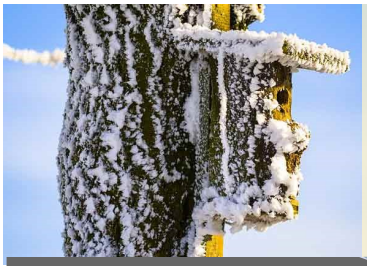

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Connections

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CMPT QUARTERLY ON-LINE NEWSLETTER

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IN THIS ISSUE

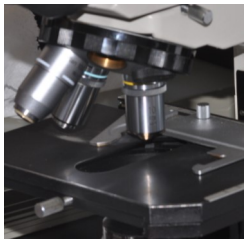
What is new at CMPT for 2018?

We have a busy year ahead, with our regular programs already on full gear.

This year CMPT introduced two new PT programs: Acid Fast Bacilli and Enteric Panel:

= ACID FAST BACILLI =

-The program is suitable for laboratories performing Acid Fast stains to detect Acid Fast Bacilli in clinical samples. It consists of three simulated smears for staining per shipment and it ships three times a year.



= ENTERIC PANEL =

-The program is suitable for laboratories investigating *Salmonella, Shigella, Yersinia, C. jejuni,* and *E. coli* O157 H7 by Multiplex or other molecular methods. There are two shipments per year and 4 simulated stool samples per shipment.

The ***Trichomonas vaginalis*** program got a facelift last year; the sample production method was modified to make the challenges suitable for laboratories performing antigen detection and also for those using molecular methods.

The grading system for the ***Clostridium difficile*** program will be modified from a 4 point system to a "Acceptable" / "Unacceptable" system.

The **Professional Development Course** started in January and is well underway with 85 participants! We keep receiving positive feedback for which we are very thankful.

The second manuscript on Patient Safety data "*Laboratory Error Reporting Rates Can Change Significantly with Year-Over-Year Examination*." has been accepted for publication in **DIAGNOSIS** and should be available online soon.

Optimizing microbiology value in small, resource limited laboratories: Providing early diagnostic value to clinicians and their patients in regional settings.

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Small regional towns and cities may be several hours away from diagnostic services. It is generally not feasible to transfer those patients to the big cities except in emergencies ("there's no room at the inn"). Some primary services can be delivered close to the patient with no increase overall costs and can help to optimize care.

In those small regional settings, the mantra of "pack and ship" medical microbiology samples without due consideration for maintaining the viability or overgrowth of microorganisms (1), no provision for multiple daily couriers to large laboratories, and without consideration for increased antimicrobial usage or antimicrobial resistance has become common.

In one such small centre in rural Alberta, the most common microbiology samples are urines for culture and throat swabs for streptococcal pharyngitis. This particular laboratory also performs MRSA screens for better utilization of beds in the local hospital. Support from a medical/clinical microbiologist is available on a daily basis for both laboratory and clinician interactions.

This article describes the process by which urine cultures were and are now processed to provide early diagnosis of infection (or not), and indicates how clinicians can access information on antimicrobial resistance in their own area to better optimize treatment when required.

Prior to 2014 at the rural hospital, urine samples were submitted to the laboratory and inoculated by pouring onto a culture medium paddle (2). After incubation for at least 18 hours at 35°C, the paddle was examined for growth. If no growth or an obvious mixture of three or more morphotypes was observed, the culture paddle was discarded and a final report of "No growth" or "Mixed growth" was released. If a pure culture or no more than two morphotypes was observed, the sample was forwarded late that date (after 5 PM) to the referral laboratory in Edmonton, Alberta. It was understood that the samples may not arrive at the referral laboratory until after 9 PM.

In 2014, the referral laboratory changed its automated inoculating and reading processes such that the culture paddle no longer fit their workflow. At that time, instead of sending a urine culture sample in a preservative tube that would not arrive until late in the evening, and likely not provide any result in a timely manner the following day, the rural laboratory decided to culture the urines as they arrived directly on chromogenic agar. Samples were submitted to the laboratory within two hours of collection. One microliter loops were used to plant the plates according to standard Cumitech protocols (3). Again, after overnight incubation at 35°C, the plates were examined for growth, quantitation of growth, for mixed cultures and for definition of chromogenic morphotypes, using the criteria (i.e.,colour differences of the colonies) provided by the media's manufacturer.

