of the Department of Pathology constitutes an unauthorized obligation for the government and the requesting physician will be held financially and administratively accountable. A list of reference laboratories utilized by USA MEDDAC is at Appendix B. The Chief, Department of Pathology reviews these laboratories annually with the medical staff to ensure any concerns or needs are addressed. The CAP, TJC, AABB or FDA accredits all reference laboratories utilized.

- Required Sample Volume: Certain laboratories require one tube of blood per test requested. If there are concerns about the amount of blood that will be collected from a patient, contact the laboratory to determine if certain tests can be combined or a smaller aliquot of sample can be submitted.

- HIV Specimens: All specimens being tested for HIV-1 and HIV-2 Antibody are sent to CDD the Women's Health Lab, San Antonio, TX as part of an Army-wide contract. Results from testing are available within 3 to 5 days if negative and two to three weeks if positive and they are entered into CHCS by our shipping tech.

Point of Care Testing

- Point of Care Testing (POCT) is utilized at USA MEDDAC to enhance patient care by providing limited laboratory testing capability at the patient bedside or in the clinic. POCT is under the control of the DCCS and is administered by the Department of Pathology. The Joint Commission (TJC) and the College of American Pathologists (CAP) inspect and accredit the program. Strict Federal and DOD regulations and TJC and CAP accreditation standards must be met for a clinic or ward to maintain POCT privileges. The program at USA MEDDAC is administered under MEDDAC Regulation 40-31-2. All users of the program, to include care line, clinic chiefs, head nurses, NCOICs, OICs and administrators are required to read and be familiar with the contents of this regulation. You may contact the Laboratory POCT coordinator at 526-6225 or **EACHPointofCare@amedd.army.mil**.

Paternity Testing: The Army does not perform or reimburse payment for paternity testing. If requested the laboratory will only draw the blood for a paternity test and then release the sample back to the patient. The laboratory will not collect any other samples for paternity testing (i.e., buccal swabs).

Legal Blood Alcohol Testing (LBAT): Legal Blood Alcohol testing will be performed by the Colorado State Department of Health Laboratory. Our laboratory will collect blood specimens for legal blood alcohol testing (LBAT) and then ship them to the State Laboratory for testing. This service is only offered during normal duty hours. After hours the Emergency Department will collect the specimens and initiate the chain of custody. The only authorized personnel that can request the test are the attending physician, the military police, a military magistrate or the individual's commander. A memorandum from the commander is required for an LBAT. Results are turned over to the Patient Administration Division (PAD) Correspondence Section for release to the requesting authority.

Legal Drug Testing

- The laboratory **does not** perform legal urine or blood drug testing. This testing is performed by the Army Substance Abuse Program (ASAP) as outlined in AR 600-85. Commanders and NCOs seeking this testing from the laboratory will be referred to the Fort Carson ASAP Coordinator and/or their Unit Prevention Leader (UPL).

- Commanders and unit providers are strongly discouraged from utilizing the medical blood alcohol test or the medical drugs of abuse screen as a basis for probable cause. This misuses hospital resources allocated for patient care. If there is a strong suspicion of drug or alcohol use, initiate the legal collection and testing procedure.

Reporting of Laboratory Results

- Laboratory Test Results: All laboratory results are recorded in the patient's electronic record in CHCS. The CHCS electronic patient file is considered the official file and the HCP should use CHCS to review patient results.

- All laboratory test results are reported back via CHCS. Only critical values will be telephonically reported back to the requesting provider. Appendix C lists critical values that were established after consultation with the medical staff.

Critical Values

- Critical Values and Reporting: Critical Values are immediately reported telephonically directly to the requesting HCP. In the event the requesting HCP is not available, the results will be reported to the Charge Nurse or the Provider's RN. For ER Providers, if not available, it is permissible to notify another ER Provider, the Charge Nurse or the Provider's RN. If the requesting HCP is a Primary Provider and is not available the Hospitalist on call will be notified. A "read-back" will be performed by the individual receiving the results, to confirm that the critical test value was correctly communicated. The notification information will be recorded in CHCS by the laboratory staff member and will include, at minimum, the date, time to whom the critical value was given, and that the results were verified by read back.

- Reporting Results to Outside Providers: Lab results will only be reported to the requesting provider. Results will be electronically faxed using the RightFax software. If the electronic results do not reach the provider than a manual fax will be attempted. Results will only be faxed to the fax number recorded in CHCS for that specific lab request. Anyone other than the original requesting HCP requesting lab results must contact PAD Correspondence at (719)526-7322/7284 or submit their fax request to (719)503-7007.

SECTION III – REQUESTING LABORATORY TESTS

Requesting Laboratory Tests

- All Fort Carson providers will utilize CHCS or AHLTA to enter lab test requests except in the event of CHCS failure. CHCS is a shared system with EACH, Air Force Academy, Peterson Air Force Base and Buckley Air National Guard Base. Certain tests and panels are unique to each facility. Order tests that are either annotated with EACH or do not have a specific laboratory designated. Do not order tests annotated with a different laboratory, i.e. AFA, Pet or Buckley. If you encounter problems with ordering through CHCS please contact the laboratory. Refer to Section III, page 10, "Continuity of Operations" for information on how Pathology will function when CHCS is down.

- Printed copies of Essentris orders **will not be accepted** unless CHCS is not functioning.

- Handwritten lab request slips are accepted from civilian network healthcare providers ONLY. These providers may also fax test requests to (719) 526-3772. The request slip MUST be legible and contain the following information: Patient's full name, sponsor's SSN, date of birth, full name of provider/signature, phone/fax number and requested test(s).

Special Requests: These are lab orders or collections for VIPs, namely O-6 and above, Command Sergeants Major or other dignitaries as identified by higher command. The escort or provider assigned to the VIP will contact the Laboratory Manager or NCOIC to arrange the visit.

Special Laboratory Tests

- The following tests must be scheduled through the laboratory prior to collection:
  - Glucose Tolerance Tests 3 hrs. GTT
  - Semen Analysis
  - Lactose Tolerance Tests
  - D-Xylose Tolerance Tests
  - Chromosome Analysis
  - Amniotic Fluid for LS/PG

- 1 Hour Glucose Tolerance test is performed Monday through Friday from 0700 to 1515 hours, excluding Federal holidays. No appointment is required.

Order Comments: CHCS allows brief comments (about 80 characters) to be entered in the "ORDER COMMENTS:" section of CHCS during order entry. Providers are encouraged to use this option to provide the laboratory with any important information (e.g. known cancer patient). If the order comment area does not provide sufficient room for necessary information the provider should call the laboratory.

CHCS Order Sets: Providers who routinely order tests in addition to the panel tests are encouraged to develop a CHCS Order Set. Any provider unfamiliar with developing order

sets can contact CHCS or the Laboratory IT Person (526-7895) to learn how to perform this function.

Order Expiration Date: UNACKNOWLEDGED CHCS ORDERS: Test orders must be less than 6 months old. When a patient presents at the Front Desk of the laboratory, only those tests with orders placed within the last 6 months will be accessioned. Orders exceeding 6 months will not be accessioned.

Verbal Orders: As stated previously, CHCS and AHLTA are the only means of obtaining orders for laboratory testing from EACH providers. Verbal orders are not authorized for EACH providers, other MTF providers, or civilian network providers.

Testing Priorities: There are three categories of laboratory testing priorities: Routine, ASAP, and STAT. All requests will be assumed to be routine unless specifically ordered as STAT or ASAP. All laboratory testing is handled in as expeditious manner as possible.

- **Routine**: Most routine tests are tested as soon as the specimen is received. Turn-around time for a routine test request is 24 hours or less, excluding specimens that are "batch tested" to reduce costs and improve efficiency (i.e. Parathyroid Hormone and Sickle Screens).

- **ASAP** (As Soon As Possible): This category is to be utilized for lab requests that are not emergencies, but require results to be received as quickly as possible. The turn-around time for an ASAP procedure is two hours. Results will be certified in CHCS and be available to the clinician within two hours of specimen receipt. All critical values will be called directly to the provider with read back verification. Multiple ASAP requests will be performed in the order received.

- **STAT**: STAT requests are for true emergencies that involve loss of life, limb or eyesight. The turn-around time for a STAT procedure is one hour or less from specimen receipt. Results will be certified in CHCS and available to the requesting clinician. All critical values will be called directly to the provider with read back verification. When multiple STAT requests are received testing is performed in the order specimens are received (unless a call for immediate priority is received from the unit nurse or clinician). THIS TESTING PRIORITY IS RESTRICTED TO TRUE EMERGENCIES. ABUSE OF THIS PRIORITY WILL BE REPORTED TO THE CHIEF, DEPARTMENT OF PATHOLOGY.

- Approved STAT and ASAP lab test(s): STAT and ASAP requests are for emergencies or urgent situations. Appendix D provides a list of available STAT and ASAP procedures offered by the laboratory. Other tests not listed will only be performed STAT with the pathologist's or lab officer's approval. The outpatient phlebotomy room will NOT collect specimens that are ordered STAT or ASAP; this is the ward or clinic's responsibility. Tests ordered STAT, which are not performed as emergency procedures will be handled as either routine or ASAP.

Continuity of Operations Plan: When CHCS fails the following procedure will be followed by the laboratory and all services that submit specimens:

- All specimens must be accompanied with an approved request lab slip/form. All forms must include: Patient's full name, sponsor's complete SSN with Family Member prefix, date of birth, ward/clinic, full name of provider and requested test(s).

- Lab Orders: All lab orders will be requested on either one of the following forms or on a handwritten/stamped clinic form. All forms must be legible and filled out completely to ensure timely and accurate specimen processing and testing:

- These forms are obtained through the Publications Office; the Laboratory does not provide these forms.

FC MEDDAC Form 119 - Lab Requisition
SF 557 - Miscellaneous
SF 549 - Hematology
SF 550 - Urinalysis
SF 553 - Microbiology I
SF 554 - Microbiology II
SF 551 - Serology
SF 552 - Parasitology
SF 518 -Blood or Blood Component Transfusion
SF 546 - Chemistry I
SF 547 - Chemistry II
SF 548 - Chemistry III
SF 515 - Clinical Record – Tissue Examination
SF 541 - Clinical Record – Cytology Examination

An Essentris Laboratory Requisition Print Out may also be used for ordering tests **only when CHCS is not functioning**.

- **Clinical Pathology** will perform test(s) on specimens and telephonically report all critical values to the responsible provider and will document notification and result read back. Laboratory personnel will fax a copy of all STAT and ASAP results to the ward or clinic. The laboratory will enter the orders and results into CHCS once it is again operational. The provider will not need to enter a CHCS order if they have already submitted a written order. If CHCS is down for more than 24 hours routine results will be sent to the providers.

- **Anatomic Pathology** If CHCS is not working, hold specimens until system is operational and then place order and submit specimen. If CHCS is down for more than 24 hours, contact the Supervisor of Anatomic Pathology (526-7306).

SECTION IV - SPECIMEN LABELING, COLLECTION AND REJECTION CRITERIA

Specimen Labeling Criteria

- All primary specimen containers (i.e. blood tubes, urine cups, culturettes) will be labeled in front of the patient after patient identification procedures have been done.
- At minimum, all labels will include
  - the patient's full name
  - DOB
  - date/time of collection
  - the initials of the person who collected the specimen.
- Anatomic pathology, microbiology and blood bank specimens for pre-transfusion testing have additional requirements that are described in the appropriate section of this pamphlet.
- UNLABELED OR MISLABELED SPECIMENS WILL NOT BE ACCEPTED.

Specimen Primary Container: Container will be a leak-proof container with a secure closure. Care must be taken by the person collecting the specimen not to contaminate the outside of this container. Before being transported to the laboratory, the primary container must be placed into a secondary container that will contain the specimen if the primary container breaks or leaks in transit to the laboratory. Plastic bags labeled with the biohazard symbol and wording are available from Logistics. Larger biohazard bags or plastic containers with a sealed lid and a biohazard label are suitable for transporting larger items. The laboratory will dispose of any specimens that arrive broken, leaking or otherwise contaminated via regulated medical waste (RMW). The requesting clinic or ward will be notified to recollect the specimen. Gloves will NOT be worn when transporting specimens in a secondary container to the laboratory.

Inpatient Specimen Collection: Any STAT or ASAP requests must be collected by ward staff and delivered to the laboratory. It is very important that any specimen collected by ward/clinic personnel be delivered to the lab as soon as possible. Time should not exceed 30 minutes as delays may cause erroneous results. If delays are expected, contact the lab for proper storage requirements. For specific instructions on sample collection requirements consult the appropriate section of this guide or refer to the LAB Test Information (LTI) in CHCS.

Outpatient Specimen Collection: Persons requiring collection of laboratory specimens will present to the Outpatient Phlebotomy Room during normal duty hours. All personnel except patients under the age of 10 are required to present a valid military identification card to receive service. The parent or guardian of patients under 10 must present with a valid I.D. card. CHCS will be checked for existing orders, or the patient may present a lab request slip from their provider. Patients who have neither a valid CHCS order nor a written order will be referred back to their provider after the lab has made every attempt to assist the patient. Lab orders older than 6 months are considered expired. The provider must then enter new lab orders before patient reports to the lab.

Blood Collection: Blood specimens will be collected in a manner that ensures proper testing and reduces the possibility of cross contamination and erroneous results. Depending on the method of blood collection, blood tubes are filled in a specific order.

- Order of draw - Specimens collected using evacuated tubes with a tube holder, such as the Vacutainer® system, will be filled in the following order:

  - Blood Cultures – SPS
  - Light Blue (Sodium Citrate)
  - Plain Red Top (Glass or Plastic)
  - Marbled red/SST/red & yellow
  - Green (Sodium or Lithium Heparin)
  - Green BD Vacutainer PST Gel Separator Tube With Heparin
  - Lavender (EDTA)
  - Gray (Sodium Fluoride)

- Order of transfer - Specimens collected in a syringe will be transferred into blood tubes in the following order:

  - Blood Cultures
  - Light blue (Sodium Citrate)
  - Green (Sodium or Lithium Heparin)
  - Lavender (EDTA)
  - Gray (Sodium Fluoride)
  - Marbled red/SST/red & yellow
  - Plain Red Top

Blood Volume: As part of a CAP accreditation standard, efforts have been made to minimize the volume of blood collected from patients. The CHCS system is set up to combine all possible tests under one accession number. For example, a request for CBC, Sickle Cell Screen, and an ESR will be combined under one accession number so only one specimen is collected to perform these tests. Certain reference laboratories require one specimen per test (e.g., HIV specimens). In these cases it is impossible to minimize the amount of blood collected. If there are concerns about blood loss to a patient during specimen collection, contact the laboratory for guidance at (719)526-7791.

Patient Collected Specimens: Patients with special sample collection requirements will report to the laboratory during normal hours for instructions and/or containers. This includes 24-hour urine, semen and fecal samples.

Microbiology Specimens: The ward/clinic personnel or the requesting clinician will collect all microbiology specimens. Specimens must be submitted to the laboratory immediately after collection to prevent loss of pathogenic organisms or overgrowth by contaminating organisms.

Cytology Specimen: Fluids such as pleural, peritoneal, CSF, urine and breast biopsies must be submitted ASAP. See the Cytology portion of this manual for specific information.

General Rejection Criteria: CAP mandates that every clinical laboratory establishes written criteria for specimen rejection. Specimens will not be accepted by the laboratory under the following conditions:

- Incomplete or missed labeled specimens: ALL specimens must contain the Patient's full name, date of birth, date/time of collection and initials of persons collecting specimen or timed sequence of collection where applicable.
- Improper specimen container and/or specimen preservative.
- Insufficient quantity.
- Clotted blood or insufficient blood volume for Complete Blood Count (CBC).
- Improperly filled anticoagulated tubes.
- Specimens without requisitions or CHCS orders.
- Specimen(s) with incorrect form or identification.
- Leaking specimens or containers.
- Contaminated specimen or lab slip.
- Incomplete timed specimens, such as 24-hour urines only partially collected.
- Mislabeled specimens.

