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Special Specimen Collection and Handling
Please refer to Specimen Handling section on www.aruplab.com for all special
specimen collection and handling information.

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ACCEPTABLE SPECIMEN VOLUMES

Test entries list minimum acceptable specimen volumes. The minimum volume is defined as the absolute minimum needed to run a validated test algorithm. If there is insufficient specimen volume for testing, attempts will be made to locate any additional specimen collected by your lab on the same date and time. There may be delays in this case, and the request may be referred to ARUP's Exception Handling Department.

ACCREDITATION/LICENSURE

ARUP participates in the CAP (College of American Pathologists) Laboratory Accreditation Program and is CLIA (Clinical Laboratory Improvement Amendments) certified. ARUP also maintains current licenses, permits, and registrations required by state or local regulations. For additional information or copies of certificates, please refer to ARUP's website at www.aruplab.com or contact ARUP Client Services.

CLINICAL RESEARCH AND STUDY TESTING

Prior to the submission of study specimens and, preferably, prior to collection, contact ARUP's Clinical Research & Studies Department at (801) 583-2787 or (800) 242-2787. Study specimens submitted under a clinical account must meet all requirements for the submission of clinical specimens.

CPT CODES

The American Medical Association's Current Procedural Terminology (CPT®) codes in ARUP's Laboratory Test Directory are provided for informational purposes only. The codes reflect our interpretation of CPT coding requirements based on annually published AMA guidelines. CPT codes are provided only as a guide to assist clients with billing. ARUP strongly recommends that clients confirm CPT codes with their Medicare administrative contractor, as requirements may differ. CPT coding is the sole responsibility of the billing party. ARUP Laboratories assumes no responsibility for billing errors due to reliance on the published CPT codes.

CRISIS CONTINGENCY PLAN

ARUP maintains a corporate contingency plan for crisis recovery and business continuation. The purpose of this plan is to ensure prompt recovery of ARUP Laboratories' critical business functions in the event of a crisis affecting any aspect of our continued patient care service. In the event of a local, regional, or national crisis that adversely affects timely delivery of specimens to ARUP facilities, ARUP will expeditiously initiate specific client-notification procedures to provide clients with necessary information and instruction on prearranged transportation and testing alternatives.

HEALTH INSURANCE PORTABILITY AND ACCOUNTABILITY ACT (HIPAA)

ARUP Laboratories is committed to complying with privacy and security standards promulgated in the Health Insurance Portability and Accountability Act (HIPAA) and the Health Information Technology for Economic and Clinical Health Act (HITECH).

ARUP has implemented policies, processes, and procedures designed to ensure compliance with these standards. Compliance is continuously monitored and audited for effectiveness. Workforce training is completed annually.

ARUP's Notice of Privacy Practices may be found at www.aruplab.com.

ARUP complies with the security standards by ensuring that systems, policies, and procedures meet or exceed all required and addressable implementation specifications. Internet and interface connectivity is encrypted and/or password protected, and electronic access is limited to authorized entities. Breaches of protected health information (PHI) or other confidential business information are reviewed and reported to the Department of Health and Human Services (DHHS) as necessary.

For ARUP and HIPAA compliance, contact:

ARUP Privacy Officer
ARUP Laboratories
500 Chipeta Way, Salt Lake City, Utah 84108-1221
(800) 242-2787, ext. 5126

INAPPROPRIATE SUBMISSIONS

All specimens must be collected, labeled, transported, and processed according to procedure. Review the appropriate container type, volume, and special handling requirements needed for analysis before the specimen is collected. If any of the guidelines for these processes are not met, the specimen may be rejected or the test may be canceled. ARUP's Exception Handling Department will contact the client for resolution. The following list represents some possible causes for specimen rejection or test cancellation:

- Inappropriate specimen type
- Insufficient volume for analysis
- Improperly labeled specimen
- Inappropriate specimen container
- Improper specimen transport
- Specimen has leaked in transit
- Specimen has been submitted in incorrect or expired transport media
- Incomplete or incorrect test request form (e.g., no tests marked)
- Test order without a specimen
- Specimen without a test order
- No specimen type provided
- No source provided*
- Compromised specimen (e.g., hemolysis, lipemic, or clotted specimens)

* The source of specimen, when appropriate, must be included on the paper or electronic request form. The source of specimen is required for all infectious disease testing, including PCR tests.