Control cultures were available for colour comparison. Samples with pure cultures of potential pathogens (or if two different pathogen morphotypes were present) at 10 – 100 x 10^6 CFU/L, were forwarded that evening to the reference laboratory for confirmation of identification and antimicrobial susceptibility testing. The actual chromogenic plates were sent (taped with parafilm in biohazard bags) and the colonies requiring workup were circled on the plates. Physicians received preliminary reports the day after primary incubation in the rural laboratory of "No growth", "No significant growth", "Mixed growth" (indicating at least three morphotypes) or a quantitation of significant growth with a presumptive genus ± species based on the chromogenic appearance of the colonies.

The chromogenic agars did not separate *Klebsiella, Enterobacter* and *Serratia*, so these were reported presumptively as one group. For those isolates that were not chromogenic (staphylococci, enterococci, group B streptococci, *Lactobacillus*), the rural laboratory preformed a Gram smear, slide coagulase, PYR or streptococcal grouping to sort those cultures which need to be forwarded for identification from those considered contaminants. The submitting physicians were also provided with updated antibiograms for the common species isolated in the rural laboratory (mainly *E. coli* and *Enterococcus* sp.) and the antibiogram from the referral laboratory, so that they could make initial early therapy decisions if required based on the presumptive identification provided by the rural laboratory on the first day.

The rural laboratory participates in the Gram smear and urine culture portions of the Clinical Microbiology Proficiency Testing (CMPT) programme to monitor their competency and has performed with excellence in that programme since the change to local primary culture of urine samples was made. In addition, they are provided with periodic

Gram smears to review and report back to the consultant microbiologist to enhance their reading skills. Results received from the referral laboratory when complete are compared to the presumptive day one reported result to determine the level of comparative performance.

Since the primary chromogenic agar testing was started, we have data for 1046 samples that met the criteria for forwarding to the referral laboratory; in 97% of those samples the presumptive identification was confirmed as correct by the referral laboratory. A number of *Citrobacter* isolates were not identified; these isolates appear as various shades of purple or bluish colour and are not thus clearly separated by the chromogen. There were also a small number of enterococci and group B streptococci that were misidentified early in the change of protocol (similar teal blue color). Better use of grouping sera, and a new source of PYR reagent has now resolved that issue. The most recent three – four month correct presumptive identification rate was 100%. The laboratory continues to monitor culture confirmation to ensure that high rates of correct presumptive identifications are being achieved.

We have reviewed data for the total number of urine cultures tested for which we have reliable data from prior to the end of 2014 to the end of 2017. During this period the annual number of urines collected has dropped from approximately 2300 to 1400 samples (a reduction of almost 40%). In the same period the percentage of isolates referred for confirmation has increased from 27% to 44%. These data support a positive change in practice in the local community. Urine samples are being submitted on patients who have significant infections, and by extrapolation, better urine collection practices are reducing the number of mixed or no growth cultures.

We have investigated the impact on select antimicrobial agents dispensed in this regional area. Collated defined daily doses (DDD) for cefixime, ciprofloxacin, nitrofurantoin, co-trimoxazole and trimethoprim were normalized by 100 inpatient days (rural hospital) to account for occupancy fluctuation. On the inpatient unit at the acute care hospital in 2013 and 2014, there were 13.5 and 11.7 DDD/100 inpatient days dispensed respectively. In 2015 that number decreased to 7.5 DDD/100 inpatient days, and to 7.0 and 6.2 DDD/100 inpatient days dispensed in 2016 and 2017 respectively.

In summary, our continuing observations clearly show that providing physicians with early and local culture results for urines, with antibiogram information, and inclusion of physicians in the process, has a positive effect on the reduction of unnecessary urine cultures. Patients with urinary tract infections are better identified early, and there has been an important and similar overall reduction in directed antimicrobials used for treatment of those patients.

Acknowledgements.

The continued testing of urine cultures in the rural hospital was made possible only by the efforts of the late Cindy Mulherin, Senior Administrator, Covenant Health. Her understanding of quality and patient care was exemplary. We also wish to thank the laboratory technologists at St. Joseph's Hospital, Vegreville, Alberta, who performed these investigations.