No Electronic CHCS Order or Request Form: Frequently the laboratory receives specimens without a request form or an electronic order in CHCS. The laboratory will make every reasonable effort to maintain the testing integrity of the specimen (e.g. centrifuge, refrigerate, etc.) and to contact the submitting provider or clinic. Irretrievable specimens, such as culturettes from wounds or anaerobic sources, CSF and blood cultures will be processed to the fullest extent possible (e.g. plating, processing CSF). Retrievable specimens are defined as routine blood specimens, throat cultures and urine (random and 24-hour) and will be discarded. Documentation of all attempts to resolve these issues will be made into CHCS or in a ledger maintained for this purpose.

Notification for Unacceptable Samples: The following protocol will be utilized for notification when samples are considered unacceptable:

- Irretrievable specimens (e.g. tissue, CSF, etc.) will be processed, if possible, and the appropriate clinic notified of specimen condition and the lack of orders.
- Samples with improper forms, contaminated containers or incomplete information will not be accepted. Ward or clinic personnel will be notified to pick up these specimens and resubmit them properly.
- For lipemic, clotted or hemolyzed blood samples the laboratory will notify the clinician or ward/clinic. If the patient is an inpatient, it is the ward's responsibility to recollect. If the patient had blood collected as an outpatient, the laboratory will contact the patient for recollection.
- Sub-optimal microbiology cultures that are irreplaceable will be held for 48 hours before discarding. The clinician will be contacted as soon as possible after receipt. If the clinician requests, these specimens will be cultured and processed.

- Specimens received without orders or information on who requested lab testing: these specimens will be held for the viable period of testing. For urine specimens and anticoagulated tubes this is 24 hours; serum specimens will be held for 7 days.

Microbiology Specimen Rejection Criteria

- All unlabelled specimens.
- Any specimen collected in an improper container.
- Specimens which have been contaminated.
- Sputum specimens that are determined to be primarily of salivary origin.
- Stools specimens not submitted in proper collection vial for test requested.
- Specimens for culture that do not identify the source of inoculums.
- Anaerobic cultures cannot be performed on the following specimens: gastric washings, sputum, throat, nasal, urine (except suprapubic), feces, ileostomy colostomy swabs, superficial skin, environment cultures, and vaginal/cervical swabs.
- Specimens such as urine or sputum in unsterile containers.
- Specimens that have leaked inside the bag.
- Unpreserved stool specimens for culture >2 hours old.

Cytology Specimen Rejection Criteria

- Unpreserved stool specimens for culture >2 hours old.
- Specimens such as urine or sputum in unsterile containers.
- Any fluid submitted without an order in CHCS, a FC MEDDAC 119, or SF 541.
- Any unlabeled/mislabeled specimen.

SECTION V – BLOOD BANK

General Information: The Department of Pathology Blood Bank is accredited by the American Association of Blood Banks (AABB) and the College of American Pathologists (CAP) and is registered as a licensed facility with the Food and Drug Administration (FDA). The Blood Bank follows the policies and standards of these agencies as well as guidelines established by the Armed Services Blood Program Office (ASBPO).

Regulations: MEDDAC Regulation 40-31-5, Blood and Blood Components cover all aspects of transfusion medicine. All personnel involved in the requesting, specimen collection, pick-up of blood products or transfusion of blood are required to be familiar with this document. This pamphlet provides only the basic information required for submitting samples for testing.

Allogeneic Blood Requests: Requests for blood products will be submitted in accordance with MEDDAC Regulation 40-31-5. Blood products available at EACH are listed below.

Required Paperwork for Transfusion Request (Type and Screen or Type and Crossmatch)

- A minimum of two SF 518s for each T&S ordered. Submit one SF 518 for each product ordered for Crossmatch (i.e. submit four SF 518s if requesting four units of Packed Red Blood Cells (PRBCs) to be Crossmatched).

- One copy of the MCXE Form Lab 40-24a (2) Nov 99, Blood/Blood Component Transfusion Release (justification for transfusion form) must be presented when picking up the first in a series of transfusions. (**exception: this form is NOT needed at the time of blood issue in situations of Emergency Release or Massive Transfusion Protocol**)

- One copy of the DA Form 4700, Informed Consent for Anesthesia, Operations, Procedures, or Treatments, must be presented when picking up the first in a series of transfusions. (**exception: this form is NOT needed at the time of blood issue in situations of Emergency Release or Massive Transfusion Protocol**)

Typenex Identification System: Specimens submitted for T&S or T&C will be labeled using the Typenex identification system as described in the regulation before submission to the laboratory. Typenex bands are available through Logistics; the lab does not provide this product. Proper use of this product is described in MEDDAC Regulation 40-31-5.

Autologous Blood Requests: USA MEDDAC has contracted out all autologous blood collections. Should a patient require this procedure, the physician or nurse must contact the Blood Bank to obtain the necessary documentation. Within 72 hours of anticipated surgery or transfusion, a pretransfusion specimen and paperwork (SF 518) must be submitted to make any autologous blood available for surgery/transfusion.

Type and Screen versus Type and Crossmatch

- Type and Screen is a procedure where the Blood Bank determines the ABO/Rh of a patient and performs a screening test to determine the presence of any “irregular” or unexpected red

cell antibodies. No blood products are set up for transfusion unless antibodies are found during the screen. In this case, the screen is automatically converted to a crossmatch. The unexpected antibody will be identified and units will be screened to find antigen negative blood. Antigen negative blood will then be crossmatched. If no antigen negative units are found in our inventory, antigen negative units will be ordered from other hospitals. Type and Screen samples are good for 72 hours (exceptions can be made for the length of time a sample is viable for some pre-operative patients).

- Type and Crossmatch starts with the same testing as in a Type and Screen (ABO/Rh and antibody screen) but then has more specific testing performed. Blood products of compatible ABO and Rh are tested against the patient's plasma to determine compatibility. Test results are valid for 72 hours after time of specimen collection. After 72 hours, a new specimen must be collected and submitted for testing (exceptions can be made for the length of time a sample is viable for some pre-operative patients).

- Due to the limited amount of blood stored at USA MEDDAC, especially O Negative, care must be taken by clinicians not to unnecessarily obligate blood to a specific patient. Clinicians are encouraged to start with a Type and Screen rather than a Type and Crossmatch if transfusion is not yet a certainty; clinicians are also encouraged to follow the Maximum Surgical Blood Order Schedule (MSBOS) in MEDDAC Regulation 40-31-5 (appendix 10).

Requests for Type and Screen or Type and Cross

- **Routine** requests should be received in the laboratory NLT 1200 for scheduled surgical patients, the day before the surgery. Patients being processed in Pre-admissions or Same Day Surgery may have their pre-surgical Typenex T&S or T&C specimens drawn up to eight days before surgery. The patient must NOT have a history of transfusion or pregnancy within the preceding 90 days to be eligible to qualify under this policy. Pre-Admissions or Same Day Surgery staff must complete and the patient must sign a "Patient History – Blood Transfusion or Pregnancy" form at the time the Typenex T&S or T&C specimen is being drawn. The completed form <u>must</u> be submitted to Blood Bank at the time of specimen and the SF 518s submission for it to be recognized and properly processed as an extended pre-surgical specimen. If the patient has been transfused or pregnant within the preceding 90 days the pre-surgical T&S or T&C must be drawn within 72 hours of the scheduled surgery. Typenex bands will be placed on the patient at the time of specimen collection, and specimens and associated paperwork will be promptly brought to the laboratory for testing.

- **ASAP Requests**: Standard crossmatch procedures are utilized; however, priority is given over routine requests. Normally the blood is available within 60 minutes if the patient has no irregular antibodies.

- **STAT Requests**: The appropriate screen or full crossmatch procedure will be started immediately upon receipt of the specimen. Crossmatches will be completed in approximately 30 minutes (providing the patient has no irregular antibodies).

- **Emergency Release:** The requesting physician or designee will sign an emergency release form to obtain release of uncrossmatched blood. A full crossmatch procedure will be started

immediately upon receipt of the pre-transfusion blood sample. NOTE: A sample of blood MUST be obtained from the patient BEFORE any transfusions are started.

-

- **Massive Transfusion Protocol:** If a patient is hemorrhaging and is anticipated to use large quantities of blood products, a physician has the option of initiating a Massive Transfusion Protocol. Once the lab has been notified that a Massive Transfusion Protocol has been initiated, the lab will automatically take steps to prepare blood products as rapidly as possible. Specifically, 4 units of packed red cells will be crossmatched (or Emergency Released if warranted), 4 units of Fresh Frozen Plasma will be thawed, and two units of Apheresis platelets will be ordered from a local hospital.

Available Blood Component Products: Blood products are obtained via a memorandum of agreement with Belle Bonfils Memorial Blood Center and through a military resource sharing program.

(1) Packed Red Cells (PRBC): An average of 22 units is maintained, six of which are O Negative**.**

(2) Leukocyte Reduced Packed Red Cells (LRPRBC): An average of 22 units are maintained, six of which are O Negative.

(3) Fresh Frozen Plasma: An average of 12 units is maintained at Fort Carson USA MEDDAC.

(4) Platelets: No platelets are maintained at Fort Carson USA MEDDAC. The nearest source is Memorial or Penrose Hospital in downtown Colorado Springs. If a patient is expected to need platelets, contact the Blood Bank as soon as possible so that calls can be made to locate products and coordinate delivery.

(5) Cryoprecipitate: Usually two pools are available (each pool is equivalent to five random donor units).

(6) Rh Immune Globulin (RhoGam): Maintained at the Blood Bank, see page 19 for more information.

Procedure for Issuing Blood

- Only an adequately trained individual should be sent to pick up blood products that are ready for issue. A DD 1289, DOD Prescription, stamped or legibly written with the patient's name, FMP/Sponsor SSN is required to pick up blood. An acceptable alternative to a DD 1289 is a printout of the physician's Essentris order to transfuse the patient.

- Generally only one unit of blood will be issued at a time for any given patient. Exceptions to this policy will be dealt with on a case-by-case basis (e.g. Emergency release or blood in a cooler for the Operating Room).

- Crossmatched blood will be reserved in the Blood Bank for only 72 hours after the time of specimen collection unless the crossmatches were done on a pre-surgical patient.

- Notify the Blood Bank 30 to 45 minutes prior to anticipated need to infuse fresh frozen plasma (FFP) or cryoprecipitate (cryo). This time is required to completely thaw FFP and/or cryo units according to established guidelines. Note: After thawing, FFP is only good for 24 hours and cryo 4 hours; these products must be discarded if not used within these timeframes.

- Any unused units of blood must be returned to the laboratory within 30 minutes of issue (except for units issued in coolers to the OR). Units returned after this time period must be destroyed.

Transfusion Process

- Patient will be asked to state his or her full name and Date of Birth (DOB) (if patient is capable). Compare this information to hospital wristband and the Typenex wristband. Never use bed or room labels as a source of a patient's name.

- Start transfusion within 30 minutes of issue and transfuse blood IAW Nursing SOP.

- Blood must be completely transfused into a patient within 4 hours of issue (an FDA regulation). If a patient has a medical condition that precludes the receipt of a full unit of PRBC (approximately 350 ml) in 4 hours (e.g. avoiding cardiac overload in a CHF patient) stop the infusion at four hours, return the incomplete unit, request that a second unit be crossmatched and then pick up that second unit to infuse the remaining required dosage of PRBCs.

- After transfusion is complete, the empty bag and a completed copy of the SF 518 must be returned to the laboratory. The original "Medical Record" copy will be posted in the patient chart.

Autologous Transfusions

- An autologous transfusion is the process where a patient is transfused with his or her own blood that has been previously donated. This procedure has the benefit of avoiding some of the hazards of allogeneic transfusion, and is especially useful in patients with high-incidence antigens or with combinations of antibodies for which compatible blood is difficult to locate.

- Each autologous unit must have an SF 518, Transfusion Request, accompanying the unit from the Blood Bank to the ward or operating room.

- If autologous blood is not used, it will be discarded and autoclaved. No autologous blood is ever released into the allogeneic inventory.

Return of Unused Blood Products from Wards: Blood that has been returned to the blood bank shall not be made available for reissue unless the following conditions have been met:

(1) The unit of blood has not been out of the Blood Bank for more than 30 minutes.

(2) The temperature of the blood has not exceeded 10°C.
(3) The unit of blood has not been penetrated or entered in any way.
(4) The integral pilot segments are still attached to the unit.

Return of Unused Blood Products that were issued in a cooler to OR: Blood that has been returned to the Blood Bank from the OR in Blood Bank's Igloo coolers shall not be made available for reissue unless the following conditions have been met:

(1) The HemoTemp label on the unit indicates that the unit has been maintained at 1° to 6° C.
(2) The unit of blood has not been penetrated or entered in any way.
(3) The integral pilot segments are still attached to the unit**.**

RhoGam (RhIG) Administration: RhoGam is used to prevent the sensitization of Rho (D) negative individuals (particularly women of childbearing age) to the Rho (D) antigen. In order to be a candidate for passive immunization to these factors, the patient must meet the following criteria:

(1) The patient must be Rho (D) negative.
(2) The patient must lack circulating active immunization anti-Rho (D).
(3) The infant (if postpartum exposure) must be Rho (D) positive.

- To be most effective RhoGam should be administered within the first 72 hours following delivery, miscarriage, or placental challenges.

- Misc RhIG (miscarriage, ectopic pregnancy, abortion, bleeding episodes, placental challenges, etc). When the health care provider places the order in CHCS for RhIG, an appropriate comment should be included that explains the patient's situation such as "Bleeding at 8 weeks" or "Threatened abortion at 14 weeks". It is important that Blood Bank staff be made aware of the patient's gestational age so that additional testing, if indicated, can be performed. Misc RhIG may be ordered as ROUT or ASAP in CHCS. If a situation warrants a STAT (1 hour or less) workup, the provider should place the order as ASAP in CHCS but notify Blood Bank staff telephonically that the order is really STAT and explain the situation.

- Antepartum RhIG (usually ordered at 28 weeks gestation). When the health care provider places the order in CHCS for RhIG, a comment of "28 week OB" should be included. RhIG orders are ordered as ROUT in CHCS. If the patient has a computer history at EVANS of being Rh negative, Blood Bank personnel will begin setting up the RhIG as soon as notification is received that the patient is waiting; in this case, the RhIG is usually available in about 15 minutes. In any case, a specimen MUST be drawn from the patient before administering the RhIG even if testing is not performed immediately on that specimen. If the patient does <u>not</u> have a history of having been tested previously at EVANS, RhIG will not be issued until testing has been completed on a newly drawn specimen; in this case, the RhIG is usually available in about 45 minutes.

- Postpartum RhIG. The order is placed in CHCS as ROUT. The Blood Bank normally processes these requests in less than 4 hours.

Transfusion Reaction: If a transfusion reaction is encountered or suspected, the following steps must be performed:

(1) Discontinue the transfusion immediately.
(2) Keep the patient's IV line open with saline or other fluids.
(3) Notify the attending physician.
(4) Follow the nursing protocol for transfusion reactions.
(5) Collect appropriate samples immediately. EDTA-purple top tube and a urine specimen.
(6) Return remaining blood and attached transfusion set to the Blood Bank for testing.

SECTION VI – CHEMISTRY

Specimen Collection Instructions

- Fasting blood specimens: Patients will have nothing to eat or drink (**except water**) for 10 to 12 hours prior to reporting to the laboratory for specimen collection. Fasting patients should report to the outpatient phlebotomy/laboratory no earlier than 0730 on normal duty days.

- 24 Hour Urines: Testing of 24-hour urines is performed by the Chemistry Section or at a reference lab. Contact the lab for specific instructions for collection. The following are general instructions for collection of a 24 hour urine:

  - Patients will report to the lab for the collection container and detailed instructions.
  - Upon awakening the patient will void and discard their urine as normal and note the exact time.
  - All urine voided during the next 24 hours will be collected into the provided container.
  - Ensure that upon rising the next morning urine is collected into the provided container.
  - Patient will keep the urine refrigerated or in a cooler during the collection period.
  - Patient will return the specimen to the laboratory upon completion for testing.

- Special Collections: 24-hour urine collected for VMA, calcium, hydroxyproline, metanephrine and oxalate testing have special requirements. Patients must not consume bananas, nuts, coffee, chocolate, tea and carbonated beverages three days prior to and during the 24-hour urine collection period.

