

2064. Molecular Detection of Enteropathogens from Diarrheic Stool of HIV-positive Patients in Gondar, Ethiopia

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Session: 235. Diagnostics - Diarrheal Disease

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Background. Infectious diarrhea is a common problem in the developing world, especially among people living with HIV/AIDS. Traditional diagnostic methods such as stool culture and microscopic examination is limited by resources. The use of molecular diagnostics for enteropathogen detection in this region of sub-Saharan Africa has not been fully explored. To identify risk factors and characterize enteropathogens from diarrheic stools of HIV positive patients in Gondar, Ethiopia using multiplex molecular panels targeting key infectious agents.

Methods. A cross-sectional study of 100 stool samples was performed. Samples were collected consecutively from HIV positive patients presenting with diarrhea at a local clinic in Gondar, a major center in NW Ethiopia. Genomic DNA was extracted from stool and processed in Canada using multiplex molecular panels (Allplex [Seegene Canada] and FilmArray [Biomereux]). Correlations between patient characteristics, symptoms, public health risk factors and enteropathogen type(s) was explored using STATA (Version 14.1).

Results. Ninety-four samples were successfully analyzed by molecular methods. Six samples were excluded due to insufficient volumes. The mean age was 35 with 43% male, 17% living in a rural area, 24% with access only to well water and 74% practicing proper hand hygiene. The majority of patients (68%) were receiving HAART with 32% having CD4 counts greater than 500/ μ L. Multiple pathogens were detected in 95% of specimens, with 62% having 5 or more enteropathogens. Common bacteria, viruses and parasites detected were *Shigella* spp./*enteroinvasive E. coli* (80%), *enterotoxigenic E. coli* (72%), *Norovirus* (15%) and *C. Parvum* (8%). CD4 cell counts and use of HAART were not associated with type or number of enteropathogens detected, though the number of patients with CD4<200/ μ l was small (23%).

Conclusion. Diarrheic stool from HIV-positive outpatients in Gondar, Ethiopia had on average 5 enteropathogens present in their stool. CD4 count was not predictive of pathogen type or number in this study. *Shigella* spp./*enteroinvasive E. coli* and *enterotoxigenic E. coli* are the major pathogens, not dissimilar to immunocompetent individuals in low income countries.

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2065. Implementation of Electronic Medical Record Hard Stop Alerts for Inappropriate Clostridium difficile Tests in Academic and Community Hospital Setting: Impact on Testing Rates and Clinical Outcomes

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Background. Ensuring appropriate *C. diff* nucleic acid amplification testing is increasingly important. We implemented electronic medical record (EMR) hard stop alerts across our health-system to reduce inappropriate tests. We review the impact on testing rates and outcome of those where testing was not pursued.

Methods. *C. diff* order in a patient with previous test (14 or 7 days for positive or negative), or receipt of laxative in past 48 hours triggered an EMR alert; test could only proceed with micro lab approved test code. The initiative was rolled out at an academic (October 2016) and two community hospitals (December 2016, January 2017). Statistical control charts (SPC) tracked changes in number of tests over time. Wilcoxon rank-sum tests were used to examine pre-post changes. Forward stepwise logistic regression models was used to explore factors associated with pursuit of testing post EMR alert. Clinical outcomes of patients at the academic hospital whose testing attempt triggered an alert and testing was not pursued were reviewed.

Results. For the 3 hospitals, mean weekly *C. diff* testing rate pre and post-intervention was 146 (SD 12.5) and 119 (SD 12.9), $P < 0.001$. Average number of weekly EMR alerts was 51; 26 for laxative, 14 for previous negative, 3 for previous positive test, 8 for undetermined reason. Figure shows SPC chart weekly testing rate for each hospital.

Table shows factors associated with *C. diff* test pursuit at the academic hospital.