LABORATORY RESULT REPORTING

ARUP communicates laboratory results to clients by several means, including printed reports, web-enabled electronic results, direct interfaces, and access to Client Services for verbal results. Clients may request a phone notification or fax report by writing the request on the test request form or by adding a footnote to an electronic order. Enhanced reports, which are available for some tests, can be downloaded by clients and physician's from ARUP Connect™ via a user name and password that accompanies the original, text-based patient test result.

Preliminary results may be offered for infectious diseases and other tests in which a final report follows. Final results are generated at the completion of the test and may contain updated information from the preliminary result. When critical values are obtained, results are called to the physician or requesting lab.

ARUP Laboratories complies with state laws by reporting certain state-defined reportable diseases and conditions to state departments of health. These reports include patient demographics and test information as required by each state's regulations. It is the responsibility of the referring laboratory to follow applicable local and state reporting requirements.

CRITICAL RESULTS

ARUP's testing laboratories operate 24 hours a day, seven days a week. Critical results are reported as soon as testing has been completed and a critical result has been identified. ARUP reports critical results immediately to the contact(s) provided by our client(s) in accordance with the Laboratory Accreditation Program Inspection Checklists from the College of American Pathologists.

LOINC® CODES

The Logical Observation Identifier Names and Codes (LOINC) database provides a universal code system for reporting laboratory and other clinical observations. LOINC codes are being used by large reference laboratories and federal agencies (e.g., the CDC and the Department of Veterans Affairs) and are part of the HIPAA attachment proposal. To request LOINC codes, call Client Services at (800) 522-2787.

MEDICARE COVERAGE OF LABORATORY TESTING

When ordering laboratory tests that are billed to Medicare/Medicaid or other federally funded programs, the following requirements may apply:

1. Only tests that are medically necessary for the diagnosis or treatment of the patient should be ordered. Medicare does not pay for screening tests, except for certain specifically approved procedures, and may not pay for non-FDA-approved tests or tests considered experimental.
2. If there is reason to believe that Medicare will not pay for a test, the patient should be informed. The patient should sign an Advance Beneficiary Notice (ABN) to indicate that he or she is responsible for the cost of the test if Medicare denies payment.
3. The ordering physician must provide an ICD-9 diagnosis code, not a narrative description, if required by the Medicare administrative contractor.
4. Organ- or disease-oriented panels should be billed to Medicare only when every component of the panel is medically necessary.
5. ARUP- and client-customized panels should be billed to Medicare only when every component of the customized panel is medically necessary.
6. Medicare National Limitation Amounts for CPT codes are available through Centers for Medicare and Medicaid Services (CMS) or its contractors. Medicaid reimbursement will be equal to or less than the amount of Medicare reimbursement.

PANELS AND REFLEX TESTING

ARUP offers groups of tests based on accepted clinical practice, as well as those defined by the American Medical Association's Current Procedural Terminology (AMA CPT) codes. Components of these panels may be ordered individually, unless otherwise indicated.

ARUP offers reflex testing, in which additional testing will be performed on specimens depending on the results of the initial test. There are two types of reflex panels: standard reflex test panels and compulsory reflex test panels. A standard reflex test panel allows the physician the option of ordering either the reflex test group or a single test. A compulsory reflex test panel automatically generates a request for additional testing if the result of the initial test meets or falls outside certain ranges. In many cases, and especially in infectious diseases and blood bank procedures, compulsory reflex test panels have been predetermined based on specific medical criteria accepted as standard-of-care by the medical community. These panels may not be available for ordering at the individual component level.

PATIENT HISTORY FORMS

Patient history forms provide ARUP with information necessary to interpret patient results. Tests that require this information are identified in the Alphabetical Test List with the following icon:



These forms are available on www.aruplab.com and should be submitted with the test request form or electronic packing list.