NOTE: Certain drugs may interfere with 24-hour urine tests. Patients should be questioned concerning drug and vitamin intake (both prescribed and home remedies). Whenever practical, the patient should be drug-free prior to collection. Annotate any drugs patients are taking during the 24-hour urine collection period on the test request slip or in ordering comments in CHCS.

Therapeutic Drug Monitoring: Knowing when to collect the sample for serum drug level monitoring is critical. Refer to the chart in Appendix E for information on when to collect specimens. Any questions should be directed to the requesting physician or a pharmacist.

Chemistry Profiles: The laboratory prefers that health care providers use the various panels offered to aid or confirm diagnosis. If additional tests are required, they must be ordered separately.

Panel Availability: The laboratory provides five chemistry panels as established by the AMA. These are the only chemistry panels that Health Care and Finance Administration (HCFA) states have medical necessity. With all other testing providers must prove medical necessity by linking the requested tests to an ICD9 code. These panels are listed at Appendix F.

SECTION VII – HEMATOLOGY & COAGULATION

Specimen Collection Instructions: Collection of blood through intravenous lines that have been previously flushed with heparin should be avoided, if possible. If the blood must be drawn through an indwelling catheter, possible heparin contamination and specimen dilution should be considered. When obtaining specimens from indwelling lines that may contain heparin, the line should be flushed with 5.0 ml saline and the first 5 ml of blood or 6-times the line volume (dead space volume of the catheter) be drawn off and discarded. For those samples collected from a normal saline lock (capped off venous port), twice the dead space volume of the catheter and extension set should be discarded.

Anticoagulants

- EDTA: The anticoagulant of choice for hematology studies is EDTA. The lavender/purple topped vacuum blood tube contains this anticoagulant. The tube must be at least 50% filled with blood. Anything less than this volume will affect the accuracy of testing and will be rejected (due to inappropriate anticoagulant to blood ratio). Providers who utilize the 'bullet' tubes are reminded that these tubes have a tendency to clot very quickly if the tube is not thoroughly mixed immediately upon collection.

- Sodium Citrate: The blue topped vacuum blood tube contains sodium citrate and is to be used for coagulation studies. This includes ship-out tests for factor studies. This type of tube must have at least 90% of the expected fill and not more than 100%. Any other volumes will invalidate test results due to inappropriate anticoagulant to blood ratio.

- Small Volumes: Pediatric tubes are available through logistics for both hematology and coagulation testing. Heel/finger stick 'bullet' collection tubes are available through logistics.

Routine Urinalysis: Routine urinalysis should be performed on a fresh specimen. Specimens that are more than one hour old will usually show signs of deterioration and will be unreliable for testing. Specimens collected from inpatient units will be delivered immediately to the laboratory. Samples can be refrigerated and should be delivered within three hours. Routine urinalysis will consist of the following tests and examinations:

- Color	Blood	Protein
- Appearance	Bilirubin	Nitrite
- Specific gravity	Ketone	Leukocyte esterase
- Urobilinogen	Glucose	

- Microscopic examination (if indicated by positive test results, appearance or clinician request).

SECTION VIII – MICROBIOLOGY & IMMUNOLOGY

Specimen Collection Instructions

- All microbiology specimens will be collected by ward staff, clinic personnel or by the requesting clinician. Blood cultures may be collected in outpatient phlebotomy. Submit all specimens to the laboratory immediately after collection to prevent the overgrowth by contaminating organisms.

- Specimens MUST be clearly marked with the patient's full name, complete sponsor SSN with Family Member Prefix (FMP), date of birth and the date/time of collection and the source (e.g. left knee, right foot) and initials of the individual collecting the specimen.

- Specimens MUST be submitted in appropriate sterile containers. The laboratory will provide outpatients with stool collection kits. All other swabs, culturettes and any items required for inpatients or outpatients must be obtained from logistics.

- A patient may report to the laboratory to receive collection kits for stool cultures and ova/parasite examination.

Culture Incubation Time

- Throat cultures will be held 48 hours unless a positive result is obtained before that time. Sputum, wound, cervical and stool cultures will be held for 48 hours.

- Blood cultures will be held for 5 days and monitored continuously for growth.

- Cultures of body fluids such as CSF and tissues will be held for 4 days.

- Anaerobic cultures will be held 5 days.

- Urine cultures will be held for 24 hours.

Antibiotic Sensitivity Studies

- The Department of Pathology utilizes a selective reporting method for antibiotics. The report sent to the provider is appropriate for the site the specimen was collected from and for the results of the gram stain. If MICs of other antibiotics are required, contact the Microbiology department or enter information in the comments of the CHCS order. If the desired sensitivity testing is not available in-house, the organism will be sent to a commercial reference laboratory for study.

- Sensitivity studies are performed routinely on all positive cultures and are normally available within 48 to 72 hours.

Parasitology Specimens: Fecal specimens for Parasitology must be collected in the kit provided by the lab. This kit consists of three vials; one white topped without chemicals or preservatives, one pink topped containing formalin and the other gray topped containing PVA. Specimens are to be collected according to the instructions in the kit. Patients must be informed of the hazards of the liquids in the vials when providing instructions. Specimens may be dropped off at any time by a patient or staff.

Mycology Specimens (Fungus)

- Specimens for vaginal wet prep/KOH examination will be collected by the requesting clinician and submitted to the laboratory placed in approximately 1 ml of saline in a plain red top tube. Skin or hair scrapings for KOH exams should be submitted in a sterile container. The source of the specimen must be noted in CHCS or on the requisition form. Wet preps and KOH preps will be reported out the day they are received.

- Mycology cultures are sent to a commercial reference laboratory for testing. Swabs of exudate will be submitted in a culturette. Other specimens, such as tissue, skin scrapings, and urine will be submitted in appropriate sterile containers. Contact the Shipping Section for further information (526-7305).

- Culture times for fungus vary with the organism. Fungal cultures are held 8 weeks before the final report is sent, although most yeast culture results are available in 3 to 5 days.

Acid Fast Cultures (AFB), Mycobacteria, and Tuberculosis

- Stains and/or cultures for AFB are not performed at Fort Carson USA MEDDAC. All specimens are sent to a commercial reference laboratory. Cultures are held for 8 weeks before the final report is sent. Contact the Shipping Section for further information (525-7305).

- Sputum specimens need to be "Deep Cough" specimens free of saliva. Collect not more than 5 to 10 ml of sputum. For optimal recovery of Mycobacteria a minimum of three single early morning sputum specimens is recommended.

- If a sputum specimen is suspected of containing AFB and the provider is requesting traditional cultures in addition to AFB, the laboratory must be informed of the hazard so special precautions may be taken to process the specimen.

- For inpatients with suspected AFB infection it is possible to send a specimen for staining to a local hospital. Results are usually available within 24 to 48 hours. A Pathologist must approve this request.

- A specimen of gastric or bronchial contents is necessary if a patient is unable to raise a sufficient amount of sputum. The gastric lavage should be performed before the patient gets out of bed and after he or she has fasted for at least 8 hours prior to collection. Deliver these specimens directly to the Shipping Section.

- A minimum of three early morning specimens is recommended for a urine AFB specimen. These must be "clean catch" specimens collected in sterile containers.

- Specimens of CSF, pleural and pericardial fluid, pus, joint fluid, bronchial secretions, resected lung tissue, and autopsy material may be submitted for AFB testing.

Virology Specimens: All specimens for virus isolation will be collected by the ward or clinic personnel and delivered to the lab immediately. Ensure that the proper type of culturette or transport media is utilized. These supplies are obtained from Logistics. Specimens will be sent to a reference laboratory. All specimens submitted for virus studies must include the specimen source.

Blood Cultures: Blood cultures must be collected prior to starting antibiotic therapy. All antibiotic therapy must be noted in CHCS when ordering this testing. If the ward is collecting the specimens, ensure proper collection technique is utilized to minimize the risk of contamination. If unsure of how to properly collect blood cultures, contact the Microbiology section. Blood cultures will be held and examined for 5 days.

CSF and Sterile Body Fluid Cultures: Spinal fluid specimens must be collected under sterile conditions and transported to the laboratory immediately. CSF will be cultured and incubated at 37° C for 72 hours. Gram stains will be made on all specimens. India ink preps are done upon request, not performed here.

Ear and Eye Cultures: Material from the ear and eye should be collected by the clinician in a sterile swab collection system and delivered to the lab without delay. These cultures will be incubated at 37° C for 48 hours. Most positive cultures will be reported in 48 hours.

Mastoid / Sinus Cultures: Material from the mastoid and sinus regions should be submitted in a sterile swab collection system. These cultures will be incubated at 37° C for at least 48 hours.

Sputum Cultures: Sputum for bacterial culture should be submitted in a dry, sterile container and sent immediately to the lab. A gram stain will be performed to determine the suitability of a specimen for culture. Cultures will be incubated at 37° C for at least 48 hours. If a sputum specimen is suspected of containing AFB and the provider is requesting traditional cultures in addition to AFB, the laboratory must be informed of the hazard so special precautions may be taken to process the specimen.

Stool and Rectal Cultures: Stool specimens should be submitted on a culturette or in an orange topped C & S Cary-Blair transport media vial. The Cary-Blair media is available through the lab for outpatients and through logistics for inpatients. DO NOT REFRIGERATE THE VIAL AFTER COLLECTION. Stool and rectal cultures will be incubated at 37° C for at least 48 hours.

Throat Cultures: Specimens are to be submitted on a culturette. Cultures will be incubated at 37° C for 48 hours. A positive report will state, "Beta Hemolytic Streptococci, Group A, Isolated." A negative report will state "Negative for Beta Strep Group A."

Urethral / Vaginal Cultures: Specimens must be submitted on sterile swabs. Cultures will be incubated at 37° C for at least 48 hours.

Urine Cultures: Specimens will be submitted in sterile containers available from logistics. If a specimen cannot be delivered within 30 minutes to the laboratory place the cup in a refrigerator that is not used for staff/patient food or that holds medications for not more than 24 hours. All cultures will be incubated at 37° C for at least 24 hours and sensitivity will be performed as necessary.

Clean Catch Instructions

(1) Wash hands with soap.
(2) Remove lid of container provided but do not touch inside of lid or container.
(3) Remove/open towelettes and cleanse genital area with towelettes.

FEMALE: Separate folds of urinary opening with thumb and forefinger and clean inside with towelettes, wiping front to back only; keep separated during urination into container.

MALE: Clean head of penis

(4) Begin urination into the toilet. As urination continues, place container under urine stream. Fill specimen container only half way.
(5) Carefully place lid back onto container – Do not touch inside of lid.
(6) Tighten lid on container. Bring specimen to front area and place in tub, or if collected on the ward or clinic, please give to nurse.

Wound and Tissue Cultures: Wound cultures will be submitted on a culturette. When collecting, avoid contamination by normal skin flora. Tissues will be submitted in small pieces in a sterile container with sufficient sterile normal saline to cover the tissue. Send immediately to the lab. A gram stain is performed on all tissue specimens. Gram stains on wounds will be performed only if requested. Wound and tissue cultures are incubated at 37° C for 48 – 72 hours. State specific site of culture in CHCS or on requisition.

Anaerobic Cultures: Specimens will be collected in anaerobic transportation tubes and sent immediately to the lab with the collection time noted on the tube. A gram stain will be performed on all anaerobic cultures. Note that the following specimens are NOT acceptable for anaerobic culture: gastric washings, sputum, throat, nasal, urine, feces, ileostomy or colostomy swabs, superficial skin or environmental cultures and vaginal/cervical swabs. Cultures are incubated anaerobically at 37° C for 5 days. Sensitivities for anaerobic organisms are not performed at Fort Carson USA MEDDAC. If susceptibility testing is needed, contact the Microbiology section. These are sent to commercial reference laboratories.

Stains

- Acid Fast Stain: Smears are sent out to reference laboratories. STATs are only available for inpatients and must be approved by a pathologist.

- Gram stain: Specimens will be submitted in sterile containers. Smears should be prepared without preservative. Gram stains on vaginal or stool specimens are discouraged due to the heavy amount of normal flora present.

- Trichrome stain: Send-out stool specimens will be submitted in the proper preservative. Trichrome stain is routinely done on all stools submitted for O&P.

Parasitology

- Occult blood: The Guaiac test is used for detection of occult blood.
- Qualitative fecal fat: Oil Red O stain is used to distinguish fecal fat in stool specimens. Quantitative fat requests are sent to reference laboratories.
- Pinworm prep: Pinworm collection paddles are to be issued by clinic, ward or lab. Obtain this item from Logistics. Results are reported the same day as the specimen is submitted.
- Stool pH: Send-out test.
- Stool reducing substances: Send-out test.
- Ova and Parasite (O&P): Send-out test. Fecal specimens are processed using standard techniques. Samples are examined microscopically and if negative, reported as "No Ova or Parasites Seen."

Chlamydia & Neisseria Gonnorrhoeae: Send-out test.

- The methodology used detects the presence of DNA from Chlamydia trachomatis and Neisseria gonnorrhoeae in cervical, urethral, or urine specimens. This methodology is not to be used for specimens from any other anatomical source.

- Obtain the collection kit from Logistics. Read all instructions before collecting specimens. The thick swab is to be used for cleaning the cervical/vaginal area prior to collection. The wire swab is used to collect the actual sample for both female and male patients. Urine collection kits are available. Add urine to the line indicated. Bring specimens to the laboratory as soon as possible after collection.

- Eye specimens from newborns; obtain specialized collection kit from the Microbiology section. This kit is different from the kit for genital/urine collection.

Semen Analysis

- Semen analysis testing is available as a comprehensive analysis or a post-vasectomy examination.

- Semen analysis is done only through appointment. Patients should contact the Microbiology section to arrange an appointment. Detailed instructions will be given to the patient at this time.

- Post vasectomy samples will be accepted Monday through Friday 0800-1400, no appointment is necessary.

- Patients will collect specimens at home and bring the specimen to the laboratory within 60 minutes of ejaculation for a comprehensive analysis.

- Semen collected in a condom, or that is contaminated with lubricants or other fluids will not be accepted.

Immunology (RPR, ASO, RF, Rubella and Mono): Certain immunology procedures are not run on a daily basis, but will be collected during the normal duty day and held for processing.

SECTION IX – ANATOMIC PATHOLOGY

General Information: The Anatomic Pathology Section consists of Histopathology, Cytology and the Morgue.

Histopathology: The mission of the Histopathology Section is to examine tissue and materials removed from patients and render diagnoses on these tissues. This section is under the direct control of the Chief, Anatomic Pathology and is administered by the Supervisor, Anatomic Pathology. Availability of all services listed in this pamphlet is subject to staffing of pathologists and cytotechnologists and mirrors normal duty hours. Every effort will be made to provide timely services either through in-house resources, reference laboratories, or contracted services. Services are limited during non-duty hours. However a pathologist is always on call.

Requests for Tissue Examination: All tissues submitted for examination must be ordered in CHCS. This must include **clinical histories** and clinical diagnosis. Specimens will be rejected if histories are not present. If CHCS is inoperative, HOLD the specimen until the system is brought back up, then place an order and submit the specimen. If CHCS is inoperative for more than 24 hours, contact the Supervisor, of Anatomic Pathology.

Submission of Surgical Specimens

- All specimens will have proper identification, be placed into an adequate amount (7:1 ratio of fixative to specimen) and appropriate fixative solution (unless for frozen section), and be enclosed in a suitable container. Attention to proper labeling is of critical importance. If these criteria are not met, the specimen will be rejected and returned to the originator.

- Specimens must be delivered to the Laboratory between 1030 and 1530 hours during normal duty hours. The container with the tissue will be labeled legibly with the patient's full name, full SSN of sponsor, name of requesting physician, date of collection, type and source of tissue (e.g. Skin, Left Forearm), and originating ward or clinic.

- Breast specimens, especially for malignancy evaluation), will list time and date the specimen was placed in formalin. Specimens will be submitted in a container large enough to allow a minimum of fixative solution to fully cover the specimen. Every attempt should be made to prevent excessive fixation times for any specimens where extended fixation could hinder additional testing, i.e. breast specimens where a ductal malignancy is favored.

