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Respiratory Virus PCR Trumps Rapid Flu Testing

With flu season now in full swing, clinicians should be aware that although **rapid antigen testing** is readily available, **sensitivity ranges from 50-90%**. In addition to rapid antigen detection tests, other traditional methods for detection of respiratory pathogens include direct fluorescent antibody (DFA) staining, culture, and serology. None of these methods is ideal for diagnostic purposes.

This past November, Saint Luke's Microbiology introduced a new Respiratory Panel by PCR that detects 17 viral and 3 bacterial pathogens. Since that time we have seen several cases where specimens tested negative by rapid influenza antigen, but were subsequently positive for influenza A or B by respiratory PCR panel. Other viruses including RSV, coronavirus, parainfluenza, and rhinovirus have been detected by the new PCR assay as well. In particular RSV seems to have increased in the elderly population within the last 2 weeks.

Testing for respiratory pathogens by PCR, greatly improves detection. The rate of viral identification increases by as much as 50% compared to traditional methods. For most respiratory pathogens, PCR detects several orders of magnitude fewer organisms than antigen testing or culture. **The sensitivity of PCR for the eight most common respiratory viruses ranges from 95-100%, with specificity of 99-100%**. Of note, mixed viral infections are detected in up to 30% of respiratory specimens tested by PCR. This test is available through Saint Luke's Microbiology and should be ordered as 'Respiratory Panel by PCR'. Testing is performed daily and is available on **nasopharyngeal swabs, nasal washes, and bronchoscopy specimens**.

Fewer Blood Culture Contaminants Improves Patient Care

Saint Luke's Regional Laboratories processed 25,840 blood cultures in 2012. Overall 9% of blood cultures were positive, which is a bit less than previous years. The decreased number of positive cultures is attributable to fewer contaminated blood

cultures. Blood culture contamination rates have improved across SLHS metro hospitals, where the majority of cultures are performed. Suspected contaminants are investigated by a clinical pathologist, who then provides feedback to phlebotomy and nursing units on a monthly basis. Phlebotomists & nursing staffs have followed through with outstanding efforts to achieve improvement by a variety of means, including modification of collection techniques and heightened attention at time of collection. Blood culture contamination rates are calculated by dividing the number of contaminants by the number of cultures performed.

SLHS Hospital	Contam Rate 2010	Contam Rate 2011	Contam Rate 2012
SLH	2.45%	1.67%	0.77%
SLN	2.20%	2.44%	1.67%
SLS	1.73%	1.97%	1.53%
SLE	1.95%	1.78%	1.67%

The total number of blood culture contaminants is worthy of note as well, as a recent publication determined average additional charges associated with a single contaminated blood culture amounts to \$8720, due to additional diagnostic studies and unnecessary treatment, which sometimes results in patient harm. Based on that figure, SLH alone saved \$1,569,600 in charges between 2010 and 2012.

SLHS Hospital	#Contam 2010	#Contam 2011	#Contam 2012
SLH	268	192	88
SLN	60	67	47
SLS	36	48	39
SLE	85	89	94

All Saint Luke's Health System Hospitals are below the 3% national benchmark for blood culture contamination. Notably, Cushing Memorial Hospital has the lowest contamination rate, at 0.4%.

It's a Fluke!

Paragonimus is a parasitic fluke, most often associated with lung infections (paragonimiasis) in Southeast Asia. The Asian fluke species,

Paragonimus westermani, is acquired through consumption of undercooked freshwater crustaceans. A related species, *Paragonimus kellicotti*, has rarely caused infections in North America. Recently, a series of nine paragonimiasis cases associated with consumption of crustaceans found in Missouri rivers, was described by Washington University, St. Louis (Emerging Infectious Diseases, vol 18(8) 2012). Saint Luke's Health System physicians have diagnosed two *Paragonimus kellicotti* infections since August 2012.

Locally acquired *Paragonimus kellicotti* infestations are most common in young men who become infected with the organism following consumption of raw crayfish while camping or on a river float trip. Infections have been associated with crayfish found in the Current, Huzzah, Meramac, Jacks Fork, and Missouri Rivers. Incubation period for onset of signs or symptoms ranges from 2-12 weeks. Following ingestion, the parasite penetrates the intestinal wall, then migrates through the diaphragm to the pleural cavity and into the lungs. Eggs are deposited into lung tissue, usually within fibrous cysts that develop around the adult worm. Extrapulmonary sites including liver, lymph node, skin, spinal cord and brain may also be infected.

Common clinical findings in these cases include cough, hemoptysis, weight loss, fever and pleural effusions. The majority of patients have significant eosinophilia (>15%) and abnormal chest radiographs which may include nodules and pericardial effusions. Examination of sputum, bronchoscopy, pleural fluid, and stool specimens for the parasite is specific for the diagnosis, but very low yield (<10% positive). Currently, serologic testing for antibody to *Paragonimus* is the diagnostic test of choice. Testing is available via a reference laboratory through Saint Luke's Regional Laboratories.

IL28B Genotype

Patients with hepatitis C virus infections are treated with antiviral medications such as pegylated interferon plus ribavirin. The treatment goal is to achieve a sustained virologic response (SVR), which is defined as the absence of HCV RNA by polymerase chain reaction (PCR) six months after stopping treatment. SVR is associated with a 99 percent chance of remaining HCV RNA negative during long-term follow-up. SVR is also associated with decreases in all-cause mortality, liver-related death, and the risk of hepatocellular carcinoma.

Two of the most important predictors of a sustained virologic response (SVR) following combination therapy are HCV genotype and baseline viral load. Higher response rates are seen in patients with genotypes 2 or 3 than in those with genotype 1. Higher response rates are also seen in those with lower baseline viral loads ($\leq 800,000$ IU/mL).

Patient-related factors that are associated with SVR include race, age, and IL28B polymorphisms. The highest response rates are seen in Asians, followed by Caucasians, African Americans and Latinos.

The IL28B gene encodes interferon lambda, which is involved in viral resistance and is upregulated by interferons. IL28B polymorphisms are strong independent predictors of responsiveness to combination therapy with pegylated interferon and ribavirin in patients with HCV genotype 1. Response is closely associated with a single-nucleotide polymorphism (SNP), designated rs12979860, located on human chromosome 19. Patients with the CC genotype have 2 to 3 fold higher SVR than patients with the CT or TT genotypes. The CC genotype has also been associated with a 3-fold increase in rate of spontaneous clearance of HCV.

Frequency of the rs12979860 C allele varies across different racial and ethnic groups. This polymorphism is most frequently present in individuals from East Asia and least common in individuals of African origin. In a recent US-based study, the CC genotype was observed in 37% of Caucasians, 29% Hispanics, and 14% of African Americans tested.

The impact of the IL28B-related polymorphism on response rates in patients infected with HCV genotypes other than genotype 1 is being investigated.

Specimen requirement is 3 mL of whole blood collected into a lavender top tube.