PATIENT INFORMED CONSENT FORMS

Patient informed consent forms are required by state or federal laws for a number of genetic tests. ARUP has provided forms on our website for clients and their physicians who do not have their own forms. These forms should be filled out by the physician and patient and retained in the patient's file. The only test ARUP offers that requires the Informed Consent Form is Huntington Disease. The Huntington Disease test that requires this form is identified in the Alphabetical Test List with the following icon:



The request to order tests published in this Laboratory Test Directory certifies to ARUP that the ordering physician has obtained the informed consent of the patient as required by applicable state or federal laws for each test ordered and that the ordering physician has authorization from the patient permitting ARUP to report results of each test ordered to the ordering physician.

Counseling and informed consent are recommended for genetic testing. Consent forms are available on www.aruplab.com.

REFERENCE INTERVALS

ARUP strives to provide clear, unambiguous reference intervals and has adopted a non-overlapping style for age groups. For example, an age group listed as 0 to 2 years should be used for all subjects from birth up to their third birthday. When reference values have been obtained from literature, ARUP conducts validation testing to confirm the values. The literature-provided age groups may be revised by ARUP in order to conform to our standard style.

REFERRAL TESTING

One of ARUP Laboratories' service goals is to support clients by providing comprehensive service for all reference laboratory testing. To accomplish this goal, ARUP has enhanced its in-house test menu of over 3,000 tests and test combinations by selecting primary vendors to perform additional tests not performed at ARUP. Primary referral vendors are selected based upon a corporate protocol that considers the aspects of service, quality, reliability, turnaround time, and price.

Every effort is made to test specimens at ARUP or at a primary vendor's laboratory. If a client requests that a test be sent to a specific outside vendor and the test is performed at ARUP Laboratories, an additional fee will be added.

All referral specimens are shipped for next-day delivery, Monday through Thursday. Specimens are also shipped on Friday to referral laboratories that accept weekend delivery. Specimens for tests with short stabilities should not be shipped to ARUP Friday through Sunday.

ARUP's transport carriers recognize the following as official holidays. As a result, specimens will not be shipped to referral laboratories on the day before or the day of the following holidays:

New Year's Day	January 1
Memorial Day	Last Monday in May
Independence Day	July 4
Labor Day	First Monday in September
Thanksgiving	Fourth Thursday in November
Christmas	December 25

Specimens submitted for referral testing are shipped on Martin Luther King, Jr. Day and Presidents' Day.

ARUP reserves the right to change vendors and test parameters for referral testing at any time. If you would like additional information about ARUP's referral testing services, please contact the Referral Testing Department at (800) 242-2787, ext. 5145.

STAT TESTING

Clients requesting STAT testing must contact ARUP's Client Services Department. Client Services will immediately contact the appropriate laboratory for approval. If the request is approved, ARUP will ensure that testing is performed promptly.

ARUP realizes that situations arise which may make it impossible to obtain approval in advance (e.g., when the specimen is already in transit or already at ARUP when the STAT is requested). In these situations, please contact Client Services as soon as possible.

ARUP will assess a STAT testing fee for each STAT test performed. A STAT call-in fee will also be assessed if a technologist must be called in to perform the testing after normal laboratory operating hours. A STAT transport fee may be assessed if special transport is required.

SUPPLY ORDERS

ARUP provides specialty vacutainers, containers, and forms for the collection and transport of select laboratory specimens. The following specialty vacutainers may be ordered: yellow (ACD Sol. A), royal blue (EDTA), royal blue (Plain, Metal Free), SPS for microbiology, and hemogard tan (K2EDTA).

Additionally, ARUP provides test-specific collection and transport kits when required. Supplies may be ordered electronically using eSupply, or clients may contact a Client Services representative.

TEST TURNAROUND TIME

Turnaround time is defined as the usual number of hours or days between the time a specimen is received at ARUP and the time a test result is released. Testing schedules may change. Contact Client Services for information about current testing schedules.