	OR	95% CI	P value
≥ 3 unformed stools within 24 hours	5.55	(2.84 – 10.81)	<0.001
ID consult team following			
No	1.00		
Yes, agreed/recommended test	11.33	(2.73 – 47.01)	0.001
Yes, disagreed/did not recommend test	3.42	(1.36 – 8.61)	0.009
Order reason: leukocytosis	3.14	(1.45 – 6.80)	0.004
Alert reason: laxatives	3.15	(1.41 – 7.03)	0.005
Comorbidity: cirrhosis	2.32	(1.15 – 4.67)	0.019

Outcome review of 83 patients who had EMR alert and did not pursue testing was as follows: 36 diarrhea resolved, 21 an alternate cause found, 3 died from non CDI related etiology, 11 had subsequent *C. diff* testing later in the admission (6 negative, 5 positive results), 12 patients were discharged home.

Conclusion. In academic and community hospital setting, EMR hard stop alerts reduced inappropriate *C. diff* test, without impact on patient outcomes.

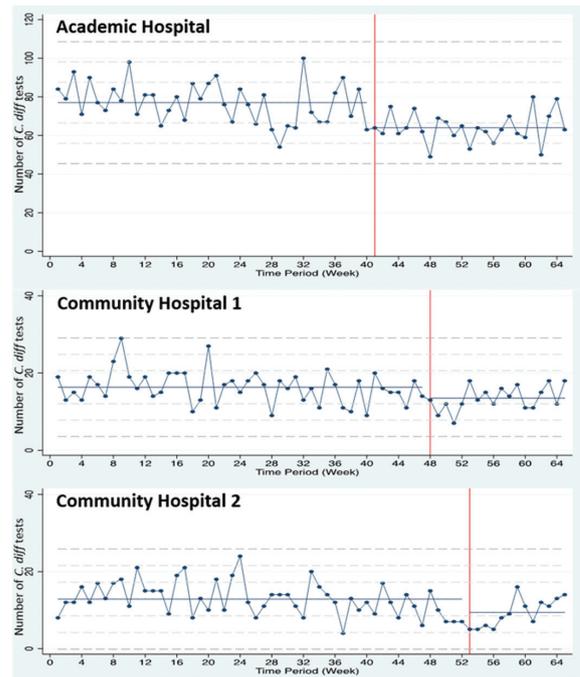


Figure shows statistical process control (SPC) charts for number of *C. Difficile* weekly test orders by hospital. The red line indicates the initiation of *C. Difficile* Electronic Medical Record alerts. Possible special cause variation resulted by the intervention is considered when 1) 4 out of 5 successive points after intervention more than 1 standard deviation (SD) from the mean on the same side of the center line; or 2) 8 successive points on the same side of the center line.

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2066. Utilization of the T2 Candida Panel for Rapid Candida Species Detection in a Large Community Hospital

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Background. Candidemia is the fourth leading hospital-acquired bloodstream infection. Blood cultures sensitivity is 50%. The T2 Candida Panel provide rapid (3–5 hours) species-specific detection of *Candida* species including *C. albicans*, *C. tropicalis*, *C. parapsilosis*, *C. krusei*, and *C. glabrata*.

Methods. Prospective, observational analysis included 345 patients who met specified criteria. The T2Candida Panel was restricted to Infectious Disease and Oncology physicians' use for specific patient populations, including with: febrile neutropenia; ICU stay for >72 hours, central venous catheter, recent antibiotics, acute pancreatitis, recent major surgery, TPN, renal failure/hepatic failure, corticosteroids and unexplained fever. Antifungal use, patient characteristics, risk factors, T2 Candida Panel results,

corresponding blood cultures, time to de-escalation, and duration of therapy (DOT) were collected.

