MCL SPOTLIGHT: NIGHT SHIFT AT MERCY CLINICAL LABORATORY

While most of us are sleeping, a very special group of professionals is working at Mercy Clinical Laboratory (MCL), performing and reporting test results. Along with the technical staff in departments mentioned below, support staff are also working, answering the phone and processing samples for testing.

The Specimen Management night shift staff includes two lab assistants in Processing and two lab assistants in Phlebotomy. Approximately 100 specimens per night are logged in and processed to make ready for testing. Phlebotomy draws approximately 60 patients per night.

Every night, three techs staff the Core Lab with one person assigned to each department, Blood Bank, Chemistry, and Hematology. The night shift plays an important role in performing analyzer maintenance during hours of lower volume. All night shift staff also run quality control samples and monitor reagents. Hundreds of samples are tested each night, including chemistry tests, CBCs, differentials, coagulation, urinalysis, body fluid analysis and cell counts. The tech in Blood Bank is fulfilling blood product requests throughout the night, handling uncrossmatched blood for traumas and preparing special product needs for surgical cases.

The Mercy Histocompatibility Lab (HLA Lab), a department of MCL, performs compatibility testing for the Mercy Transplant Center, the UnityPoint (Methodist) Kidney Transplant Program and the Iowa Donor Network. Testing includes tissue typing of potential recipients and donors, HLA antibody testing on the potential recipients, and HLA compatibility testing between recipients and living or deceased donors. A technologist from the HLA lab is on call during the hours the lab is not routinely staffed, and is frequently called in on the night shift when an organ becomes available. The transplant coordinator is in communication with the HLA lab during this time to manage the transplant process.

The Histology department has staff working during the overnight hours to ensure tissue samples are analyzed in a timely manner. Each evening, surgical technicians place all tissue samples into the processors by 8:30 p.m. One staff member works until 12:30 a.m. preparing pap smear slides for evaluation by a cytotecnologist. Histotechs begin their shift around 3 a.m., to embed tissue in paraaffin, cut the block of tissue for slide creation, and distribute slides to the pathologists for reading and subsequent diagnosis within 24-48 hours of specimen receipt.

The Microbiology department has one technologist working each night from 9 p.m. until 7 a.m. Some of the testing performed at night includes Biofire® PCR panels, C. difficile and M. tuberculosis PCR, Mycoplasma testing, MRSA screens, environmental cultures, and QuantiFERON® Gold Plus testing. Culture plates are set up on specimens that come in and gram stains are performed. Positive blood cultures that are flagged on the BacT Alert® instrument are pulled and processed.

The Client Services department is staffed with one or two employees focused on reporting critical values promptly, faxing results, taking courier requests for the next day, fax verification, and answering a variety of questions to ensure patient care continues.

Testing performed on the night shift gives valuable information to providers so proper treatment can be started, improving patient outcomes. The staff members working on night shift are dedicated to providing accurate, accessible and timely laboratory results to our patients and providers.

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The mission of Mercy Clinical Laboratory (MCL) is to provide accurate, accessible and timely laboratory results to health care providers and patients. Recently, an inquiry was received from a provider regarding the accuracy of a Free T4 (FT4) result obtained on a patient because the patient’s clinical status did not correlate with the result. MCL takes very seriously any concerns like this, and initiated an immediate quality review of the test.

First, both internal quality control (QC) data and external controls (i.e. proficiency testing, peer group, etc.) were reviewed to determine if there was a system issue at the time of testing. Finding no apparent cause for the discrepancy, and because the sample in question had been discarded, a correlation study was performed for FT4. Samples were tested at MCL and a portion of the same samples were referred to Mayo Medical Laboratories, which utilizes the same testing platform. This correlation study found that MCL was reporting FT4 values slightly higher than what Mayo was reporting. Concurrently, MCL reviewed normal reference ranges for FT4 to ensure clinicians were guided appropriately with interpretation of results based on test method used. The reference ranges were found to be appropriate, but the root cause of the high FT4 had not yet identified.

Digging deeper, the laboratory reviewed all FT4 test calibration records prior to, at the time of, and after the questionable results were obtained. As a result of this research, a shift in quality control data (and patients) had occurred following a single calibration and had gone undetected. Why undetected? The QC ranges were set too wide, so when a shift occurred, QC results were still found to be acceptable. Following this discovery, a comprehensive review of QC ranges was performed to ensure acceptable range limits are set that enable detection of test changes.

Laboratories are mandated by Clinical Laboratory Improvement Amendments (CLIA) to run commercial products with known concentrations of analytes at defined times throughout the analytical run. This requirement enables the laboratory to detect any changes in the test system so that inaccurate patient results are not released. Establishing appropriate QC ranges that reflect the test system and will alert the laboratory when a change has occurred is crucial to this process. The challenge lies in setting ranges that are not too restrictive to result in an increased number of “out of range” results that require investigation unnecessarily, but tight enough to detect any shifts in reported values.

This scenario demonstrates that laboratory testing is not absolute. While there are processes in place to prevent erroneous results, inaccurate reporting can occur. The overall correlation of laboratory results to the patient’s clinical condition lies with the health care provider. If at any time, a provider questions results obtained by MCL or any other laboratory, the performing laboratory should be notified so that investigative activities can be initiated and patient samples retested.