%Total	percent total
A	angstrom
ADA	American Diabetes Association
Alc	alcohol
AMA	American Medical Association
APL	IgA phospholipid units
ARC	acid-resistant cells
ASHI	American Society for Histocompatibility and Immunogenetics
AU	arbitrary unit(s)
AU/mL	arbitrary unit(s) per milliliter
BAL	bronchoalveolar lavage
CAE	complement activity enzyme
CAP	College of American Pathologists
CDC	Centers for Disease Control and Prevention
CFU/mL	colony forming unit(s) per milliliter
CGG repeats	detection of mutation
CLSI	Clinical and Laboratory Standards Institute
cm	centimeter
CMS	Centers for Medicare & Medicaid Services
cP	centipoise unit
CPM	count(s) per minute
CPT	Current Procedural Terminology
cps/mL	copies per milliliter
cpy/mL	copies per milliliter
CRT	creatinine
crt	creatinine
CR	creatinine
cr	creatinine
CSF	cerebrospinal fluid
CVS	clean voided specimen
D	day
deg C	degree(s) Centigrade
dL	deciliter
EIA	enzyme immunoassay
EIU	enzyme immunoassay unit
ELISA	enzyme-linked immunosorbent assay
ETU/mL	endotoxin unit(s) per milliliter
EU	ELISA unit(s)
EV	ELISA value

f	femto
fL	femtoliter
fmol/L	femtomole(s) per liter
G	gram
g/24 hours	gram(s) per 24 hours
g/24 hrs	gram(s) per 24 hours
g/24h	gram(s) per 24 hours
g/d	gram(s) per day
g/dL	gram(s) per deciliter
g/g	gram(s) per gram
g/L	gram(s) per liter
GPL	IgG phospholipid unit(s)
Hb	hemoglobin
Hgb	hemoglobin
HIPAA	Health Insurance Portability and Accountability Act
HPF	high-powered field
hr	hour(s)
ISR	immune status ratio
IU	international unit
IU/24	international unit(s) per 24 hours
IU/24 hours	international unit(s) per 24 hours
IU/24 hrs	international unit(s) per 24 hours
IU/24h	international unit(s) per 24 hours
IU/g	international unit(s) per gram
IU/L	international unit(s) per liter
IU/mL	international unit(s) per milliliter
IV	index value
kDa	kilodalton
kg	kilogram
kPa	kilopascal
kU/L	kilounit(s) per liter
L	liter
lb	pound(s)
LOINC	Logical Observation Identifier Names and Codes
LIA	Microlatex Particle-Mediated Immunoassay
LI	Lyme Index
LIV	Lyme Index Value
log	log

KEY TO UNITS AND ABBREVIATIONS

QUALITY, TRUST, & RELIABILITY

log IU	log international unit(s)
LPF	low-powered field
M/ μ L	million(s) per microliter
mcg	microgram
mcg/dL	microgram(s) per deciliter
mcg/g	microgram(s) per gram
mcg/L	microgram(s) per liter
mcg/mL	microgram(s) per milliliter
mg	milligram
mg/24 hours	milligram(s) per 24 hours
mg/24 hrs	milligram(s) per 24 hours
mg/24h	milligram(s) per 24 hours
mg/d	milligram(s) per day
mg/dL	milligram(s) per deciliter
mg/g	milligram(s) per gram
MIC	minimum inhibitory concentration
min	minute(s)
mIU	milli international unit(s)
mIU/hr	milli international unit(s) per hour
mIU/L	micro international unit(s) per liter
mL	milliliter
mL/min	milliliter(s) per minute
mm	millimeter
mm/hr	millimeter(s) per hour
mm/h	millimeter(s) per hour
mM creatinine	millimole(s) of creatinine
mmol	millimole
mmol/24 hours	millimole(s) per 24 hours
mmol/24 hrs	millimole(s) per 24 hours
mmol/24h	millimole(s) per 24 hours
mmol/d	millimole(s) per day
mmol/L	millimole(s) per liter
mmol/m	millimole(s) per meter
mmol/mol crt	millimole(s) per mole creatinine
mmol/mol CRT	millimole(s) per mole creatinine
mol	mole
mOsm	milliosmole(s)
mOsm/kg	milliosmole(s) per kilogram
MPL	IgM phospholipid units

