LAB Connections

June 2017
ISSUE 148

HAMILTON REGIONAL LABORATORY MEDICINE PROGRAM

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Bacteremia and the Importance of Blood Cultures

Blood is one of the most important specimens received by the microbiology laboratory for culture, and culture of blood is the most sensitive method for detection of bacteremia or fungemia. Blood cultures should be obtained before the initiation of antibiotics for a patient where there is suspicion of bacteremia. Symptoms of bacteremia may include fever and chills, and possibly leukocytosis or leukopenia. (1) However, a normal white blood count does not rule out bacteremia. It is especially important to note that in the elderly population, the classical symptoms and signs of bacteremia may not be present, and the only presenting sign may be confusion. Blood cultures are especially important where there is a concern for deeper infections including endocarditis, meningitis, osteomyelitis, deep abscesses and pneumonia, and are a critical diagnostic tool in evaluating fever of unknown origin.

Careful technique is important to avoid contamination by normal skin flora during collection. The site should be cleansed using a chlorhexidine based solution, and should be allowed to dry before blood is taken. Care should be taken to not retouch the cleaned area before blood is collected. Blood should be collected directly into blood culture bottles, after cleaning the rubber stopper with ethanol, and the specimen should be transported immediately to the lab. Lower contamination rates have been observed with chlorhexidine-based solutions than with povidone-iodine solutions which require a longer skin contact time to be effective (2). Arterial blood cultures provide the same yield as venous blood

cultures. A total of two blood culture sets is recommended and should be obtained by at least two separate venipunctures. A total of three blood culture sets is recommended in patients with suspected infective endocarditis who have not received prior antibiotics. (3) The blood culture yield depends greatly on the volume of blood cultured. In adults, each of the two sets should contain 20-30ml of blood. The correct volume can be achieved by filling the bottle to the white line on the label as shown. The black fill arrow does not indicate the fill volume.

For pediatric patients, the recommended volume of blood is based on the patient's weight (5, 6) and should be <1% of the total blood volume (7). A quality audit in 2013 at McMaster University Medical Centre found that only 11.5% met weight based recommendations (8). To improve collection, additional partitioning of weight categories and guidance on type of bottles was recommended based on consensus between the microbiology laboratory and the Department of Pediatric Infectious Diseases.

Patient weight (kg)	Total Volume
≤1	0.5-1.0*
1.1-2	1.5-2.0*
2.1-5	2.0-4.0*
5.1-12.7	5.0-7.0**
12.8-36.3	14-20**
36.4-45	20**
>45	Follow adult protocol

*Pediatric blood culture bottle
**Divide into aerobic blood culture bottle
(anaerobic cultures are not required routinely)

Contamination of blood cultures can occur even when precise techniques for collection and processing are used. Contamination rates of less than 3 percent are desired and higher rates must be investigated further. Important clinical pathogens include Staphylococcus aureus, Streptococcus pneumoniae, group A streptococci, Enterobacteriaceae, Haemophilus influenzae, Pseudomonas aeruginosa, Bacteroides and Candida species. These are always considered significant even when only one out of two sets of blood cultures reveals growth of the organism. Viridans group streptococci and Enterococcus species may reflect true pathogens or contaminants depending on the clinical scenario. Organisms for which it can be difficult to distinguish between infection versus contamination include Propionibacterium acnes, Corynebacterium species, Bacillus species (other than B. anthracis), and coagulase-negative staphylococci, and the likelihood of pathogenicity is increased if the organism is observed in multiple blood cultures. (4) Blood culture contaminants can be harmful to patients by resulting in unnecessary antibiotics for patients, lines being changed, prolonged hospital admission and unnecessary investigations such as additional cultures and echocardiograms and added costs (2).

The Hamilton Regional Laboratory Medicine Program (HRLMP) monitors blood culture contamination rates to ensure that they are maintained below 3%, which is the acceptable laboratory standard (5). When rates are higher than 3% the laboratory works with clinical staff to provide education to clinical staff and help strategize ways to improve this. One program included the poster shown.