- When several specimens from different sites are removed from one patient, these specimens will be placed in separate, appropriately labeled containers. All specimens will be listed under one CHCS order and labeled "A, B, C" etc. If orientation of a specimen is desired or required, it must be tagged in some manner (e.g. sutures). This tagging and orientation must be described on the order in CHCS.

- Utilize 10% formalin to preserve all routine specimens in a 7:1 ratio. Formalin is obtained from logistics. Tissue must be placed into fixative solution immediately. Refrigeration is

not a substitute for a fixative; refrigeration will dry out specimens, resulting in unacceptable specimens that will not be processed. Saline is not a fixative and its use should be avoided.

Frozen Sections: All frozen sections are scheduled through Anatomic Pathology. If the need arises for an unscheduled frozen section, contact Anatomic Pathology at 526-7306. Indicate the approximate time, type of operation, physician's name, and patient's name. Specimens MUST be fresh (not in formalin) and must be accompanied by a Frozen Section Report Form. Once acquired, the fresh specimen should be immediately transported to the histology section of the laboratory. The pathologist will render their opinion directly to the surgeon via telephone or in person. The frozen section diagnosis will be documented on the final report. For frozen sections occurring after duty hours, the pathologist on call must be notified as soon as possible to prevent a delay in diagnosis.

Requests for Unusual or Non-routine Tissue Analysis: Please call for pathologist approval and coordination to prevent loss of specimen evaluability.

Tissue Chromosome Analysis: Tissue will be collected as soon as possible in as sterile a manner as possible and placed in RPMI preservative (available through the laboratory). Ideally, 1cm sections of thigh skin and muscle or placental tissue should be submitted. **DO NOT PLACE THE TISSUE IN FORMALIN OR SALINE**. The specimen in RPMI will be brought to the Laboratory immediately for shipping to an outside reference facility.

Muscle and Nerve Biopsies

- Prior coordination with the Laboratory, University of Colorado and courier must occur well in advance of surgery.

- Tissue will be collected and placed on a broken tongue depressor with sutures placed to prevent contraction. Do not use clamps, immerse in formalin, saline, or other fluids. Wrap in saline gauze and bring immediately with all required paperwork to the Laboratory for shipping to University of Colorado.

Histopathology Reports: Surgical specimen reports are usually completed within 48 hours of receipt of the specimen; however, based on Pathologist availability, fixation time, processing time and the need for special procedures or stains, some cases may require 72 hours or longer. Contact the Anatomic Pathology supervisor or the responsible pathologist if there is a need to expedite processing. A verbal report may be available sooner if notification is given.

Cytopathology: The mission of the Cytopathology Section is to identify disease processes, especially precancerous and cancerous conditions by observing cells and sub-cellular structures under light microscopy. Availability of all services listed in this pamphlet is subject to staffing of pathologists and cytotechnologists and mirrors normal duty hours. Every effort will be made to provide timely services either through in-house resources, reference laboratories, or contracted services.

Preparing Request for Cytologic Evaluation: Orders for cytology studies must be placed in CHCS and a printed copy of the order must accompany the specimen. The request **must** include the complete clinical history including LMP, medications, previous cytology results, etc - Specimens will be rejected if the history is not present. If CHCS is inoperative, HOLD the specimen until the system is brought back up, then place the order and submit the specimen. If CHCS is inoperative for more than 24 hours, contact the Supervisor, Anatomic Pathology. All fields in CHCS designated for patient history must be completed.

Collection and Preparation of Pap Smears

- Write the patient's full name, date of birth, and sponsor SSN on the ThinPrep vial containing solution. Attention to correct labeling is of utmost importance. Blood must be cleaned from cervix prior to collection of the PAP specimen. If the specimen is contaminated with even a small amount of blood, they are usually unsatisfactory. **DO NOT SUBMIT BLOODY THIN PREP SPECIMENS.**

- Sample the endocervix with the endocervical brush and swirl the brush in the vial to dislodge the captured cellular material. **DO NOT SUBMIT THE BRUSH**.

- Sample the ectocervix with the plastic spatula and swirl the spatula in the vial to dislodge the captured cellular material. **DO NOT SUBMIT THE PLASTIC SPATULA**.

- Seal the vial and submit to Anatomic Pathology.

Collection of Non-Gynecological Specimens

- Body fluid samples (such as pleural fluids, urines, sputum, etc) submitted for cytologic studies during normal duty hours may be collected unfixed ONLY if they are brought to the laboratory immediately. During all other times contact the laboratory for guidance.

- No 24-hour urine samples may be used. Any fresh clean-catch specimen is acceptable; first morning specimens should NOT be used for cytology examination.

- One exception of the general fixation requirement involves large bags of fluid which are drained from a patient after normal duty hours. If cytologic studies are desired, complete the order, store the bag (properly labeled) in the refrigerator overnight, then bring to the Anatomic Pathology Section in the morning.

- Containers of fixative may be obtained from the laboratory for outpatients who are asked to provide a series of urine or sputum samples. Samples may be returned at one time.

Breast Smears and Aspirations

- Patients who have abnormal nipple discharge may be sampled by placing a drop of discharge directly into a ThinPrep® vial. Submit the specimen to the laboratory with a valid CHCS order, to include clinical history.

- Breast cysts may be aspirated by inserting a needle attached to a syringe directly into the cyst and aspirating the fluid. The needle is removed and the labeled syringe is capped and presented immediately to Anatomic Pathology for processing.

- If the aspiration is performed after duty hours, the aspirate contents can be placed in a Thin Prep vial (containing solution). Aspirate contents should not be held in the syringe overnight. A valid CHCS order, including clinical history, must accompany the specimen.

Requests for Fine Needle Aspiration (FNA): FNAs of superficial lumps and inner organs, including thyroid, liver, lung, prostate, solid or suspicious breast lesions, and other lesions and masses are available. Contact the Anatomic Pathology Supervisor at 526-7306 to schedule a procedure. Ideally procedures are scheduled at least a day in advance. A cytotechnologist can respond if contacted at least 30 to 60 minutes before the procedure is to begin.

Miscellaneous: Scraping from surface lesions (skin, oral cavity, eye, etc.) taken for the detection of herpes virus (Tzank Preparations) will be placed onto a glass slide, air dried, and labeled with the patient name and SSN. Immediately deliver the slide to Anatomic Pathology. Alternatively, a provider may collect the scrapings into a ThinPrep® vial.

Prioritizing of Specimens: All non-gynecological specimens will receive first priority in the cytology workload and results will typically be posted in one or two working days. Exceptions can result from the requirement to make cell blocks or perform special staining procedures. Call the Supervisor, Anatomic Pathology at 526-7306 for any special requests or to obtain additional information.

SECTION X – MORGUE OPERATIONS

General Information: The Department of Pathology maintains the Morgue, which has the capability of storing nine human remains. The morgue is attached to an autopsy suite where an autopsy can be performed. **MEDDAC Regulation 40-31-4, Morgue Operations Concerning the Receipt & Release of the Deceased** covers how remains are to be received and released from the morgue. Patient Administration Division and nursing policies discuss preparation of remains for transport. At a minimum SF 523 (Disposition of body), DD Form 565 (Statement of Recognition), and Toe Identification Tags will accompany the remains prior to admission to the morgue.

Autopsy Request: Refer to MEDDAC Regulation 40-31 for specific information on requesting autopsies.

Appendix A
Pathology Contact Information and Telephone Listing

Chief, Pathology	526-7533
Chief, Clinical Pathology	526-8044
Chief, Anatomic Pathology	524-4207
Laboratory Manager	526-8821
Laboratory Officer	526-7304
NCOIC, Pathology	524-4203
QA Coordinator	526-7679
POCT Coordinator	526-6225 / 503-7091
Main Reception/Phlebotomy	526-7791/7900
Specimen Shipping/HIV	526-7053
Specimen Procurement Supervisor	526-7846
Blood Bank	526-7999/7195
Blood Bank Supervisor	526-7999/7196
Chemistry	526-7064
Chemistry Supervisor	526-7678
Hematology/Urinalysis	524-4097/6411
Hematology Supervisor	526-7118
Microbiology	526-7677
Microbiology Supervisor	526-7683
Histology	526-7308/524-6415
Histology Reports	526-7306
AP Transcriptionist	526-7306
AP Supervisor	526-7309
Morgue	524-6417

Appendix B
Reference Laboratories Utilized by USA MEDDAC

1. San Antonio Military Medical Center (SAMC), San Antonio, Texas (CAP # 21419-01)
2. Wright-Patterson Epidemiology Laboratories, WPAFB, OH (CLIP #DOD7823502)
3. Armed Forces Institute of Pathology, Washington, DC (CAP # 20305-01)
4. Colorado State Department of Health, Denver, CO (CLIA# 06D0644326)
5. Quest Diagnostic, California (CLIA# 05D0643352)
6. University of Colorado Health Sciences Center, Denver, CO (CLIA# 51032)
7. Penrose-St. Francis Health Care Center, Colorado Springs, CO (CAP #21876-01)
8. Memorial Hospital, Colorado Springs, CO (CAP# 21880-01)
9. Belle Bonfils Memorial Blood Center (CAP# 21811-01)
10. CDD the Women's Health Lab, San Antonio, TX (CLIA #45D0660475)
11. Madigan Army Medical Center, Tacoma, WA (CAP#24724-01)
12. General Leonard Wood Army Community Hospital, Ft. Leonard Wood, MO (CAP #1947801)

Appendix C
Laboratory Critical Values

ANALYTE	LOW	HIGH	UNIT
CHEMISTRY			
Acetaminophen	None	>20 mcg/mL	mcg/mL
Albumin	<1.5 g/dL	None	g/dL
Amylase	None	≥366 U/L	U/L
Bilirubin (Neonatal - baby must be <14 days old)	None	≥15 mg/dL	mg/dL
Blood Urea Nitrogen (BUN)	None	>100 mg/dL	mg/dL
Calcium	≤7 mg/dL	≥12 mg/dL	mg/dL
Calcium (Newborn)	≤6 mg/dL	≥13 mg/dL	mg/dL
Carbon Dioxide	≤15 mmol/L	≥40 mmol/L	mmol/L
Carbamazepine	None	>12 ug/mL	ug/mL
Chloride	≤80 mmol/L	≥120 mmol/L	mmol/L
Creatinine	None	≥5.0 mg/dL	mg/dL
CSF, protein	None	≥100 mg/dL	mg/dL
D-dimer	None	≥400 ng/mL	ng/dL
Digoxin	None	≥2.0 ug/mL	ug/mL
Gentamicin (Trough)	None	>2.0 ug/mL	ug/mL
Gentamicin (Peak)	None	≥10.0 ug/mL	ug/mL
Glucose (male)	≤50 mg/dL	≥400 mg/dL	mg/dL
Glucose (female)	≤40 mg/dL	≥400 mg/dL	mg/dL
Glucose (newborn)	≤35 mg/dL	≥300 mg/dL	mg/dL
Lactic Acid	None	>5 mEq/L	mEq/L
Magnesium	≤1.2 mEq/L	≥4.9 mEq/L	mEq/L
Magnesium (OB)	≤4.0 mEq/L	≥8.0 mEq/L	mEq/L
Osmolality (Serum)	<265 mOsm/kg	>320 mOsm/kg	mOsm/kg
Phenytoin (Dilantin)	None	>20 ug/mL	ug/mL
Phosphorus	≤1.0 mg/dL	None	mg/dL
Potassium	≤2.5 mmol/L	≥6.5 mmol/L	mmol/L
Potassium (newborn)	≤2.5 mmol/L	≥8.0 mmol/L	mmol/L
Protein (24 hr OB)	None	>300 mg/24hrs	mg/24hrs
Salicylates	None	≥20.0 mg/dL	mg/dL
Sodium	≤120 mmol/L	≥155 mmol/L	mmol/L
Theophylline	None	≥20 ug/mL	ug/mL
Troponin I	None	≥0.12 ng/mL	ng/dL
Valproic Acid (Depakote)	None	> 150 ug/mL	ug/mL
Vancomycin (Trough)	None	>40 ug/mL	ug/mL

Appendix C - Continued
Laboratory Critical Values

ANALYTE	LOW	HIGH	UNIT
BLOOD GASES			
Arterial pH	<7.20	>7.60	mmHg
Arterial pCO2	<19.0	>67.0	mmHg
Arterial pO2	<50.0	None	mmHg
Venous pH	<7.15	>7.65	mmHg
Venous pCO2	None	>50	mmHg
Venous pO2	<30	None	mmHg
Capillary pH	<7.20	>7.60	mmHg
Capillary pCO2	<20	>80	mmHg
Capillary pO2	<30	None	mmHg
Cord pH	<7.0	>7.65	mmHg
Cord pCO2	None	>50 (Venous Only)	mmHg
Cord, Arterial Base Excess	≥ -12	None	mmHg
HEMATOLOGY			
WBC	<2.5	>30	k/cmm
Hematocrit:			
0 – 1 week	None	>65	%
1 wk – 12 yrs	<30	>59	%
> 12 years	<18%	>59	%
Platelet	<50	>1,000	k/cmm
Neutrophils (#)	<0.5	None	
Smear for Blood Parasites	None	Positive	
COAGULATION			
PTT – nontreated	None	>70	seconds
PTT – heparinized (IM)	None	>100	seconds
PTT – heparinized (IV – ICU) none	None	>120	seconds
INR	None	>5.0	
Fibrinogen	<100	None	mg/dL
Bleeding Time	None	>15	minutes
MICROBIOLOGY			
Sterile Body Fluid Culture		Positive	
Sterile Body Gram Stain	Visible Organisms on Gram Stain		
Blood Culture - Gram Stain of "Positive" BC Bottle	Visible Organisms on Gram Stain		
CSF Culture		Positive	
CSF Gram Stain	Visible Organisms on Gram Stain		
URINALYSIS			
Urine/Cath	None	≥ 300 glucose and large ketones	
Urine/Cath	None	≥ 1000 glucose with or without ketones	
BLOOD BANK			
Indirect Antibody Test (IAT/Screen)		Positive	
Transfusion Compatibility Testing		Incompatible results	
Transfused Apheresis Platelets that have subsequently tested positive for bacterial contamination.			
Any findings in a Transfusion Reaction Investigation Report that would indicate that a hemolytic transfusion reaction is occurring or has occurred.			