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Antibiotic Resistance – A Survey

By Dr. M. Noble

The first bullet within the CMPT Quality Policy states "*Our vision is to be recognized provincially, nationally, and internationally as a valued contributor to EQA innovation, education and as passionate advocates for continued quality improvement in EQA for the benefit of healthcare, our participants and our program.*" Increasingly we find kinship with other EQA providers (especially) microbiology, provision of EQA samples defends and protects not only patient care, but importantly ***public*** health.

Some examples of this are in the domain of EQA for susceptibility testing. If a medical laboratory provides incorrect information on antibiotic resistance, this can result in delayed or incorrect care for individual patients. On a larger level it can result in incorrect monitoring of antibiotic resistance in a hospital or community setting. Errant testing may be very local and very specific, or may be wide spread. Testing laboratory performance through EQA samples can contribute to earlier detection of error and implementation of corrective measures.

It is in that context that CMPT helped organize and deliver a survey of international EQA providers through the European Organization of External Quality Assurance for Laboratory Medicine (EQALM) to monitor the performance of their participating laboratories on the detection and reporting of Methicillin Resistant *Staphylococcus aureus* (MRSA), Vancomycin Resistant Enterococci (VRE), and Carbapenem Resistant Enterobacteriaceae (CRE).

Participants were asked to provide the degree of verification and validation of the isolate and results by the provider prior to send-out, and the style of reporting, and the correctness of the report produced by the laboratories. With respect to correctness of the report, the participants were asked to provide the total number of reporting laboratories, the number that called an isolate 'resistant, the number that reported the isolate as 'possibly resistant' and sent to a reference laboratory, and the number that reported the isolate as susceptible.

Overall 12 EQA programs participated in the survey, which represented 1500 laboratories for which information was available. The greatest number of reports was for MRSA and the least was CRE. This was not a surprise, since MRSA has been a part of the microbiology EQA repertoire for a much longer period of time.

For MRSA, there were reports from almost 1900 laboratories with 97.6 percent appropriately reporting the isolate as resistant and another 0.9 reporting as probable MRSA (submit to reference). Only 2.2 percent missed the presence of MRSA.

The results of VRE were similar. While the total number of laboratories tested against VRE was smaller (653), the number that reported on the presence of VRE or Probable VRE was 97.5% and only 2.5% missed the presence of VRE.

Unfortunately the results were not quite as successful with the CRE. Of the 1536 reporting on the presence of CRE, only 87.5% reported on the definite presence of CRE and 6.4% reported the absence of any resistant bacterial. This large laboratory failure number may not be a bad as it looks, in that variables, such as how the laboratory defined resistance and the methodology used, none the less the failure to report the presence of carbapenem resistance, if carried on clinical samples could potentially extend a hospital outbreak

This style of study has advantages because we can fairly easily get a global sense of success or failure in antimicrobial resistance reporting. The results obtained indicate that resistant isolates are detected by most clinical laboratories tested; however, when considering CRE isolates, almost 1 in 19 could be missed by the laboratories resulting in a lost time, and poorer care.

CMPT expects to continue on participating in these studies and over time will help contribute to reports on the performance of medical laboratories. Further studies will be much more detailed and the information will be much more analytic and critical.

In Canada, most laboratories commonly will retest any isolate that is found to be resistant to carbapenem in order to ensure the accuracy of the resistance designation. Unfortunately the approach may have to change to ensure that all the susceptible designations are also confirmed.

> We are what we repeatedly do. Excellence, then, is not an act, but a habit.
>
> **– Will Durant**

Upcoming Events

APRIL 2018

28th European Congress of Clinical Microbiology and Infectious Diseases
April 21 - 24, 2018 Madrid, Spain
More info: http://www.eccmid.org/

MAY 2018

AMMI Canada—CACMID Annual Conference
May 2-5, 2018, Vancouver , BC
More info: https://www.ammi.ca/annual-conference/

JUNE 2018

ASM Microbe
June 7-11 Atlanta, GA
More info: https://www.asm.org/index.php/asm-microbe-2018/atlanta

ABOUT CONNECTIONS

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