Results. Patients mean age 60 years, 54% were male. Candidemia risk factors included: 28% immunocompromised (cancer, chemotherapy, chronic steroids, febrile neutropenia), 26% renal failure, 19% malnutrition/TPN, 14% CVC/PICC line and 11% intra-abdominal infection/surgery. 78% of the patients were in the ICU. 9% of T2 tests were positive. The resulting species were as follows: *C. albicans/tropicalis*, 47% *C. parapsilosis* 41% and 12% *C. glabrata/Krusei*. Of the patients with a positive T2 result only 24% had a positive corresponding blood culture while those with positive blood culture results 94.9% were T2 positive. Negative T2 tests resulted in discontinuation of antifungal therapy in 23% and avoid antifungal therapy initiation in 41% of patients but 36% of patient's antifungal regimens were not discontinued despite a negative T2 result. Average time to de-escalation was 40.8 hours. Negative T2 results decreased average duration of therapy of micafungin by 2.1 days.

Conclusion. T2 Candida Panel demonstrated greater sensitivity and faster to detect Candidemia compared with blood cultures. Despite the test's rapid nature and high sensitivity, time to de-escalation remains at 2 days suggesting variations in physicians' utilization of T2 test results.

Disclosures. All authors: No reported disclosures.

2067. Relationship of T2 Candida Panel to Disease Severity, Mortality and Time to Therapy in Patients with Candidemia

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Background. Candidemia is a common hospital-acquired infection that is associated with high mortality. Diagnosis via blood cultures (BC) is limited by poor sensitivity (50%) and slow turnaround time (2-5 days). T2Candida (T2C) is a newly available rapid test using magnetic resonance that can detect 5 species of *Candida* from whole blood in < 6 hours with a sensitivity of 91.1%.

Methods. We performed a retrospective analysis of all cases of candidemia detected by BC and/or T2C during 2016 at UAB Medical Center. The test was targeted to ICU patients who had higher risk criteria for candidemia. We collected APACHE II scores at the time of BC or T2C test collection as a surrogate for severity of illness. Other outcomes included 30-day mortality and time to initiation of therapy (TTT).

Results. We identified 139 patients with candidemia, defined as a positive BC (BC+) and/or positive T2C (T2C+). Performance of a single test led to diagnosis in 103 patients (74%). On initial diagnosis if both a BC and T2C were performed within a 24 hour interval, patients were grouped based on the results of both tests. 36 patients (26%) had both tests performed: 8/36 (22%) were concordant (BC+/T2C+) and 28/36 (78%) discordant. 23/28 patients (82%) with discordance were BC-/T2C+ and the remaining 5 were BC+/T2C-. The difference in APACHE II scores and 30-day mortality rate of BC+ patients (13.6, 0.36) and T2C+ patients (16.4, 0.46) were not significant (*P*-values 0.06 and 0.29, respectively); the difference in TTT between BC+ patients (1.6 day) and T2C+ patients (0.1 day) was statistically significant (*P*-value < 0.00001).

Conclusion. T2C demonstrated excellent sensitivity (88.6%) in a 'real world' setting focused in the ICU. We observed a significant reduction in TTT associated with the T2C assay, but did not observe an improvement in survival with earlier therapy for candidemia defined as a T2C+. Patients with T2C+ had higher APACHE II scores suggesting biased testing towards sicker patients. We cannot explain the large number of discordant results (BC-/T2C+, BC+/T2C-), but hypothesize that T2C+ may be a more sensitive marker for invasive candidiasis/candidemia. These data strongly endorse the need for a large, prospective, multicenter study exploring the use of T2C vs. standard of care in the diagnosis and management of this disorder.

Diagnostic Test(s) Performed	N	<i>C. albicans</i> * (%)	TTT (days)	APACHE II	30-Day Mortality
BC+ (± T2C)	112	42	1.6	13.6	0.36
BC+ (T2C not done)	99	42	1.8	13.2	0.33
BC+/T2+	8	50	0.13	14.3	0.5
BC+/T2C-	5	40	0.4	20.6	0.6
BC-/T2C+	23	65	0.1	16.6	0.43
T2C+ (BC not done)	4	50	0.1	20	0.5
T2C+ (± BC)	35	60	0.1	16.4	0.46

*T2C does not discern between *Candida albicans* and *C. tropicalis*

	BC+	T2C+	<i>p</i> -value
Number	112	35	
Apache II	13.6	16.4	0.06
Mortality	0.36	0.46	0.29
TTT (days)	1.6	0.1	< 0.00001