Appendix D
STAT & ASAP Procedure List

Hematology:

CBC with Automated Differential

Hematocrit

- Hematocrit & Hemoglobin
- Platelet Count
- Prothrombin Time (PT)
- Activated Partial Thromboplastin Time (APTT or PTT)
- Fibrinogen
- CSF Cell Count
- Other Body Fluid Cell Count (ASAP only)

Blood Bank:

- Type and Screen (ASAP only)
- Type and Crossmatch
- Direct Antiglobulin Test (DAT) or Coombs
- Transfusion Reaction Investigation

CSF Chemistry:

- Glucose
- Protein

Blood Gases (Arterial, Venous, Capillary & Cord):

- pH
- pCO2
- pO2
- Total Hemoglobin
- Oxyhemoglobin
- Carboxyhemoglobin
- Methemoglobin

Urinalysis:

- Urinalysis, macroscopic
- Qualitative hCG (urine)
- Qualitative hCG (serum)

Bacteriology:

- Influenza A Virus
- Spinal Fluid Gram Stain (ASAP)
- Gram Stain on Acute Exudates or Sputum (ASAP)
- Mononucleosis (ASAP)
- RSV screen (ASAP)
- Wet Prep / KOH Prep ASAP

Microbiology ASAP Tests

- Gram stain
- Sterile Body fluid
- Blood culture
- CSF Culture/Smear

Chemistry:

- Acetone
- Albumin
- Alcohol (Medical)
- ALT/ AST
- Alkaline Phosphatase
- Ammonia
- Amylase
- Beta-hCG (Quant -ASAP only)
- Bilirubin, Total
- Calcium
- Carbon Dioxide
- Chloride
- CK Total
- CK-MB
- Creatinine
- C-Reactive Protein (high Sensitive)
- D-Dimer
- Fetal Fibronectin
- Glucose
- Lipase
- Lactate
- Magnesium
- Myoglobin, Serum Only
- Newborn Bilirubin
- ProBNP-NT
- Phosphorus
- Potassium
- Sodium
- Therapeutic Drugs
  - Digoxin
  - Valproic Acid
  - Phenytoin
  - Carbamazepine
  - Theophylline
  - Acetaminophen
  - Salicylate
  - Gentamicin
  - Phenobarbital
  - Vancomycin
- Total Protein (Serum)
- Troponin I
- Urea Nitrogen (BUN)
- Uric Acid
- Urine Drug Screen (medical use only)

Appendix E
Therapeutic Drug Monitoring (TDM) Information

DRUG	LEVEL	WHEN
Aminoglycosides (Gent, Amikacin)	Peak	Draw sample 1/2 hour after "1/2hr infusion"
	Trough	Divided dose: Draw immediately before dose Daily Dosing: Peak level not required, draw ONLY a Trough level before 3rd dose to ensure the patient is eliminating the drug
Vancomycin	Peak	Draw sample 1 hour after a "1hr infusion"
	Trough	Draw 30 minutes before dose
Digoxin	Therapeutic Level	Draw at least 8 to 24 hours after dose (immediately before AM dose is preferable)
Theophylline	Trough	PO - Immediately before dose (Mid-interval levels are Acceptable). Note time drawn on requisition. Draw level 1/2 hour after "1/2hr infusion". If infusion started before dose, draw another level 8 hours after starting the infusion and again after 24 hours. Monitor levels every 24 hours
Phenytoin	Trough	Once at steady state, draw immediately before dose Note: May not reach steady state for 4 to 6 weeks
Lithium	Trough	Draw level immediately before morning dose. Ensure that this is at least 12 hours after the last dose
Anti-arrhythmic (Procainamide, Quinidine, etc)	Trough	Immediately before next dose
Anti-convulsants (Carbamazepine, Phenobarbital, Primidone, Ethosuximide, etc)	Trough	Immediately before next dose

Appendix F
Chemistry Profiles

Anemia
dTIBC
Ferritin
Total Iron
Transferrin

ABG-COOX Blood Gas Panel
pH
pCO2
pO2
HCO3
Base Excess, calculated
% Oxygen, saturation
Total Hemoglobin, calculated
Total Oxygen Content, calculated
% Fraction of Oxyhemoglobin
% Fraction of Carboxyhemoglobin
% Fraction of Methemoglobin
% Fraction of Deoxyhemoglobin

Basic Metabolic Panel
Anion Gap
Bicarbonate
BUN
BUN / CREAT Ratio
Calcium
Chloride
Creatinine
Glomerular Filtration Rate (GFR)
Glucose
Potassium
Sodium

Cardiac ER
CK
CKMB
INDEX
MYO
Troponin I

Cardiac ICU
CK
CKMB
INDEX
Troponin I

Comprehensive Metabolic Panel
Alanine Aminotransferase
Albumin
Alkaline Phosphatase
Anion Gap
Aspartate Aminotransferase
Bicarbonate
BUN / CREAT Ratio
Calcium
Chloride
Creatinine
Glomerular Filtration Rate (GFR)
Glucose
Potassium
Sodium
Total Bilirubin
Total Protein
Urea Nitrogen (BUN)

CO-OX Panel
Total Hemoglobin, calculated
Total Oxygen Content, calculated
% Fraction of Oxyhemoglobin
% Fraction of Carboxyhemoglobin
% Fraction of Methemoglobin
% Fraction of Deoxyhemoglobin

CHCSF
CSF Glucose
CSF Protein

Electrolytes Panel
Anion Gap
Carbon Dioxide
Chloride
Potassium
Sodium

Hemoglobin A1C
Hemoglobin A1C %
Estimated Avg Glucose, calculated

Hepatic Function Panel
Albumin
Alkaline Phosphatase
Aspartate Aminotransferase (AST)
Bilirubin, Total
Total Protein

Lipid Panel
Cholesterol
HDL Cholesterol
LDL Cholesterol
Risk Factor
Triglycerides
VLDL (Calculated)

Physical Lipid
Cholesterol
Glucose
HDL Cholesterol
LDL Cholesterol
Triglyceride
VLDL, calculated

Renal Function
Albumin
Anion Gap
BUN
BUN / CREAT Ratio
Calcium
Chloride
CO2
Creatinine
Glucose
Phosphorous
Potassium
Sodium

Thyroid
FT4
TSH

Urine Drug Screen (medical)
Amphetamine
Barbiturates
Benzodiazepine
Cocaine
Methadone
Opiates
PCP
THC

Body Fluid Panel
Glucose
Total Protein
Fluid LDH
Fluid Amylase
Albumin

Appendix G
Urine Drug of Abuse Screen Cut-off Values

DRUG	SPECIMEN	UNITS	CUT-OFF	
Amphetamine (AMP)	Random Urine	ng/mL	1000	Note: Amphetamine and Methamphetamines are combined in a single assay.
Barbiturates (BAR)	Random Urine	ng/mL	300	
Benzodiazepines (BZO)	Random Urine	ng/mL	300	
Cannabinoids (THC)	Random Urine	ng/mL	50	
Cocaine	Random Urine	ng/mL	300	
Methadone (MTD)	Random Urine	ng/mL	300	
Opiates (MOR)	Random Urine	ng/mL	300	
Phencyclidine (PCP)	Random Urine	ng/mL	25	

Reference range is NEGATIVE

Cut-off values represent urine concentrations that result in a presumptive Positive result.

RESULTS ARE INTENDED FOR MEDICAL SCREEN USE ONLY

Appendix H
ALPHABETICAL LISTING OF CLINICAL LABORATORY PROCEDURES.

Due to the length of or technical nature of reference ranges, we have omitted this information for certain analytes listed below. Consult Lab Test Information (LTI) or the Patient Laboratory Inquiry (PLI) in CHCS for reference range information.

TEST NAME	SPECIMEN COLLECTION	REFERENCE RANGE	SECTION
ABO/RH - Routine Blood Type	Blood in purple top tube	See Lab Report	Blood Bank
Abscess Anaerobic Culture	Puss, tissue, etc. obtained from an abscess, biopsy, aspirate, drainage, exudate, lesion, or wound in Anaerobic culturette or syringe (no needle). To ensure proper growth of organisms, specimens for anaerobic culture should have an order for aerobic culture from same site.	No growth of anaerobic bacteria 5 days	Microbiology
Abscess Culture, Routine	Puss from aspiration in syringe (NO NEEDLE!) or culturette	No growth 48 hours	Microbiology
Accutane	Blood in SST, protect from light	See Lab Report	Shipping
Acetaminophen, Serum (ACTMN)	Blood in SST, Collect specimen for toxicity 4 hr post-ingestion	Therapeutic: 10-30 mcg/mL, Toxic: > 30 mcg/mL	Chemistry
Acetone, Serum (SKETO)	Blood in SST	Negative in normal nutritional states	Chemistry
Acetylcholine Receptor Antibodies/Myasthenia Gravis (ACET)	Blood in SST - Bring to Lab STAT	See Lab Report	Shipping
Acid-Fast Stain,Synonyms: AFB Smear, AFB Stain, Atypical Mycobacterium Smear, Mycobacterium Stain, TB Stain.	Sputum, Tissue, CSF, Random Urine	No mycobacteria identified	Shipping
Acid Phosphatase, Serum	Blood in SST, Bring to lab STAT	0.0 - 2.7 ng/mL	Shipping
ACTH (Adrenocorticotropic Hormone)	Blood in Pre-chilled Lavender tube, Bring to Shipping STAT	See Lab Report	Shipping
Activated Partial Thromboplastin Test (APTT)	Blood in Blue top tube. Refer to specific information in hematology section and general section (order of draw and transfer).	Reported with patient results, Approx. 27-41 seconds. Established and rechecked periodically. Therapeutic range: Patients on heparin therapy is approx. 50-100 seconds. Recommended test for monitoring Heparin Therapy.	Hematology

Acyclovir	Specimen: SST	See Lab Report	Shipping
Adrenocorticotricotropic Hormone - See ACTH		See Lab Report	Shipping
AFB, Fluid	Body Fluid in sterile tube	Negative	Shipping
AFB, ACID, 1st morning sputum x3 (no saliva)	Sputum in falcon collection kit or specimen cup, Refrigerate immediately, all cultures requesting AFB work-up get an Acid Fast Stain	See Lab Report	Shipping
Alanine Aminotransferase (ALT, GPT, SGPT)	Blood in SST Tube	M 21 - 72 IU/L Fe 9 - 52 IU/L	Chemistry
Albumin, Serum (ALB)	Blood in SST Tube	3.5 – 5.0 g/dL	Chemistry
Albumin, Prealbumin, Serum	Blood in SST Tube	See Lab Report	Chemistry
Alcohol, Blood	Blood in SST for medical, Blood in gray top tube for legal. DO NOT prepare venipuncture site with any alcohol-containing swab, use iodine.	Negative. <10.0	Chemistry
Aldolase, Serum	Blood in SST Tube	See Lab Report	Shipping
Aldosterone, Serum	Blood in SST Tube	See Lab Report	Shipping
Aldosterone, Urine	24 hour urine collection, no preservative, refrigerate during collection	See Lab Report	Shipping
Alkaline Phosphatase, Serum	Blood in SST Tube	38 - 126 IU/L	Chemistry
Alpha-1 Antitrypsin	Blood in SST Tube, Fasting is required	See Lab Report	Shipping
Alpha-1 Antitrypsin Phenotyping	Blood in SST Tube, Bring to Shipping STAT, Fasting required	See Lab Report	Shipping
Alpha Fetoprotein, Serum Maternal	Blood in SST Tube, Patient must be in the gestational window of 15-20 weeks.	0 - 8.5 ng/mL	Shipping
Alpha-Tocopherol (Vitamin E)	Blood in SST Tube, Bring to shipping STAT	See Lab Report	Shipping
Amikacin (Peak and Trough)	Blood in SST Tube	See Lab Report	Shipping
Amino Acid Screen (Blood, Urine)	Blood in Green top or random urine, bring to Shipping STAT, fasting required	See Lab Report	Shipping
Amiodarone (Cardarone)	Blood in SST, collect 8-10 hours post dose of just before next dose	See Lab Report	Shipping
Amitriptyline (Elavil, Nortriptyline)	Blood in Plain red top	See Lab Report	Shipping
Ammonia, Plasma	Blood in Purple top tube, Put on ICE immediately, bring to lab STAT. Patient should not clench fist during venipuncture.	9 – 30 uMOL/L	Chemistry

Amniotic Fluid, OD Scan, Delta OD 450	Amniotic Fluid, 5 mL, Must have gestational age on lab slip, protect from light	See Lab Report	Shipping
Amphetamines	Random Urine	Negative	Chemistry
Amylase, 24 Hour Urine	24 hour urine, entire collection, keep specimen refrigerated	See Lab Report	Chemistry
Amylase, Urine, Random	Random urine or timed urine i.e. 2, 12, or 24 hour interval. A timed 2 hour urine collection is preferred	No established ranges for 24Hour. Random 32 - 641 IU/mL	Chemistry
Amylase, Serum	Blood in SST Tube	30 - 110 IU/L	Chemistry
Ampicillin Level	Blood in SST, use aseptic procedure, send to lab STAT to freeze	See Lab Report	Shipping
ANA-C, ANA Complete or ANA Profile, Includes DNA, Sm., RNP, SS-B Antibodies, & SS-A-SCL70	Blood in SST, 1 tubes are required	See Lab Report	Shipping
Anafranil	Blood in Plain Red Top Tube	See Lab Report	Shipping
Androstenedione	Blood in SST, send to lab STAT	See Lab Report	Shipping
Angiotensin-1-Converting Enzyme (ACE)	Blood in green top	See Lab Report	Shipping
Anticardiolipin Antibodies (ACA)	Blood in SST Tube	See Lab Report	Shipping
Antibody Identification	Blood in Purple top tube, non-hemolyzed	See Lab Report	Blood Bank
Anti ACL-70 (scl 70) Scleroderma antibody, serum	Blood in SST Tube	See Lab Report	Shipping
Anti Centromere (ACEAB)	Blood in SST Tube	See Lab Report	Shipping
Anti DNA (A - DBL)	Blood in SST Tube	See Lab Report	Shipping
Anti-Glomerular Basement Membrane	Blood in SST Tube	See Lab Report	Shipping
Anti - HAV (M) Antibody to Hepatitis A Antigen, IgM Specific - HAV	Blood in SST Tube	Negative	Shipping
Anti - HBC (Total) Convalescent Phase, Antibody to Hepatitis B Core	Blood in SST Tube	Negative	Shipping
Anti - HBC (IgM) Acute Phase Antibody to Hep B Core	Blood in SST Tube	Negative	Shipping
Anti - HBe (Hepatitis Be Antibody) HbeAB	Blood in SST Tube	Negative	Shipping
Anti - HBs, Antibody to Hep B Surface	Blood in SST Tube	Negative	Shipping
Anti - HCV, Antibody to Hep. C	Blood in SST Tube	Negative	Shipping

Anti - HD, Antibody to Hep D	Blood in SST Tube	Negative	Shipping
Anti - HTLV 1, Antibody to HTLV	Blood in SST Tube	Negative	Shipping
Antigliadin IgG & IgA	Blood in SST Tube	Negative	Shipping
Anti - Hyaluronidase (AHT)	Blood in SST Tube	See Lab Report	Shipping
Antinuclear Antibody (ANA)	Blood in SST Tube	See Lab Report	Shipping
Antistreptolysin O Titer, Serum	Blood in SST Tube	< 200 reported as negative	Immunology
Anti-Neutrophilic Cytoplasmic Ab (ANCA)	Blood in SST Tube	C-ANCA: < 1:20 IFA Titer, P-ANCA: < 1:20 IFA Titer	Shipping
Anti-Platelet Associated Antibodies (IgG, IgM)	Blood in Yellow (ACD Solution A), 2 tubes required, Collect Mon-Wed before 1400 ONLY	See Lab Report	Shipping
Anti-Striational Antibody (ASAP)	Blood in SST Tube	See Lab Report	Shipping
Anti Thyroglobulin (Antibody) TGA	Blood in Plain Red top	See Lab Report	Shipping
Anti Thyroid Antibody	Blood in SST Tube	See Lab Report	Shipping
Antithrombin III (AT III) ATT 3	Blood in 2 blue tops	See Lab Report	Shipping
Aspartate Aminotransferase (AST, GOT, SGOT)	Blood in SST Tube	M 17 – 59 IU/L Fe 14 – 36 IU/L	Chemistry
Aspergillus (Aspergillosis) Comp Fix (EPI - Fungal Profile)	Blood in SST Tube	See Lab Report Note: Test performed only if positive by immunodiffusion	Shipping
Autologous Blood Collection	Consultation form must be completed by requesting physician. Blank forms are available from Blood Bank. Collection performed at a civilian hospital		Blood Bank
Autopsy	Requires SF 523 (Authorization for Autopsy); Refer to MEDDAC Regulation 40-31		Anatomic Pathology
Basic Metabolic Panel	Blood in SST Tube	See Lab Report	Chemistry
Bacterial Antigen Screen, CSF/Urine, Synonyms: Directogen, Latex Agglutination, Bacterial Antigen Screen	CSF - 1 mL/Urine - 3 mL	Negative	Microbiology
Benzodiazepine	Random Urine	See Lab Report	Chemistry
Bile Acids	Blood in SST, bring to Shipping STAT, fasting required	Fasting: < 0-60 mcg/dL, Postprandial values are approximately three times the fasting level	Shipping
Bile, Urine (Ictotest)	Fresh random urine	Negative	Urinalysis