mPOL	milli polarization unit
mU	milliunit
mU/g	milliunit(s) per gram
mU/L	milliunit(s) per liter
mU/mL	milliunit(s) per milliliter
NCCLS	National Committee Clinical Laboratory Standards (now known as Clinical and Laboratory Standards Institute)
ng	nanogram
ng/dL	nanogram(s) per deciliter
ng/L	nanogram(s) per liter
ng/mL	nanogram(s) per milliliter
ng/mL/hr	nanogram(s) per milliliter per hour
nmBCE	nanomole(s) of bone collagen equivalents
nm/dL	nanomole(s) per deciliter
nM/mM	nanomole(s) per millimole
nmolBCE	nanomole(s) of bone collagen equivalents
nmol/mmol	nanomole(s) per millimole
nmo/mL	nanomole(s) per milliliter
nmol	nanomole
nmol/24 hours	nanomole(s) per 24 hours
nmol/24 hrs	nanomole(s) per 24 hours
nmol/24h	nanomole(s) per 24 hours
nmol/d	nanomole(s) per day
nmol/dL	nanomole(s) per deciliter
nmol/g	nanomole(s) per gram
nmol/L	nanomole(s) per liter
nmol/mL	nanomole(s) per milliliter
OD	optical density (equivalent to absorbance)
PCR	polymerase chain reaction
pg	picogram
pg/mL	picogram(s) per milliliter
pmol	picomole
pmo/mL	picomole(s) per milliliter
pmol/g	picomole(s) per gram
pmol/L	picomole(s) per liter
ppm	part(s) per million
PPT	plasma preparation tube
PST	plasma separator tube
RPR	rapid plasma reagin

QNS	quantity not sufficient
SAU	standard IgA beta-2 glycoprotein unit(s)
SD	standard deviation
sec	second(s)
SGU	standard IgG beta-2 glycoprotein unit(s)
SI	stimulation index
SI unit	international system of unit(s)
SMU	standard IgM beta-2 glycoprotein unit(s)
SST	serum separator tube
TNP	testing not performed
TV	total volume
TOI	tincture of iodine
U	unit
U/24 hours	unit(s) per 24 hours
U/24 hrs	unit(s) per 24 hours
U/24h	unit(s) per 24 hours
U/day	unit(s) per day
U/g	unit(s) per gram
U/g Hb	unit(s) per gram of hemoglobin
U/gHgb	unit(s) per gram of hemoglobin
U/hr	unit(s) per hour
U/L	unit(s) per liter
U/mL	unit(s) per milliliter
U/mLWB	unit(s) per milliliter whole blood
UUHSC	University of Utah Health Sciences Center
%	percent
µg	microgram
µg/24 hours	microgram(s) per 24 hours
µg/24 hrs	microgram(s) per 24 hours
µg/24h	microgram(s) per 24 hours
µg/d	microgram(s) per day
µg/dL	microgram(s) per deciliter
µg/g	microgram(s) per gram
µg/g crt	microgram(s) per gram creatinine
µg/g CRT	microgram(s) per gram creatinine
µg/gHb	microgram(s) per gram hemoglobin
µg/L	microgram(s) per liter
µg/mg	microgram(s) per milligram
µg/min	microgram(s) per minute

µg/mL	microgram(s) per milliliter
µgE/mL	microgram equivalent(s) per milliliter
µIU/mL	micro international unit(s) per milliliter
µL	microliter
µmol	micromole
µmol/ 24 hours	micromole(s) per 24 hours
µmol/ 24 hrs	micromole(s) per 24 hours
µmol/ 24h	micromole(s) per 24 hours
µmol/d	micromole(s) per day
µmol/dL	micromole(s) per deciliter
µmol/g	micromole(s) per gram
µmol/L	micromole(s) per liter
µmol/m	micromole(s) per meter
µmol/mL	micromole(s) per milliliter
µU/mL	microunit(s) per milliliter
µ/mL WB	microgram(s) per milliliter whole blood
WB	whole blood
wk	week(s)
y	year(s)

COMPONENTS OF A LABORATORY TEST RESULT

A laboratory test result issued by ARUP or most any other clinical laboratory in the United States has several components:

- The result itself, which may be a number (numeric), words (alphabetic), or both (alphanumeric)
- A reference interval, as applicable
- A flag, as applicable; available flags include H (high), L (low), A (abnormal), and C (critical)
- Additional interpretive comments and/or footnotes, as applicable

ESTABLISHING REFERENCE INTERVALS

To assist physicians and other care providers with interpreting test results, ARUP provides reference values, if available, for tests. The original concept of a reference interval (formerly referred to as a normal range) was the central 95 percent of results from a healthy volunteer population. Such an interval divides results into low, normal, and high. Some tests, such as serum sodium, use this form of reference interval. Other tests, however, use reference intervals based on the expected values in different disease states, and some have multiple gradations of normal and abnormal.