Overall, blood cultures remain a critical diagnostic tool in evaluating patients suspected of having bacteremia, and the results are essential in helping to guide antimicrobial therapy. Blood culture collection techniques and methods are crucial in ensuring accurate and clinically useful results and contribute to high quality patient care.

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News from Administration

Congratulations, and *our sincerest thanks* to pathology for establishing this critical diagnosis and to all other laboratory staff who were involved in this child's care.

This story [quoted below] demonstrates exceptional team-based effort and highlights the significant role of laboratory professionals in the delivery of patient care.

Our thanks again to all involved for making the HRLMP proud.

Dr. John Fernandes, Chief, Laboratory Medicine HHS and SJH
Mr. Duane Boychuk, Director of Laboratory Operations, HRLMP

Submitted by e-mail from Dr. Stacey Marjerrison:

"Today was one of those days you envisioned as a pediatric sub-specialist, when you were once a naïve med student. When every single person in the whole Children's Hospital would be singularly focused on trying to work together for the best interest of our ill children and their families. Over the course of 24 hours, I admitted an unwell child, and had a full diagnostic workup and was able to start emergency therapy – because every single health practitioner this child met provided brilliant, flexible and collaborative care.

First, last night, was Dr. Nathalie Schindler and the ER team who recognized the problem and urgency, despite other institutions having missed it. My home team in oncology really pulled together to get everything organized effectively behind the scenes, and make sure the family felt immediately supported and cared for. Then today started and ended with Drs. Amanda Whippey, Tracey Bruce and the sedation team that provided early assurances, and all-day follow-through that the sedation we needed for a bunch of procedures would be available - no matter where and when that was required. The thoroughness of Dr. Claudia Martinez–Rios and the team in MRI was the key to identifying the critical diagnosis and need for emergency intervention. Drs. Doron Sommer, Femi Ajani, Karen Bailey and the surgical team worked together seamlessly to make and execute the safest and most effective surgical plan I could imagine – despite the fact that not all of them were even on call. Dr. Radenka Bozanovic and her pathology colleagues, with the patience of a saint, after waiting for hours, was able to

confirm in moments that the tiny samples were tumour, and began the rigorous work of diagnostic preparation with a supportive smile, after all of us were done our parts. Despite having already gone home to her family, Paula MacDonald turned around and drove right back to the hospital to organize the emergency chemotherapy required, and Angela Filice just never went home to hers, until our part in the OR was done, since she knew I needed an experienced nurse to help me collect samples.

Despite having to tell a family some terrible news today, the tears in my eyes as I left work weren't because a child had a bad cancer, those tears were because I felt so lucky and proud to work with such amazing colleagues. Just thought I'd pass this story on…"

Teri-Lynn Steeves from the **HLA laboratory** is featured in a video explaining the work they do to match donors with recipients for transplant.

This video was created by SJHH as part of their recent livestreaming of a kidney transplant.

Click on the link below to view another example of the great work we do throughout the HRLMP!

https://m.youtube.com/watch?sns=fb&v=L_dCXo8a3Z0

To a site near you … … … McMaster Children's Hospital to be exact.

Introducing **TUG**, an autonomous mobile robot that transports materials throughout a hospital footprint. It navigates the hallways, opens automatic doors, and even rides the elevator all on its own. It is safe, secure, and reliable. This new, innovative technology does not require facility changes or lots of construction to implement.

Compare this to the amount of work that is required to install a pneumatic tube system. TUGs can be added to either new or existing facilities with nothing more than an AutoCAD map, adequate wireless network connections, an elevator control box, and a charging location. If a ward moves, you simply need to change the route that is programmed into the TUG.

We will be running a 3 month pilot between the Pediatric Wards and Clinics and the Core Lab at McMaster Children's Hospital beginning in June. This is a joint project involving Pediatrics, Customer Support Services, and the Lab. We will be evaluating the technology to see if it is user friendly and reliable. We will also be collecting data on defined metrics such as turnaround time from Collect to Receive in order to demonstrate that this automation technology is a value add.