Bilirubin, Direct	Blood in SST or bullet	0.0 - 0.3 mg/dL	Chemistry
Bilirubin, Neonatal	Blood in bullet	See lab report for interpretation	Chemistry
Bilirubin, Total (Adult)	Blood in SST Tube	0.2 – 1.3 mg/dL	Chemistry
Biopsy Culture, Routine	Specimen: Surgical tissue, bone marrow, biopsy material, etc., Collection: The surgical specimen should be separated whenever possible from portion submitted to Anatomic Pathology utilizing sterile technique, although the operative suite is the preferred site. Division of the specimen should be performed in consultation with the Pathology staff and performed by a pathologist on request. The specimen will be divided in the lab for fungal culture and KOH preparation, mycobacteria culture and smear, routine bacterial cultures and Gram stain only if specimen is accompanied by a requisition for each procedure and specimen has adequate volume for all tests. Specimens for anaerobic culture should be placed in asterile container and brought to the laboratory within one half hour.	No growth	Microbiology
Blastomyces Antibody	Blood in SST Tube	See Lab Report	Shipping
Bleeding Time (Modified Ivy Bleeding Time)	Hematology performs on patient, call 524-4097 to schedule	<16 yrs 1.3-8.9 minutes Adult 2 – 8 minutes	Hematology
Blood Culture	Adults: Aerobic and anaerobic bottles inoculated with 5 – 10 mL blood in each. Pediatric: Pediatric bottle inoculated with 1 -4 mL of blood. Recommend collection of two cultures, 30 minutes apart, from different sites. Blood culture should be drawn prior to initiation of antimicrobic therapy. Strict aseptic technique is essential. Remove the plastic cap from the blood culture bottles, wipe stoppers with alcohol pad and allow to dry. Scrub venipuncture site with Chlora Prep for 30 seconds and allow to air dry. Collect blood using syringe or butterfly blood collection adapter set. Collect anaerobe bottle first. Transport to lab within one hour.	Negative - 5 days	Microbiology
Blood Type - See ABO/RH			Blood Bank

Body Fluid Culture, Routine	Aseptically aspirated body fluid, sterile tube or syringe. Specimen must be transported to laboratory immediately after collection. Contamination with normal flora from skin, rectum, vaginal tract, or other body surface must be avoided. NO NEEDLE	No Growth 72 hours	Microbiology
Body Fluid, Chemistry Panel	Plain Red Top	See Lab Report	Chemistry
Body Fluids Analysis i.e. Pleural, Peritoneal, Pericardial, Synovial	Body Fluid, 3-5 mL, Lavender top/ mix well, Bring to Laboratory STAT	See Lab Report	Hematology
Bordetella Pertussis/Smear	2 Smears/Nasopharyngeal or Throat swabs placed in transport media, Bring to Laboratory STAT	Negative	Shipping
Bronchial Aspirate Culture	Tracheal aspiration, bronchoscopy specimen, or transtracheal aspirate	No growth normally, Tracheal aspirate and bronchoscopy specimens usually are contaminated with normal flora.	Microbiology
Brucella Antibody	Blood in SST Tube	See Lab Report	Shipping
BUN, Serum	Blood in SST Tube	M 9 – 20 mg/dL Fe 7 – 17 mg/dl	Chemistry
BUN, Urine	24 hour urine	12-20 g/24hrs	Chemistry
BUN/Creatinine Ratio calc.		6-20 mg/dL	Chemistry
Caffeine, Serum	Blood in SST Tube	See Lab Report	Shipping
Calcitonin	Blood in SST Tube, Bring to Shipping STAT	See Lab Report	Shipping
Calcium, Ionized	Blood in unopened SST Tube.	See Lab Report	Shipping
Calcium, Serum	Blood in SST Tube	8.4 – 10.2 mg/dL	Chemistry
Calcium, Urine	24Hour	100 – 300 mg/24Hr	Chemistry
Cannabinoids (THC)	Random urine, 20mL	Negative	Chemistry
Carbamazepine (Tegretol)	Blood in SST Tube	4-12 ug/mL	Chemistry
Carbon Dioxide, Total	Blood in SST Tube	22 - 30 mmol/L	Chemistry
Carbon Monoxide (Carboxyhemoglobin)	Li Heparin Green without gel	See Lab Report	Chemistry
Carcinoembryonic Antigen (CEA)	Blood in SST Tube Plasma	0-5 ng/mL	Chemistry
Cardiac Enzyme Profile (CK, CKMB, Myoglobin, Troponin T, Index)	Blood in SST Tube	See Individual Listing of Analyte	Chemistry
Carnitine, Total & Free	Blood in SST Tube, bring to Shipping STAT	See Lab Report	Shipping

Carotene	Blood in SST Tube, protect from light, bring to Shipping STAT, fasting required	See Lab Report	Shipping
Catecholamines, Free (CATE) Includes Epinephrine, Norepinephrine, Dopamine	24-hour urine.	See Lab Report	Shipping
Catecholamines, Fractionated Plasma, Includes Dopamine, Epinephrine, & Norepinephrine	Blood in 2 green top tubes, patient to remain in supine position for 30 minutes prior to collection	See Lab Report	Shipping
Catheter Tip Culture, routine **Urine catheters will not be cultured**.	Avoid contamination with normal flora from skin or other body surfaces. Deliver specimen to lab within 2 HRS of collection. Make direct smear of any exudate from catheter site after catheter has been removed.	No growth	Microbiology
C-DIFF (Clostridium Difficle Toxin)	10 grams of stool in sterile specimen container	See Lab Report	
CEA See Carcinoembryonic Antigen			
Celontin (Methsuximide or Normethylsuximide)	Blood in plain red top	See Lab Report	Shipping
Cerebrospinal Fluid CSF	CSF At least 1 mL in each of 3-4 sterile tubes BRING TO LAB STAT	<u>Hematology</u> <1month = 0-30 Mononuclear cells 1month to 4yrs = 0-10 Mononuclear cells 5yrs to adult = 0-5 Mononuclear cells <u>Microbiology</u> No organisms seen <u>Chemistry</u> Protein: 12 – 60 mg/dL Glucose: 40 – 70 mg/dL	
Cerebrospinal Fluid CSF - Culture	1.0 mL CSF, Contamination with normal flora from skin or other body surfaces must be avoided.	No growth in 72 hours	Microbiology
Ceruloplasmin (Cerul)	Blood in SST Tube, fasting required	See Lab Report	Shipping
Chlamydia (Antibody)	Blood in SST Tube	See Lab Report	Shipping
Chlamydia (DNA Probe) - Eye (see Conjunctival culture)	Chlamydia collection swab from urethral or vaginal/cervical area only	Negative	Shipping
Chlordiazepoxide (Librium)	Blood in plain red top tube, protect from light	See Lab Report	Shipping

Chloride, Serum	Blood in SST Tube	98 - 107 MMOL/L	Chemistry
Chloramphenicol (Chloromycetin)	Blood in plain red top	See Lab Report	Shipping
Cholesterol	Blood in SST Tube	< 200 mg/dL	Chemistry
Cholinesterase, RBC Specify= Baseline or follow-up Separate within 4hours of collection	Blood in lavender top	See Lab Report	Shipping
Chromosome Analysis, Blood Sodium Heparin tube only	Blood: Adults: 1 green top, Infants: 1, 3mL green top, Bring to Shipping STAT	See Lab Report	Shipping
Clonazepam (Klonopin)	Blood in plain red top	See Lab Report	Shipping
Clostridium difficile Toxin	Collect stool in orange top Carey Blair container 24 hour turnaround time	See Lab Report	Microbiology
CMV Cultures (Cytomegalovirus)	Swab must be sent in viral transport tube. (Green cap). Indicate specimen source on lab order. Send undiluted body fluids. Do not freeze any specimen.	See Lab Report	Shipping
Cocaine, Urine	Random Urine	Negative	Chemistry
Coccidioides (Complement Fixation)	Blood in SST Tube	Negative, Remarks: Done only if POSITIVE by immunodiffusion	Shipping
C, Esterase	Blood in SST Tube	See Lab Report	Shipping
C-Peptide	Blood in SST Tube, Bring to Shipping STAT	See Lab Report	Shipping
C-Reactive Protein, High Sensitivity (cardiac)	Blood in SST Tube	See Lab Report for interpretation	Chemistry
C-Reactive Protein, (Inflammatory)	Blood in SST Tube	<1.0 mg/dl	Chemistry
CA 27-29	Blood in SST Tube, Bring to Shipping STAT	See Lab Report	Shipping
CA 19-9	Blood in SST Tube, Bring to Shipping STAT	0 - 37.0 U/mL	Shipping
CA – 125	Blood in Plain Red Top Tube	0 - 35 U/mL	Shipping
Complement C3, C4, & CH50 (CH50-Single test specimen requirement the same)	Blood in SST Tube, Bring to Shipping STAT	101 - 300 units	Shipping
Coccidioidomycosis (Coccidioides)	Blood in SST Tube	See Lab Report	Shipping
Colorado Tick Fever	Blood in SST Tube	See Lab Report	Shipping
Complement, Serum	Blood in SST Tube	C3: 75-135 mg/dL C4: 10-40 mg/dL	Shipping
Complete Blood Count (CBC)	Blood in Lavender top - Mix specimen well	See Lab Report	Hematology

Comprehensive Metabolic Panel	Blood in SST Tube	See Lab Report	Chemistry
Conjunctival Culture, Routine	Specimen must be delivered to the lab within 2 hrs of collection. Collect the specimen by swabbing, pass moistened swab 2 times over lower conjunctiva. Avoid eyelid border and lashes. SCRAPINGS: Use local anesthetic and platinum spatula. Rub spatula with scrapping gently over small area on slide. If too dry use very small amount of sterile water. Indicate if it is the right eye or the left eye on the slide and slip.	See Lab Report	Microbiology
Conjunctival Culture, Chlamydia (Newborn)	Obtain collection kit from the Microbiology section.	See Lab Report	Shipping
Coombs Direct	Blood in Lavender top tube, Cord blood preferred on newborns	Negative	Blood Bank
Coombs Indirect (Antibody Screen)	Blood in Lavender top tube	Negative	Blood Bank
Copper, Urine or Serum	24 hour urine OR Blood in Royal blue top (no additive)	See Lab Report	Shipping
Cord Blood Work up	Cord blood in Lavender top tube	Negative	Blood Bank
Cortisol, Serum AM 0700-0900 PM 1600-1800	Blood in Red top,	See Lab Report	Shipping
Cortisol, Urine	24 hour urine specimen	See Lab Report	Shipping
Creatine Phosphokinase - CPK, CK	Blood in SST Tube	MALE: 55 - 170 IU/L, FEMALE: 30 - 135 IU/L	Chemistry
Creatine Kinase - MB	Blood in SST Tube	< 3.38 ng/mL	Chemistry
Creatinine, Serum	Blood in SST Tube	M 0.66 – 1.25 mg/dL Fe 0.52 – 1.04 mg/dL	Chemistry
Creatinine Clearance - CrCl	24 Hour Urine	MALE: 97-137 mL/MIN, FEMALE: 88-128 mL/MIN	Chemistry
Creatinine, Urine	24 Hour	M: 1000 – 2000 mg/24Hr Fe: 800 – 1800 mg/24Hr	
Cryofibrinogen (Qualitative)	Blood in Pre-warmed plain red top	Negative	Shipping
Cryoprecipitate – call Blood Bank to notify – one SF 518 for each pool of five requested.	Blood in 7 ml Purple Top Tube. Typenex labeling system must be used and must have date, time, and phlebotomist's initials on the tube label.		Blood Bank
Cryptococcal – Antigen	Blood in SST or Spinal Fluid in sterile tube	Negative	Shipping
Cycloserine	Blood in plain red top	See Lab Report	Shipping
Cyclosporine	Blood in Lavender top	See Lab Report	Shipping
Cystine, Quantitative	24 Hour urine specimen	See Lab Report	Shipping
Cytology: See Anatomic Pathology SOPS			

Cytomegalo Virus (CMV Titre)	Blood in SST Tube	See Lab Report	Shipping
Dalmane (Flurazepam or Desalkylflurazepam)	Blood in plain red top	See Lab Report	Shipping
Darvon (Propozyphene & Norpropozyphene)	Blood in plain red top tube or random urine	See Lab Report	Shipping
D-Dimer (quantitative)	Blood in Lavender tube	0 – 399 ng/mL	Chemistry
Dengue	Blood in SST Tube	See Lab Report	Shipping
Desalkylflurazepam (Flurazepam or Dalmane)	Blood in plain red top	See Lab Report	Shipping
Desipramine, Serum	Blood in plain red top	See Lab Report	Shipping
DHEA – Serum	Blood in SST Tube, fasting required	See Lab Report	Shipping
Dialysis Fluid, Peritoneal, Routine Culture	Peritoneal dialysis fluid collected in sterile container	No growth 72 hours	Microbiology
Diazepam (Valium)	Blood in plain red top	See Lab Report	Shipping
Digoxin, Serum	Blood in SST Tube	Adult – 0.8-2.0 ng/mL	Chemistry
Dilantin (PTN, Phenytoin)	Blood in SST Tube	10-20 ug/mL	Chemistry
DNA Antibody Double – Stranded (Anti DNA Antibody)	Blood in SST Tube	See Lab Report	Shipping
Doxepin (Sinequen Level)	Blood in plain red top	See Lab Report	Shipping
Drug Screen	Random urine	Negative	Chemistry
Drug Screen (Medical/Legal) ALL AIR/LAND CRAFT ACCIDENTS GO TO AFIP, Use AFIP Form 1323	Blood: 2 x 15 mL Red tops, 2 x 7 ml Gray tops, 3 x 5 mL purple tops, 50 – 100 mL random urine	See Lab Report	Shipping
Ear Culture, Routine	External: insert bacterial culture swab into ear canal until resistance is met. Rotate swab and allow fluid to collect on swab.	No growth 48 hours	Microbiology
Eclampsia Pre Panel	Includes: CMP, CBC, UA, Urine Protein, Lactate Dehydrogenase, and Uric Acid	See Lab Report	
Elavil (See Amitriptyline)		See Lab Report	Shipping
Electrolytes, Serum	Blood in SST Tube	See Individual Listing of Analyte	Chemistry
Electrolytes, Urine	Specimen: 24 hr urine	See Individual Listing of Analyte	Chemistry
Eosinophil Smear	Smear made from swab of nasal secretion, no fixation	No eosinophil identified	Hematology
Epstein Barr Virus, Antibodies (EBV)	Blood in SST Tube	See Lab Report	Shipping
Erythrocyte Sedimentation Rate (ESR)	Blood in Lavender Tube	See Lab Report	Hematology

Esterase (C1 Esterase)	Blood in plain red top	See Lab Report	Shipping
Estradiol/Estrogen/17 Beta Serum	Blood in plain red top	See Lab Report	Shipping
Ethosuximide (Zarontin)	Blood in plain red top	See Lab Report	Shipping
Extractable Nuclear Antibody (ENA)	Blood in SST Tube	See Lab Report	Shipping
Factor 5 or Factor VII, VIII	Blood in blue top (citrate), one tube for each factor ordered, Bring to Shipping STAT	See Lab Report	Shipping
Factor V Leiden	Blood in Lavender Top Tube	See Lab Report	Shipping
Febrile Agglutinins	Blood in SST Tube	See Lab Report	Shipping
Fecal Fat (Lipid, Quant.) 24hr, 48hr and 72hr	Stool: Obtain container and instructions from shipping.	See Lab Report	Shipping
Fecal Leukocyte Stain, Wright Stain	Stool in preservative, or fresh stool delivered within 30 minutes of passing	No leukocytes present	Hematology
Felbamate	Blood in plain red top	See Lab Report	Shipping
Ferritin, Serum	Blood in SST Tube	MALE: 17.9 – 464 ng/mL, FEMALE: 6.24 – 137 ng/mL	Chemistry
Fetal Maternal Screen (FMH)	Blood in Lavender top	Negative	Blood Bank
Fibrinogen	Blood in Blue top tube	See Lab Report	Hematology
Fiorinal see Butalbital			Shipping
Fluorescent Treponemal Antibody, CSF (FTA)	3 mL spinal fluid	Nonreactive	Shipping
Florescent Treponemal Antibody, Serum (FTA) (Confirmatory testing only)	Blood in SST Tube	See Lab Report	Shipping
Fluoride (ION-Selective Electrode)	Blood in plain red top	See Lab Report	Shipping
Flu, A&B	Nasal washing, sponge swab. Swab is obtained from the Microbiology section	See Lab Report	Microbiology
FMH – See Fetal Maternal Screen			
Folate, RBC	Blood in 2 Lavender Top Tubes	See Lab Report	Shipping
Folate	Blood in SST Tube	2.76 - >20 ng/mL	Chemistry
Follicle Stimulating Hormone, Serum, FSH	Blood in SST Tube	Male: 1.55 – 9.74 MIU/mL Female: Follicular=1.98-11.6 MIU/mL, Mid-cycle=5.14-23.4 MIU/mL, Luteal=1.38-9.58MIU/mL, Menopausal=21.5-131 MIU/mL	Chemistry