ARUP uses the Cerner Millennium® PathNet® laboratory information system (LIS) to manage test results. Like most other laboratory information systems, Millennium PathNet functions simplistically; it does not allow multiple gradations in reference interval reporting, which would distinguish equivocal from positive results.

For tests such as serum sodium for which the traditional form of the reference interval is applicable, ARUP uses the Millennium PathNet reference interval function. The reference interval automatically appears next to the test result in ARUP's System 2000® and paper chart formats. The reference interval will also be passed across HL7 interfaces into client lab information systems, which will likewise allow similar charting functions.

For many tests, however, the use of a traditional reference interval would oversimplify the test results and mislead physicians and other care providers (see examples on the next page). In such cases, ARUP's medical directors often choose to present interpretive information in the form of a textual footnote comment attached to the result rather than rely on the reference interval function in our LIS.

MECHANISMS FOR SETTING HIGH/LOW FLAGS

When a test has been set up in our LIS with a numeric result type, and if a reference interval has been defined in the LIS for that test, then the high/low flags will automatically appear for each test result based on that reference interval. A numeric result that is greater than the upper end of the reference interval will automatically flag as "H," and a numeric result that is less than the lower end will automatically flag as "L."

Tests with a numeric result type, for which no reference interval is defined in the LIS, do not trigger any flags regardless of the result (see examples on the next page). Tests set up with an alphanumeric result type are flagged according to rules defined in the LIS by ARUP. For example, ARUP might flag a test result of positive as either high or abnormal.

COMPLEXITIES IN FLAGGING TEST RESULTS

Use of a single reference interval that categorizes results as high, low, or abnormal works well for tests such as serum sodium where the interpretation is best made in comparison to results in a healthy population. However, for other tests, especially highly esoteric ones, the traditional concepts of high, low, or abnormal do not apply cleanly, and flagging results in this fashion can be misleading.

The following examples demonstrate the oversimplification and misinformation that could occur if traditional reference intervals were used:

EQUIVOCAL TEST RESULTS FOR WEST NILE VIRUS IgG

West Nile Virus IgG, like most other infectious serology tests, has three result categories: a numeric result of <1.3 is negative; a result of 1.3 to 1.5 is equivocal; and >1.5 is positive. An H flag would be assigned for results >1.5 and an L flag for results <1.3. No mechanism exists for defining an equivocal range inside or alongside a reference interval. For these reasons ARUP's immunology laboratory has historically chosen not to define a reference interval in the LIS for these tests; instead the lab provides interpretive information in a comment that accompanies each test result.

POSITIVE TEST RESULTS FOR MEASLES IgG

For measles IgG, at least two plausible clinical scenarios exist that have very different charting implications. Determining whether to flag a positive result as normal or abnormal is not straightforward. For an unvaccinated child, a positive result would be clearly abnormal, and it might seem reasonable to flag such a result as high. The same result on a vaccinated child, however, would be considered normal, and a high flag would be misleading. Conversely, in a vaccinated child, a negative test is usually abnormal and reflects a need for a booster vaccination, and so it would seem reasonable to have it trigger a low flag. But in an unvaccinated child with a history of viral rash, this would simply be a negative result.

COMPLIANT OR ILLICIT USE OF OPIATES

Opiate testing is ordered in two major clinical settings, both of which are very common in pain clinics. For patients who have been prescribed opiates, the test is used to verify that the patient is taking the drug and thus presumably not diverting the drug into the black market. For such patients it would seem reasonable to flag negative results as low and not flag positive results. On the other hand, for patients not prescribed opiates, the test is used to detect illicit opiate use. In this setting, it would seem reasonable to flag positive results as high and not flag negative results.

LIMITATIONS OF CHARTING SYSTEMS

Many ARUP client laboratories issue laboratory results to their physicians in the form of paper charts. A few of these charting systems display the results in the form of normal and abnormal columns. In order to determine in which column to place a result, these systems typically look for the presence of a flag (H, L, C, or A); all flagged results display in the abnormal column, and everything else in the normal column.