TUG is already working in over 150 hospitals in the US, Australia and Europe. We are very excited to be the first hospital in Canada to trial this new technology.

Education News

The HRLMP hosted a **National Medical Laboratory Week** Celebration on April 19th, 2017. It was a great evening for catching up with colleagues. The evening featured excellent lectures by Dr. Rajan Kumar Sur, Dr. Crystal Hann and Dr. Rosalyn Juergens on *New Advancements in Cancer Therapy.*

Wellwood Cancer Support Centre sent their sincere *thank you* for the generous donation to their Centre from the 50/50 draw. Thank you to all who bought tickets in support of the great work of Wellwood.

MediaLab, an online learning system, provides learning opportunities for laboratory staff to over 100 continuing education courses.

The HRLMP plan to use the courses in 3 different ways:
1. **Open enrollment** – any courses available through MediaLab can be taken by any individual at any time. This is a great way to get hours for your CMLTO professional portfolio, to brush up on theory, or to just learn something new.
2. **Competency assessment** – some courses may be used by particular disciplines as part of their annual theoretical competency assessment
3. **Theoretical knowledge** – learning modules on particular aspects of a discipline that may be assigned to all staff in that area to ensure they have the theoretical base knowledge they need to succeed.

Click on the link below and follow the log on instructions to learn more about these CE opportunities!

https://www.medialabinc.net/?ref=google_medialab_website&gclid=CMyxreuC0tMCFcW3wAodWlcDsQ

Hematology News

Dr. Mark Crowther and **Dr. Ted Warkentin** have been awarded the **2017 Eberhard F. Mammen Excellence in Thrombosis and Hemostasis Awards** from Seminars in Thrombosis & Hemostasis (STH) for authoring one of the most popular articles published by that journal in 2015/2016.

Dr. Crowther (along with one of his fellows, Dr. Kochawan Boonyawat) won in the ***General Category***. **Dr. Warkentin** won in the ***Open Access Category***.

To read the Editorial in STH, please click on the link below:
https://www.thieme-connect.com/products/ejournals/pdf/10.1055/s-0037-1601457.pdf

Congratulations also to **Dr. Jack Hirsh**, who was awarded the **ISTH Grant Medal** on June 6th, 2017.

The Grant Medal is the highest award of the International Society on Thrombosis and Haemostasis.

Dr. John Kelton was awarded an honorary doctorate of laws by the University of Windsor at its recent Faculty of Nursing convocation. Congratulations!

To read the full story, click on the link below:

https://fhs.mcmaster.ca/main/news/news_2017/university_of_windsor_honours_John_Kelton.html

Congratulations to **Dr. Catherine Hayward**, Head, Regional Coagulation Laboratory, as she was acclaimed as ISLH President for a 2nd - 3 year term.

In addition, **Karen Moffat**, Technical Specialist, Coagulation, was re-elected to the ISLH Board of Directors for a 2nd term.

Election results were announced at the **XXXth International Symposium on Technical Innovations in Laboratory Hematology** held May 4 - 6, 2017 in Honolulu, Hawaii.

The annual *Hematology Fun Rounds* were held June 16th, 2017, at the Juravinski site. At these rounds, the Hematology residents announced the winners of the **2017 Resident Choice Teaching Awards.**

"Hats off" to **Dr. Wendy Lim**, Hematologist, and **Mr. Nick Sandercock**, Senior MLT, Red Cell Disorders and Molecular Hematology, who are this year's winners!!

Congratulations to both awardees and *thank you* to all faculty and allied health professionals who provide excellent teaching to our Hematology Residency Program.

Dr. Wendy Lim and Dr. Clinton Lewis

Mr. Nick Sandercock

The HRLMP, the Division of Hematology, the Department of Medicine, and the Department of Pathology and Molecular Medicine were well represented at the **XXXth International Symposium on Technical Innovations in Laboratory Hematology** held in Honolulu, Hawaii in early May

2017. A Guideline Development pre-meeting workshop and a number of invited lectures were presented by HRLMP staff and McMaster faculty.