Free T4, (Free Thyroxine) Serum	Blood in SST Tube	0.78 – 2.19 ng/dL	Chemistry
Fresh Frozen Plasma – Call Blood Bank and notify – one SF 518 for each unit requested	Blood in 7 ml Purple Top Tube. Typenex labeling system must be used and must have date, time, and phlebotomist's initials on the tube label.	Blood Bank	
FTA-ABS, CSF	3 mL Spinal Fluid	Nonreactive	Shipping
FTA-ABS, Serum	Blood in SST Tube	Nonreactive	Shipping
Fungal Culture	Culturette or Sterile Cup	See Lab Report	Shipping
Gamma Glutamyl Transpeptidase (GGT, GT)	Blood in SST Tube	MALE= 15 – 73 IU/L FEMALE=12 – 43 IU/L	Chemistry
Gastric Aspirate Culture	Gastric aspirate must be obtained before feeding infant. Deliver specimen to the lab within 1 hour.	See Lab Report	Microbiology
Gastrin	Blood in SST Tube, Bring to Shipping STAT, fasting is required	See Lab Report	Shipping
Gentamicin	Blood in SST Tube	See Lab Report	Chemistry
Genital Culture, Routine	Swab of vagina, cervix, discharge, aspirated endocervical, endometrial, prostatic fluid, or urethral discharge. Collection: FEMALE: DO NOT use lubricant on speculum. Cervical culture mucous should be removed before inserting swab from Culturette into endocervical canal, Return swab to the transport tube, label. MALE: Using small wire swab gently scrape the anterior urethral mucosa to collect specimen of urethral discharge.	See Lab Report	Microbiology
Giardia Antigen Test (GAG)	Stool specimen collected in 10% formalin, (O & P kit)	Negative	Microbiology
Glucagon	Blood in Lavender Top Tube, Bring to Shipping STAT, fasting required	40-130 pg/mL	Shipping
Glucose 6 Phosphate Dehydrogenase	Blood in Lavender top tube	146 – 376 U/dL	Shipping
Glucose – Fasting, 2 hr PP, 1 hr, 24 hr urine, CSF	Blood in SST Tube or Grey Sodium Oxalate (STAT) OR 24 Urine OR CSF	See individual listing or see lab report for interpretation	Chemistry
Glycosylated HGB See Hemoglobin A1C			
Gram Stain	Duplicate of specimen appropriate for routine culture of the smear	Microbiology	
Group B Strep	Collect at 35 – 37 weeks gestation using a single swab or two separate swabs, swab the distal vagina followed by the rectum.	See Lab Report	Microbiology
Group B Strep (Penicillin Allergic)	Collect at 35–37 weeks gestation using a single swab or two separate swabs, swab the distal vagina followed by the rectum. Susceptibility testing will be performed.	See Lab Report	Microbiology
Haloperidol (Haldd)	Blood in Plain Red Top Tube	1-30 ng/mL	Shipping
Haptoglobin, Serum	Blood in SST Tube, Patient must be fasting,	See Lab Report	Shipping

HAV (Anti-HAV, Hepatitis IGM Specific)	Blood in SST Tube	See Lab Report	Shipping
HCG, Serum QUALATATIVE (Human Chorionic Gonadotropin)	Blood in SST Tube	Negative or Positive	Urinalysis
HCG, Serum QUANTATIVE (Human Chorionic Gonadotropin)	Blood in SST Tube	< 5.0 mIU/L	Chemistry
HCG, Urine (Human Chorionic Gonadotropin)	Random Urine	Negative or Positive	Urinalysis
Heavy Metal Screen (Mercury Urine)	24 Hour urine	See Lab Report	Shipping
HLA DB-2	Blood in 2 Yellow Top Tubes with ACD	See Lab Report	Shipping
Hematocrit	Blood in Lavender Top	AGES, MALE, FEMALE, Up to 1 month, 43-65,43-65,1 month to 2 years, 30-40,30-40,2 to 12 years, 31-43,31-43,Over 12 years, 42-54,37-51	Hematology
Hemoglobin A1C (Glycosylated HGB A1C)	Blood in Lavender Top	<6.0% See lab report for additional information	Chemistry
Hemoglobin Electrophoresis	Blood in 2 Lavender Tops	See Lab Report	Shipping
Hemoglobin, Plasma	Blood in Lavender Top	Reference Range: AGES, MALE, FEMALE, Up to 2 months, 11-22,11-22,2 months to 2 yrs, 10-15,10-15,2 to 12 years, 11-16,11-16,Over 12 years, 14-18,12-17	Shipping
Hepatic Function Panel (Liver Panel)	Blood in SST Tube	See Lab Report	Chemistry
Hepatitis A – See Anti HAV		See Lab Report	Shipping
Hepatitis B Antigen (Surface Antigen)	Blood in SST Tube	Negative	Chemistry
Hepatitis Be Antigen (HBeAG)	Blood in SST Tube	Negative	Shipping
Hepatitis C - See Anti HCV	Blood in SST Tube	See Lab Report	Shipping
Hepatitis D Also see Anti HD	Blood in SST Tube	Negative	Shipping
Hepatitis B Panel, Acute HbsAG, Anti-HBc (IgM), Anti-HBc (Total)	Blood in SST Tube	Negative	Shipping

Hepatitis Viral Panel HbsAG, Anti-HBc (IgM), Anti-HAV (IgM), Anti-HCV	Blood in SST Tube	Negative	Shipping
Hepatitis B Panel, Chronic HbsAG, HbsAB, Anti-HBc (Total)	Blood in SST Tube	Negative	Shipping
Hepatitis Viral Panel, Chronic HbsAG, HbsAB, Anti-HBc (Total), Anti-HCV	Blood in SST Tube	Negative	Shipping
Herpes Culture	Viral culturettes; indicate source of specimen	See Lab Report	Shipping
Herpes Titer	Blood in SST Tube	Herpes I, II IgG <0.91 EU/mL & Herpes I, II IgM <1:5 IFA Titer	Shipping
Heterophile Titer	Blood in SST Tube	Negative	Shipping
Hexosaminidase A (Tay-Sachs Screen)	Blood in SST Tube, Bring to Shipping STAT. Annotate if patient is pregnant.	See Lab Report	Shipping
5-HIAA, QUANTITATIVE See Hydroxyindole Acetic Acid		See Lab Report	Shipping
High Density Lipoprotein Cholesterol (HDL)	Blood in SST Tube , Patient must be fasting	40-60 mg/dL	Chemistry
Histology, Routine	Use container of appropriate size, place biopsy specimen in 10% formalin solution. Use approximately 10 times as much formalin solution, making sure specimen is totally covered.	See Lab Report	Histology
Histoplasma	Blood in SST Tube	See Lab Report	Shipping
HIV	Blood in SST Tube	Negative	Shipping
HLA-B27 (B27)	Blood in 2 Yellow tubes (ACD), Must arrive in laboratory prior to 1500. Bring to Shipping STAT	Negative	Shipping
Homocystine Qualitative (Cystine)	24 hour urine,	Negative	Shipping
Homogentisic Acid, Urine	50 mL Random urine	Negative	Shipping
Homovanillic Acid (HVA)	24 Hour urine,	3-8 mg/24 hours	Shipping
H. Pylori AB (Helicobacter)	Blood in SST Tube	Negative	Serology
H. Pylori AG	Stool Sample	See Lab Report	Shipping
Human Growth Hormone (HGH)	Blood in SST Tube, Patient must be fasting	See Lab Report	Shipping
Hydroxyproline	24 Hour urine	See Lab Report	Shipping
5 Hydroxyindole Acetic Acid (5-HIAA)	24 hour. Dietary Restriction - Pineapples, bananas, eggplant, kiwi fruit, plums, tomatoes, walnuts and grapefruit for 72 hours PRIOR to collection.	See Lab Report	Shipping

17-Hydroxy-Corticosteroids (17 OH)	24-hour urine. Test is NOT valid during pregnancy or if patient is taking oral contraceptives.	See Lab Report	Shipping
Ibuprofen	Blood in Plain Red Top Tube	See Lab Report	Shipping
IgA	Blood in SST Tube	MALE: 100-490 mg/dL, Female: 85-450 mg/dL	Shipping
IgE	Blood in SST Tube	0 - 378 mg/dL	Shipping
IgG	Blood in SST Tube	800-1700 mg/dL	Shipping
IgG Subclass (1,2,3 & 4)	Blood in SST Tube	See Lab Report	Shipping
IgM	Blood in SST Tube	MALE: 5-320 mg/dL, FEMALE: 60-370 mg/dL	Shipping
Imipramine (Tofranil, Presamine)	Specimen: Plain red top tube	See Lab Report	Shipping
Immunoelectrophoresis (IEP)	Blood in SST Tube OR 24 hour urine collection	See Lab Report	Shipping
India Ink (CSF)	CSF	Negative	Shipping
Influenza A/B Antigen Screen	Nasal wash or special swab obtained from lab.	Negative	Micro
Influenza A, B, Viral Isolation	Specimen: Viral swab, throat washing, transtracheal aspirate, pleural fluid. Collect throat swab on patients with upper respiratory symptoms. Postmortem: lung tissue	See Lab Report	Shipping
INR	Blood in Blue top tube. Refer to specific information in hematology section and general section (order of draw and transfer).	Coumadin Therapy 2.0 - 3.0; Heart valve replacement 2.5 - 3.5	Hematology
Insulin, Serum	Blood in SST Tube, Bring to Shipping STAT	See Lab Report	Shipping
Insulin Antibodies (Bovine and Porcine) Serum or Plasma	Blood in SST Tube, Bring to Shipping STAT	See Lab Report	Shipping
Iron	Blood in SST Tube	MALE: 49 - 181 ug/dL, FEMALE: 37 - 170 ug/dL	Chemistry
Isopropyl Alcohol	Blood in 1 x 7 mL gray top (Unopened), Do not prepare venipuncture with alcohol	See Lab Report	Shipping
17-Ketosteroids, total (17-KS)	24 hour urine,	See Lab Report	Shipping
Kleihauer-Betke	Blood in Lavender Top	See Lab Report	Shipping
KOH Preparation	Physician should collect scrapings adequate to put on 2 slides.	No fungal elements identified	Microbiology
Lactic Acid	Blood in Grey top tube; draw without tourniquet, put on ice, bring to Chemistry STAT within 30 minutes.	0.7 – 2.1 MMOL/L	Chemistry
Lactate Acid Dehydrogenase (LDH)	Blood in SST Tube	313 - 618 IU/L	Chemistry
Lactate Acid Dehydrogenase Isoenzymes #1	Blood in SST Tube	See Lab Report	Shipping

LAP (Leukocyte Alkaline Phosphates)	Blood in 2 green top tubes (heparin), Bring to Shipping STAT	See Lab Report	Shipping
Lead	Blood in Lavender top tube	See Lab Report	Shipping
Lead Urine	24 Hour Urine	See Lab Report	Shipping
Legionella Antibody	Blood in SST Tube	See Lab Report	Shipping
Leukocyte Alkaline Phosphates See LAP			Shipping
LGV	Blood in SST Tube	See Lab Report	Shipping
Librium See Benzodiazepine			
Lidocaine (Xylocaine)	Blood in Plain red top tube	See Lab Report	Shipping
Lipase, Serum	Blood in SST Tube	23 – 300 IU/L	Chemistry
Lipid Profile	Blood in SST Tube , patient must be fasting 8 - 12 hrs	See individual listing or refer to lab report for interpretation	Chemistry
Lipoprotein Electrophoresis	Blood in SST Tube, Patient must be fasting 12-14 hours before test	See Lab Report	Shipping
Lithium, Serum	Blood in SST Tube	0.5-1.5 mEq/L	Shipping
Liver Panel/Profile	Blood in SST Tube	See Individual Listing of Analyte	Chemistry
Low Density Lipoprotein (dLDL)	Blood in SST Tube	<100 mg/dl	Chemistry
L/S Ratio	5-10 mL Amniotic Fluid, Specimen must be free of blood. Protect from light. Must be tested within 4 hrs. of aspiration. Note on lab request gestational age.	See Lab Report	Shipping
Lupus Anticoagulant	Blood in Blue top tube. Refer to specific information in hematology section and general section (order of draw and transfer).	See Lab Report	Shipping
Luteinizing Hormone, Serum	Blood in SST Tube	FEMALE: Follicular 2.58-12.1 MIU/mL, Mid-cycle 27.3-96.9 MIU/mL, Luteal 0.83-15.5 MIU/mL, Post-menopausal 13.1-86.5 MIU/mL	Chemistry
Lyme Disease Antibody	Blood in SST Tube	Negative	Shipping
Lysozyme, Serum	Blood in Plain red top tube, Bring to Shipping STAT	See Lab Report	Shipping
Magnesium, Serum	Blood in SST Tube	1.6 – 2.3 mg/dL	Chemistry
Magnesium, Urine	Random or 24 hour urine	No established ranges for random urine. 24HR= 73-122 mg/24hrs	Chemistry
Malaria Smear	Blood in Lavender Top	No organisms present	Hematology
Measles Antibody Titer	Blood in SST Tube	See Lab Report	Shipping

Mercury (HG)	Blood in Dark blue tube (metal free/heparin)	See Lab Report	Shipping
Mercury, Urine (Heavy Metal Screen)	24 hour urine or random urine	See Lab Report	Shipping
Metanephrine	24 hour urine	See Lab Report	Shipping
Methsuximide See Celontin		See Lab Report	Shipping
Methylphenidate (Ritalin)	Blood in Plain Red Top Tube	See Lab Report	Shipping
Micro-Albumin, Urine	Random or 24 Hr Urine	See Lab Report	Shipping
Microsomal Antibody	Blood in SST Tube	See Lab Report	Shipping
Mitochondrial Antibodies	Blood in SST Tube	Negative	Shipping
Mononucleosis	Blood in SST Tube	Negative	Immunology
Mucopolysaccharides, Urine	Random urine, 10 mL minimum	See Lab Report	Shipping
Multiple Sclerosis (Panel #2)	Blood in SST Tube, 3 mL CSF in 3 aliquots	See Lab Report	Shipping
Mumps Titer	Blood in SST Tube	Negative: < 1.0 Index, Positive: > 1.0 Index	Shipping
Muramidase, Serum see Lysozyme			Shipping
Mycoplasma Pneumoniae	Blood in SST Top Tube	Negative	Shipping
Myelin Basic Protein, CSF	1 mL CSF and 1 SST Tube, Bring to Shipping STAT	See Lab Report	Shipping
Myoglobin, Serum	Blood in SST Tube	See Lab Report	Chemistry
NAPA	Blood in SST Tube	4-10 ug/mL	Shipping
Neisseria Gonorrhoeae (DNA Probe)	Genital sites only. Chlamyia/GC collection swab.	Neg	Micro
Neisseria Gonorrhoeae Culture	Eye, Rectal, Throat sites. Bacterial culture swab delivered to lab as soon as possible.	See lab report.	Microbiology
Neisseria Gonorrhoeae Smear	Smear made of discharge from male.	No gram-negative diplocci seen	Microbiology
Neurontin	Blood in Plain Red Top Tube	See Lab Report	Shipping
Norpace Level (Disopyramide)	Blood in Red Top Tube	See Lab Report	Shipping
Nortriptyline (Elavil, Amitriptyline)	Blood in Red Top Tube	See Lab Report	Shipping
Occult Blood, Hemoccult	Fresh stool	Negative	Microbiology
OD Scan (Delta OD 450)	5 mL amniotic fluid, provide gestational age, protect from light	See Lab Report	Shipping
Opiates, Urine	Random Urine	Negative	Chemistry
Organic Acids, Urine	Random urine, 20 mL minimum	None detected	Shipping
Osmolality, Serum	Blood in SST Tube	275 - 300 mosm/kg	Chemistry
Osmolality, Urine	Urine	50 – 1500 mosm/kg	Chemistry
Ova and Parasites, Stool	Stool, collect in O&P Kits available from lab or clinics recommend submission of 3 samples over a 7-10 day period	No ova or parasites seen	Microbiology
Oxalate/Citrate, Urine	24 hour urine,	0-40 mg/24 HOUR	Shipping