Knowing whether a result is normal or abnormal for a given patient depends on clinical context; making that designation on a chart based simply on the existence of a flag or footnote is simplistic and at times misleading to the clinician. It is critical that physicians review all test results, not just the ones that a laboratory has labeled as abnormal. As illustrated in the examples above, it is not always possible for ARUP Laboratories to define reference ranges and flag settings in our LIS in ways that satisfy all the major clinical settings in which a test is used. ARUP does not recommend the practice of charting results in normal and abnormal columns.

COMMON ROOT CAUSES

As a reference laboratory, ARUP Laboratories, Inc., receives more than 30,000 specimens from across the United States daily. Quality is of utmost importance at ARUP. Accuracy and clarity of laboratory reports, appropriateness of samples, labeling, transport conditions, and assay precision are continually monitored. Only a small percentage of tests are cancelled; one reason a test may be cancelled is that the volume received was not sufficient for testing. Whenever a specimen volume is deemed unsuitable for testing, ARUP will immediately notify clients of the problem. Listed below are some of the more common reasons why ARUP may not be able to perform an ordered test on a particular specimen.

For additional information, please contact our Client Services Department, which is staffed 24 hours a day, seven days a week, via email at clientservices@aruplab.com or at (800) 522-2787.

Compromised specimen: Specimen received was compromised during shipping, receiving, or test preparation process.

One or more of the following events occurred:

- Specimen was shipped in a non-approved container. A container must be capable of withstanding pressure differentials of 95 kPa or greater.
- Specimen leaked during delivery or thaw.
 - Cap was not tightly seated (e.g., cap was not tightened; specimen was shipped in a vacutainer whose stopper had been removed and resealed; or incorrect cap was placed on the tube).
 - Parafilm was used to seal the tube (e.g., instead of a cap or to further seal a capped tube, parafilm was used; parafilm contracts and expands during pressure and temperature changes and may loosen a cap).
 - Sealed tube cracked (e.g., because a shipping rack was not used, dry ice blocks or other heavy contents cracked or broke the specimen tube during shipping).
 - In some cases it may not be clear why the specimen leaked.

See **Specimen Transport Guide** for the appropriate container type, volume, and special handling requirements. Specimens may be rejected if any of the requirements for these processes are not met.

Insufficient specimen volume: Specimen received was less than the minimum published volume.

- The volume listed in the ARUP Laboratory Test Directory is the minimum volume required. If less than the minimum volume is received, ARUP may reject the specimen for testing.

Depleted specimen volume: ARUP received the published minimum volume; however, that volume was depleted during the testing process. One or more of the following events occurred:

- ARUP needed to repeat the test to ensure that the results were correct.
 - A technical error may have occurred during the first round of testing, which required that the test be run again.
 - The clinical picture, including the results of related tests, did not match the initial result of this test, and the test was repeated to verify the results.
- The client ordered a group test.
 - A group test requires several component tests be performed. The specimen volume sent was insufficient to perform all of the component tests.
- The client requested that several different tests be performed on one specimen.
 - To meet this requirement, the specimen is divided among test tubes and sent to different sections of the lab. However, in the process of dividing the specimen, the volume can be decreased and at times depleted.

- The specimen was sent to a referral laboratory that required a larger specimen volume.
 - When ARUP cannot perform a test due to temporary instrumentation or reagent difficulties, ARUP sends the specimen to another laboratory to be performed. Sometimes, the referral laboratory requires more specimen volume than ARUP does.
- Due to an ARUP handling error, insufficient sample volume remained to complete the correct test.

TROUBLESHOOTING

ARUP will:

- Immediately notify clients of insufficient or depleted specimen volumes.
- Attempt to locate additional specimen collected on the same day at the same time.
 - Sometimes, ARUP will dilute a specimen to increase the usable volume; however, dilution is not a viable option for all tests.
- Continually monitor assay performances and recommend changes in laboratory processes when indicated.

ARUP recommends that:

- Clients review and comply with the specimen volumes required for each test in the ARUP Laboratory Test Directory.