Disclosures. P. G. Pappas, T2Candida Panel: Grant Investigator and Scientific Advisor, Grant recipient, Research grant and Research support Merck: Grant Investigator, Grant recipient and Research grant Gilead: Grant Investigator, Grant recipient and Research grant Scynexis: Grant Investigator and Scientific Advisor, Grant recipient and Research grant Cidara: Grant Investigator and Scientific Advisor, Grant recipient and Research grant Astellas: Grant Investigator, Grant recipient and Research grant Viamet: Scientific Advisor, Consulting fee Amlyx: Scientific Advisor, Consulting fee Vical: Scientific Advisor, Consulting fee

2068. High-volume Sputum Culture for the Diagnosis of Pulmonary Aspergillosis

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Background. Improved diagnostics are needed for the management of invasive fungal infections. Standard sputum cultures have a low yield in the detection of mold. Conventionally only a fraction of the specimen is cultured. We studied the performance of high-volume cultures (HVCs) where the entire specimen is plated on Sabouraud agar (SA).

Methods. Specimens were collected at our center from January 2015 through February 2017. For conventional culture, sputum was homogenized by mixing with an equal volume of 0.1% dithiothreitol solution and diluted 500-fold in sterile water. Ten µL of the diluted specimen was cultured on SA (2 plates) and incubated at 37°C and 45°C for up to 5 days. For HVC, the entire undiluted specimen (up to 1 mL) was cultured on SA (up to 2 plates) and incubated at 30°C for up to 14 days.

Results. We studied 306 paired specimens that were collected for both conventional culture and HVC on the same day. A total of 139 patients with positive cultures had the following conditions: chronic pulmonary aspergillosis (58%), allergic bronchopulmonary aspergillosis/severe asthma with fungal sensitization (27%), *Aspergillus* bronchitis (9%), cystic fibrosis/bronchiectasis (6%).

Aspergillus was recovered by HVC in 114 specimens that had no mold growth by conventional culture. The same *Aspergillus* species was recovered by both HVC and conventional culture in 50 paired specimens. For 142 specimens there was no *Aspergillus* growth by HVC (*Penicillium* spp. grew in 4). For two of the negative HVC specimens *A. fumigatus* grew by conventional culture. The following species were recovered by HVC: *A. fumigatus* (80%), *A. niger* (10%), *A. flavus* (3%), other (7%). Susceptibility testing (EUCAST standard) was performed for 127 isolates of *A. fumigatus*. Rates of antifungal resistance were as follows: itraconazole 28%, voriconazole 19%, posaconazole 28%, isavuconazole 32%, amphotericin B 8%. Pan-azole resistance was detected in 17%. If HVCs were not performed, resistance to at least one of the antifungals would have been missed in 18/37 (49%) of cases.

Conclusion. The recovery rate of *Aspergillus* spp. is significantly higher for HVCs compared with conventional cultures and this can impact patient care. HVCs can be performed in any microbiology laboratory without the need for additional tools.

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2069. Automated Detection of *Candida auris* Direct from Whole Blood by T2MR

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Background. *Candida auris* is now recognized worldwide as a virulent pathogen that is difficult to manage, resulting in high mortality rates. The majority of *C. auris* isolates have exhibited resistance to one or more antifungal agents. Nosocomial infections caused by *C. auris* are growing due to the increasing rate of colonization and environmental causes. The diagnostic tests available for the identification of *C. auris* are limited to date. Additionally, microbiological cultures and subsequent identification of *Candida* species require 2-5 days, and have a sensitivity of approximately 50%. Accurate diagnosis of a *C. auris* infection is also hampered by misidentification of *C. auris* as other species, commonly *C. haemulonii* and *Saccharomyces cerevisiae*.

Here we evaluate the use of the T2MR platform for the highly sensitive, rapid species level identification of *C. auris*, *C. lusitanae* and *C. haemulonii* in whole blood samples.