Packed Red Cells, Transfusion, 1 SF 518 for each unit	Blood in 7 ml Purple Top Tube. Typenex labeling system must be used and must have date, time, and phlebotomist's initials on the tube label.	Blood Bank	Blood Bank
Parainfluenza	Blood in SST Tube, acute & convalescent required	< 1:8 titer	Shipping
Parasite Smear (Blood)	Blood in Lavender top	No organisms present	Hematology
Parathyroid Hormone (PTH) Intact	Blood in SST Tube	7.3 – 53.5 pg/mL	Chemistry
Pepsinogen 1	Blood in SST Tube	See Lab Report	Shipping
Pertussis Culture	Culturette with source. Treat as STAT. Will not survive > 4 hours	See Lab Report	Shipping
Pertussis, Serum (Bordetella Pertussis AB)	Blood in SST Tube	< 2	Shipping
Phenobarbital, Serum	Blood in SST Tube	15-40 ug/mL	Chemistry
Phenylalanine	Blood in SST Tube, Bring to Shipping STAT	< 4 mg/dL	Shipping
Phenytoin (PTN) See Dilantin	Blood in SST Tube		
Phosphorus, Serum	Blood in SST Tube	2.5-4.5 mg/dL	Chemistry
Phosphorus, Urine	24 hour urine	400 – 1300 mg/24 hours	Chemistry
Pinworm Preparation	Pinworm paddles. Specimen is best obtained first thing in morning before patient has moved. Pinworms migrate from anus during periods of rest and lay eggs around anal opening. Paddles available in lab.	No pinworms identified	Microbiology
Plague AB Titer	Blood in SST Tube	Acute and Convalescent required - 14 days apart	Shipping
Platelet Aggregation Test cannot be done by our reference lab, see pathologist			
Platelet Count	Blood in Purple Top Tube	130-400	Hematology
Platelet Concentrate for Transfusion Call Blood Bank to notify, not stocked in lab, Request Form: One SF 518 for each dose of 6.	Blood in 7 ml Purple Top Tube. Typenex labeling system must be used and must have date, time, and phlebotomist's initials on the tube label.	See Lab Report	Blood Bank
Polio Virus AB (Comp Fix)	Blood in SST Tube, Acute and Convalescent required	< 1:8 titer	Shipping
Porphobilinogen, Urine (qual.)	Urine, Three serial samples of first morning void. Protect from light.	Negative	Shipping
Porphyrin, Urine see Porphobilinogen, urine			Shipping
Post Vasectomy (Semen)	Semen	No Sperm Seen	Microbiology
Potassium, Serum	Blood in SST Tube	3.5-5.1 MMOL/L	Chemistry

Potassium, Urine	Random or timed urine	25 - 125 MMOL/24 hrs	Chemistry
Primidone	Blood in Red Top Tube	See Lab Report	Shipping
ProBNP	Blood in SST Tube	See lab report for interpretation	Chemistry
Procainamide, Serum	Blood in SST Tube	4-10 ug/mL	Shipping
Progesterone	Blood in SST Tube	See Lab Report	Shipping
Prolactin, Serum	Blood in SST Tube	Male: 3.7 – 17.9 MIU/mL Female: 3.0 – 18.6 MIU/mL	Shipping
Prostatic Acid Phosphates (PAP)	Blood in SST Tube, Bring to Shipping STAT	0-2.8 ng/mL	Shipping
PSA Total & Free(Prostatic Specific Antigen):	Blood in SST Tube	See Lab Report	Shipping
Protein, Body Fluid	Body fluid, i.e. pleural, synovial	No reference ranges available.	Chemistry
Protein, Bence-Jones	24 Hour urine	See Lab Report	Shipping
Protein C	Blood in Blue Top (Citrate), Bring to Shipping STAT	70-140%	Shipping
Protein, Cerebrospinal Fluid	CSF	12 – 60 mg/dL	Chemistry
Protein Electrophoresis (SPEP)	Blood in SST Tube	See Lab Report	Shipping
Protein S	Blood in Blue Top (Citrate), Bring to Shipping STAT	See Lab Report	Shipping
Protein, Screening, Urine	Urine	Negative	Urinalysis
Protein, Total, Serum	Blood in SST Tube	6.3 – 8.2 g/dL	Chemistry
Protein, Urine	Random or 24 Hour urine	Random <12.0 mg/dl 24HR 42 – 225 mg/24hrs	Chemistry
Prothrombin Time (PT)	Blood in Blue top tube. Refer to specific information in hematology section and general section (order of draw and transfer).	Approximately 11-14 seconds. Established and rechecked periodically and sent with report.	Hematology
Protoporphyrin Zinc (ZPP)	Blood in 7 mL lavender top, protect from light	< 35 ug/dL	Shipping
Pyridoxal Phosphate (Vitamin B 6, plasma)	Blood in Lavender top tube, protect from light, Bring to Shipping STAT	See Lab Report	Shipping
Pyruvate Kinase Screen	Blood. Call lab for specific instructions, or have lab draw blood	See Lab Report	Shipping
Quinidine, Serum	Blood in SST Tube	2-5 ug/mL	Shipping
Rabies Titer	Blood in SST Tube	See Lab Report	Shipping
RBC Folate	Blood in Lavender Top Tube, protect from light	> 145 ng/mL cells	Shipping
Red Blood Cells for Transfusion - See Packed Red cells			Blood Bank
Reducing Substance (Clinitest)	Random clean catch urine	Negative	Urinalysis

Renin (Angiotensin)	Blood collected in Pre-chilled EDTA tube, Bring to Shipping STAT	See Lab Report	Shipping
Respiratory Syncytial Virus (RSV)	Nasal Wash	Negative	Microbiology
Reticulocyte Count	Blood in Lavender top tube	Adult: 0.4 -2.4%	Hematology
Rheumatoid Factor	Blood in SST Tube	0.0 – 12.0 IU/mL	Chemistry
Rh Immune Globulin, (Rhogam - Rh Negative Patient) ABO/Rh and antibody screen must also be requested	Blood in Lavender Top Tube	See lab report	Blood Bank
Rh Typing - See ABO/Rh			Blood Bank
Ritalin (Methylphenidate)	Blood in Plain Red Top Tube	5-23 ng/mL	Shipping
Rocky Mountain Spotted Fever	Blood in SST Tube, acute & convalescent recommended. Convalescent not required.	See Lab Report	Shipping
Rotavirus	1 Gram stool or rectal swab, Bring to Shipping STAT	Negative	Shipping
RPR	Blood in SST Tube	Nonreactive	Immunology
Rubella IgG	Blood in SST Tube	Immune or non immune See lab report for interpretation	Chemistry
Rubella Titer, IgG	Blood in SST Tube, Acute and convalescent required, Draw conv. 14-21 days after acute.	See Lab Report	Shipping
Salicylate	Blood in SST Tube	Therapeutic: 0 - 20 mg/dL Toxic: > 20 mg/dL	Chemistry
Semen Analysis and Post-vasectomy	Semen, Requires appointment, send patient to the lab.	See report	Microbiology
Serum Aspartate Aminotransferase See AST)	Blood in SST Tube	See AST	Chemistry
Serum Alanine Aminotransferase (See ALT)	Blood in SST Tube	See ALT	Chemistry
Sickle Cell Preparation	Blood in Lavender top tube	Negative	Hematology
Sinequen Level See Doxepin			Shipping
Smooth Muscle Antibody	Blood in SST Tube	Negative	Shipping
Sodium, Urine	Random or 24 hour urine	Random 30 – 90 MMOL/L 24 HR 40 - 220 MMOL/24 hrs	Chemistry
Sodium, Serum	Blood in SST Tube	137 - 145 MMOL/L	Chemistry
Somatocedin C	Blood in SST Tube	See Lab Report	Shipping
Specific Gravity, Urine	Random or timed urine	1.002-1.035	Urinalysis

Spinal Fluid (Histology)	1-2 mL spinal fluid (No fixative) BRING TO SHIPPING STAT	Anatomic Pathology	AP
Sputum Culture, routine	Sputum, first morning specimen preferred, Collect specimen resulting from deep cough into a sterile container.	Microbiology	Microbiology
Stool Culture Routine/Campylobacter/E. Coli 0157.H7	Orange topped C & S vial for stool specimen recommend submission of 2 samples, collected 2 different days.	Negative for Salmonella, Shigella, Campylobacter, and E. Coli 0157.H7	Microbiology
Stone Risk Analysis	Get special container from Lab	See Lab Report	Shipping
Sweat Chloride	Requested from provider	Patient sent down town	Memorial
Tay-Sachs Screen (Hexosaminidase A)	Blood in SST Tube, Bring to Shipping STAT	See Lab Report	Shipping
Testosterone, Serum	Blood in SST Tube	See Lab Report	Shipping
THAT Antibody (Anti-Thyroid Antibody)	Blood in SST Tube	Negative	Shipping
Theophylline, Serum	Blood in SST Tube	10-20 ug/mL	Chemistry
Throat Culture, Routine	Throat swab,Collection: Depress tongue and rub swab vigorously over each tonsillar area and posterior pharynx. Any exudate should be touched and care taken to avoid the tongue and uvula. Place in Culturette.	Negative for group A beta-hemolytic streptococci	Microbiology
Thyroglobulin Antibody (TGA)	Blood in SST Tube	See Lab Report	Shipping
Thyroid Stimulating Hormone, TSH, ultrasensitive TSH	Blood in SST Tube	0.465 – 4.68 uIU/ML	Chemistry
Thrombin Time (TT)	Blood in Blue top tube. Refer to specific information in hematology section and general section (order of draw and transfer).	See Lab Report	Shipping
Thyroxine Total T4	Blood in SST Tube	See Lab Report	Shipping
Thyroxin Binding Globulin (TBG)	Blood in SST Tube	See Lab Report	Shipping
Tissue Culture	Sample of tissue submitted in sterile container with a little sterile saline to keep sample moist	NG 72 hours	Microbiology
Tissue exam: See Anatomic Pathology SOP			
Tobramycin	Blood in Plain Red Top Tube	See Lab Report	Shipping
Tofranil See Imipramine			Shipping
Torch Screen (Includes: Toxoplasma IgM, Rubella IgM, CMV, Herpes, IgG I & II)	Blood in SST Tube	See Lab Report	Shipping
Total T3	Blood in SST Tube, Put in comments any thyroid medications	0.97 – 1.69 ng/mL	Chemistry
Total Iron Binding Content, direct (dTIBC)	Blood in SST Tube	MALE 261 – 462 ug/dL FEMALE 265 – 497 ug/dL	Chemistry

Toxicology, Drug Screen, Urine	Random urine	Negative; Refer to lab report for cutoff values	Chemistry
Transferrin	Blood in SST Tube	286 - 381 mg/dL	Chemistry
Transfusion Reaction Work-up, Request Form: Transfusion reaction report form (FC MEDDAC Form 32)	Blood in Red top tube AND lavender top tube AND first voided urine	No evidence of hemolytic incompatibility	Blood Bank
Triglyceride	Blood in SST Tube , patient must be fasting	Normal <150 mg/dL Borderline High 150-199 High 200 – 499 mg/dL Very High >500 mg/dL	Chemistry
Troponin I	Blood in SST Tube	< 0.012 ng/mL See Lab Report for interpretation	Chemistry
Trypsin, Stool (Chymotrypsin)	10 g Stool, Bring to Shipping STAT	See Lab Report	Shipping
Tularemia	Blood in SST Tube	See Lab Report	Shipping
Type and Crossmatch, one SF 518 for each unit.	Blood in 7 mL Purple Top Tube. Typenex labeling system must be used and must have date, time, and phlebotomist's initials on the tube label.		Blood Bank
Type and Screen, one SF 518 for each unit; minimum of two.	Blood in 7 mL Purple Top Tube. Typenex labeling system must be used and must have date, time, and phlebotomist's initials on the tube label.		Blood Bank
Tyrosine	Blood in Green top tube (heparin), Bring to Shipping STAT, fasting required	See Lab Report	Shipping
Urea Nitrogen, Serum See BUN, Serum	Blood in SST Tube	See Lab Report	Chemistry
Urea Nitrogen, Urine	24 hour urine	12 – 20 g/24hours	Chemistry
Uric Acid, Serum	Blood in SST Tube	MALES: 3.5 – 8.5 mg/dL FEMALES: 2.5 – 6.2 mg/dL	Chemistry
Uric Acid, Urine	24 Urine	250-750 mg/24 HRS	Chemistry
Urinalysis	Random or Cath urine	See Lab Report	Urinalysis
Urine Anaerobic Culture, Suprapubic Puncture	Suprapubic urine aspirate only, Collection: Collect specimens from the prepared site using sterile techniques	No growth of anaerobic bacteria	Microbiology
Urine Culture	Clean Catch, Cath urine	No growth	Microbiology
Urobilinogen Screen, Qualitative	50 mL random urine, protect from light	See Lab Report	Shipping
Vaginal Culture	Bacterial Culturette	Normal Flora	Micro
Valium See Diazepam			
Valproic Acid	Blood in SST Tube	15 - 120 ug/mL	Chemistry
Vancomycin	Blood in SST Tube	TROUGH: 5-10 ug/mL PEAK: 30-40 ug/mL	Chemistry
Varicella IgG (Chicken Pox)	Blood in SST Tube	Immune or Non-Immune	Shipping
VDRL, CSF or Serum	1.0 mL CSF or Blood in SST Tube	Nonreactive	Shipping

Viral Culture	Swab area where active lesion is with the viral culturette, advise if pregnant	See Lab Report	Shipping
Vitamin B-12 (Cobalamin)	Blood in SST Tube, Protect from light	239 - 931 pg/mL	Chemistry
Vitamin D, 1,25	Blood in SST Tube, Bring to Shipping STAT	See Lab Report	Shipping
Vitamin E	Blood in SST Tube, Bring to Shipping STAT	See Lab Report	Shipping
VMA Vanilla Mandelic Acid	24 Hour Urine with preservative. Patient should be off medications for 72 hrs, diet restrictions: pineapples, bananas, eggplant, kiwi fruit, plums, walnuts, tomatoes, and grapefruit.	See Lab Report	Shipping
Watson Schartz Screen: See Porphobilinogen			
Wound Culture	Pus or other material properly obtained from a wound site or abscess onto bacterial culturette	No Growth	Microbiology
Xylocaine See Lidocaine			Shipping
Yellow Fever	Blood in SST Tube, acute and convalescent. Required	See Lab Report	Shipping
ZZP- ZNPP see Protoporphyrin zinc			

References:

a. Clinical Laboratory Technical Procedure Manuals: Approved Guidelines 5th Edition, Wayne PA. Clinical Laboratory Standards Institute, 2006(CLSI GP2-A5).
b. Department of Defense Clinical Laboratory Improvement Program, AFIP PAM 40-24. Rockville, MD. Armed Forces Institute of Pathology-ZD.2007.
c. Quality Systems in the Blood Bank Environment, 2nd Edition, Abbott Park IL. Abbott Quality Institute 1998.
d. Clinical Laboratory Improvement Manual, CAP, Northfield, Illinois, Current Edition.
e. Standards for Laboratory Accreditation, CAP, Northfield, Illinois, Current Edition.
f. Accreditation Manual for Pathology and Clinical Laboratory Services, Joint Commission on Accreditation of Health Care Organizations, Chicago, Illinois Current Edition.
g. CAP Master Activity Menu, www.cap.org. Current edition.
h. AR 600-110, Identification, Surveillance, and Administration of Personnel Infected with Human Immunodeficiency Virus (HIV).
i. CLSI Documents GP16-A, H3-A5, H4-A4, H21-A4, M28-A, M29-A.
j. MEDDAC Regulation 40-31, Autopsy Criteria and Procedures.
k. MEDDAC Regulation 40-31-2, Point of Care Laboratory Testing.
l. MEDDAC Regulation 40-31-4, Morgue Operations Concerning the Receipt and Release of the Deceased.
m. MEDDAC Regulation 40-31-5, Blood & Blood Components.