In addition, four abstracts were submitted and accepted for presentation – three were poster presentations and one was an oral presentation.

Microbiology News

Congratulations to **Mark Gaskin**, Technical Specialist in Microbiology, for his presentation at the **27th European Congress of Clinical Microbiology and Infectious Diseases** in Vienna, Austria in April.

Mark's abstract was titled *Implementation of Colorex™ MRSA/VRE bi-plate on WASP™/WASPLab™ to Screen for MRSA and VRE using the ESwab™ Duo Swab*.

Click on the link below for the full story:
http://www.copanusa.com/news-events/blog/2016-blog-2/chromogenic-bi-plates-and-dual-eswab-processed-wasplab-cuts-number-specimens-and-plates-used-surveillance-cultures-half/

All In A Day's Work

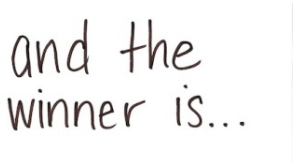
Microbiology stretches toward Wellness.

Workload pressures were taking their toll on the staff in Microbiology, with staff complaining of neck and shoulder pain, low back discomfort and headaches at the end of their shifts.

To combat this we decided to implement group stretches in the lab. The process is driven by our wellness "champions" who turn on the music and guide the staff through 5 minutes of exercises. It is an efficient break that can be fit into even the busiest days.

The Microbiology Residency Training Program is pleased to announce that **Dr. Fatimah Al Mutawa**, **Dr. Katie Gregory-Miller**, **Dr. Lei Jiao** and **Dr. Diana Whellams** have passed their Royal College examinations in Medical Microbiology.

News from Pathology



Congratulations to **Frank Jiang**, the 2017 **Michener Diagnostic Cytology Gold Medal Winner**.

The Gold Medal is awarded to the student with the highest cumulative grade point average for the graduating class.

The HRLMP Cytopathology Laboratory has a long history of teaching excellence with many students receiving medals for academic achievement. Arlene Murray is the Clinical Coordinator for the program and all the staff Cytotechnologists participate in the training process.

Previous winners include:
2009 – Nancy Santana
2010 – Tricia Lee
2013 – Amreesha Sinanan
2014 – Melissa Komadina
2015 – Aubrey Gribbon
2017 - Frank Jiang

Congratulations to the medal winners and to the staff of the Cytopathology Laboratory for a job well done.

Linda Turner-Smith
Manager – Anatomical Pathology

Cytology Teaching Team at HRLMP

Congratulations to **Dr. Jennifer Dmetrichuk**, PGY4 in General Pathology as she is the winner of the **Laboratory Medicine Most Outstanding Resident Award** for 2017, awarded by the HHS Medical Staff Association.

L-R: Dr. Jay Maxwell, Dr. Deepti Ravi, Dr. Ipshita Kak, Dr. Paul Borowy-Borowski

Congratulations to our Laboratory Medicine residents in Anatomic and General Pathology – **Dr. Jay Maxwell**, **Dr. Deepti Ravi**, **Dr. Ipshita Kak**,

and **Dr. Paul Borowy-Borowski**. All were successful in passing their Fellowship examinations of the Royal College of Physicians and Surgeons of Canada.

Research News

Hamilton researchers recently published the results from the "VISION" study in JAMA, The Journal of the American Medical Association. The study reported that the results from a simple blood test, a **high-sensitivity troponin T**, can predict and possibly prevent deaths that occur post-surgery.

Click on either link below to read the full story:

https://fhs.mcmaster.ca/main/news/news_2017/researchers_discover_simple_blood_test_can_predict_much.html

http://www.thespec.com/living-story/7261312-hamilton-researchers-discover-simple-blood-test-can-predict-heart-injury/

On June 28th, 2017, the ***McMaster Center for Transfusion Research*** held its official opening in its renovated space – HSC-3H50.

Click on the link below to learn more about this exciting and innovative team:

http://fhssf.mcmaster.ca/mctr