Sexually transmitted diseases (STDs) are on the rise in the United States. Rates have increased for a third straight year. Numbers from 2016 show the following increases from 2015:

- **1.59 MILLION CASES OF CHLAMYDIA**, **UP 4.7%**
- **468,514 CASES OF GONORRHEA**, **UP 18.5%**
- **27,814 CASES OF SYPHILIS**, **UP 17.6%**

Left untreated, STDs can cause an increased risk of giving or getting HIV, long-term pelvic/abdominal pain, and inability to get pregnant or pregnancy complications. Getting tested is the only way to know for sure if someone has an STD.

Mercy Clinical Laboratory (MCL) offers molecular polymerase chain reaction (PCR) testing for chlamydia and gonorrhea which can be conveniently performed from a ThinPrep® PAP vial or from a Cobas® transport tube. MCL also offers syphilis blood testing which detects Treponema pallidum antibodies. This testing, performed in our laboratory, gives the health care provider accurate results within a short timeframe, to allow treatment to be started in a timely manner.
WHEN TO ORDER QUANTIFERON-TB GOLD TESTING

Mercy Clinical Laboratory (MCL) offers in-house QuantiFERON®-TB Gold Plus (QFT®-Plus) testing. QFT®-Plus is the next generation of Interferon-gamma Release Assay (IGRA) testing for tuberculosis (TB) detection.

The CDC recommends IGRA for testing in most risk groups including:

- Those likely to be infected with TB
- Anyone with low or intermediate risk of disease progression
- Those for whom it has been decided that testing for latent TB is warranted

IGRAs are also strongly recommended in those who are BCG-vaccinated, or who are unlikely to return to have their TB skin test (TST) read.

Early detection of TB infection is critical to the spread of the disease. Approximately ten percent of those infected with latent TB will develop active TB as a result of reactivation at some point in their lifetime. The U.S. Centers for Disease Control and Prevention (CDC) identify specific groups at higher risk for TB exposure and for progression to active TB.

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<th>INCREASED RISK FOR TB INFECTION</th>
<th>INCREASED RISK FOR TB PROGRESSION</th>
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<td>Close contacts of active TB cases</td>
<td>Individuals living with HIV</td>
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<td>Health care workers</td>
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<td>Foreign-born persons</td>
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<td>Persons in long-term care facilities</td>
<td>Organ transplant recipients</td>
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<td>Persons who abuse drugs or alcohol</td>
<td>Persons recently infected with M. tuberculosis</td>
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MCL performs QFT®-Plus testing six days a week, giving health care providers accurate results in a short timeframe. Only one office visit is needed, no second visit to read a skin test reaction is required. Instructions for collection must be followed closely to minimize recollection and indeterminate results. Collect 1 ml of blood into each of the four QFT®-Plus tubes. Volume of blood must be in the range of the black line on the tube. Complete collection instructions are available in the MCL test catalog online at www.mercydesmoines.org/mcl.
CATECHOLAMINE/METANEPHRINES TESTING

Catecholamines are a group of hormones (dopamine, epinephrine [adrenaline], and norepinephrine) that is released into the bloodstream in response to physical or emotional stress. They also help transmit nerve impulses in the brain. These hormones are produced in the adrenal medulla, the interior portion of the adrenal glands and by cells of the sympathetic nervous system. Catecholamines are normally present in the plasma in minute amounts, but levels can increase dramatically and rapidly in response to change in posture, environmental temperature, physical and emotional stress, hypovolemia, blood loss, hypotension, and exercise.

Patients with pheochromocytoma (tumor of catecholamine-producing cells of the adrenal medulla) or paraganglioma (tumor of sympathetic ganglia) may have continually or episodically elevated catecholamine levels. Symptoms are episodic or sustained hypertension, palpitations, cardiac arrhythmias, headache, sweating, pallor, anxiety, tremor, and nausea. Intermittent or continuous elevations of one or several of the catecholamines also may be observed in patients with neuroblastoma and related tumors.

MCL refers this testing to Mayo Medical Laboratories. Collecting a blood sample for Catecholamine, Fractionated, Free Plasma testing requires drawing blood from an indwelling line after the patient has been lying down and resting for 30 minutes. (The stress of having blood drawn can increase catecholamine blood levels.) This process is required for an accurate result. Please review the Interpretation and Cautions sections in the Mayo test catalog. http://www.mayomedicallaboratories.com/test-catalog/Clinical+and+Interpretive/8532.

An alternative test is Metanephrines, Fractionated, Free Plasma (PMET). Sample collection for this test is a routine blood draw; an indwelling catheter is not required. MCL also refers this testing to Mayo Medical Laboratories.

Metanephrine and normetanephrine (collectively referred to as metanephrines) are the metabolites of epinephrine and norepinephrine, respectively. The metanephrines are stable metabolites and are cosecreted with catecholamines by pheochromocytomas and other neural crest tumors. This results in sustained elevations in plasma free metanephrine levels, making them more sensitive and specific than plasma catecholamines in the identification of pheochromocytoma patients.

Please review the Mayo test catalog. http://www.mayomedicallaboratories.com/test-catalog/Clinical+and+Interpretive/81609