1120. *Clostridium difficile* Infection Risk Factors, Severity, and Outcomes in Patients Infected with NAP1/027 Strain in a Non-Epidemic Setting

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**Background.** Evidence surrounding outcomes with the North American pulsed-field gel electrophoresis type I (NAP1) *Clostridium difficile* (CDI) strain remains conflicting. We compared risk factors, severity of illness, and mortality of patients infected with NAP1 strain compared with patients with non-NAP1 strains in our multi-hospital health system.

**Methods.** This is a retrospective case-control analysis of patients admitted to one of five hospitals (one academic and four community hospitals) and diagnosed with CDI from April 2014 through July 2017. CDI definition included three or more stools per day with positive stool sample polymerase chain reaction (PCR) testing for *C. difficile*. A total of 490 patients met inclusion, of which 155 had the NAP1 strain and 335 patients were infected with non-NAP1 strains. More patients with NAP1 were older, female, had CHF and presented from a healthcare facility as opposed to from the community (all P < 0.05). No difference in 90-day antibiotic class use was found. NAP1 patients had increased ICU admission (12.3 vs. 6.0%, P = 0.016), a shorter length of stay (10.8 vs. 13.4 days, P = 0.037), abnormal CT findings (P < 0.025), and trend towards more ID consults (P = 0.067). PER DA classification, 61.9% in the NAP1 CDI group had severe CDI as opposed to 49.6% in the non-NAP1 study group. (P = 0.038). There was no observed difference in inpatient mortality (7.7 vs. 5.7%, P = 0.581).

**Conclusion.** CDI caused by NAP1 strain did result in increased severity but did not result in increased mortality compared with CDI caused by non-NAP1 strains. Evidence continues to mount that while the NAP1 strain may affect severity, its effect on mortality remains in question.

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1121. Epidemiology and Risks for Infection Following Cytoreductive Surgery and Hyperthermic Intra-Peritoneal Chemotherapy at an Australian Centre

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**Background.** Cytoreductive surgery with hyperthermic intraperitoneal chemotherapy (CRS-HIPEC) is associated with improved cancer survival but increased risk of infection in patients with abdominal-pelvic malignancy. We evaluated risks and characteristics of infectious outcomes at an Australian cancer centre.

**Methods.** Patients undergoing CRS-HIPEC between January 2016 and November 2017 at Peter MacCallum Cancer Centre were retrospectively reviewed. Malignancy type, comorbidities, perioperative risk factors, and infectious complications were captured, using standardized definitions for surgical site infection. Association between risk factors and infection outcomes was evaluated by logistic regression modeling.

**Results.** Sixty-nine patients underwent CRS-HIPEC, predominantly for colorectal cancer and pseudomyxoma peritonei. Overall, 32 (46.3%) experienced an infectious complication, including infections at surgical site (16), respiratory tract (6), urinary tract (5), *Clostridium difficile* (2), and post-operative sepsis (10). In most, infection onset was within 7 days post-operatively. Median length of hospitalisation was 20 days for patients with infection, compared with 8 days for those without (P = 0.000). Of variables potentially associated with infection at surgical site, small bowel resection (OR 2.56, 95% confidence interval [CI] 1.09–28.19; P = 0.039) and number of resected viscera (OR 1.71, 95% CI 1.05–2.76; P = 0.029) were significantly associated with infection on univariate analysis.

**Conclusion.** We demonstrate a significant burden of early invasive complications in patients undergoing CRS-HIPEC, including surgical and non-surgical infections. Findings support the need for multimodal programs to reduce the risk of a broad range of infections in this population. Higher risk subgroups, including those with small bowel resection and increased number of resected viscera, may benefit from enhanced monitoring.

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1122. Evaluation of Fecal Microbiota Transplant (FMT) in Elderly Patients With Recurrent *Clostridium difficile* Infection (CDI)

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**Background.** CDI is a bacterial infection that typically occurs after the use of broad-spectrum antibiotics. Older adults are particularly susceptible to this potentially deadly disease and at higher risk of recurrence.

**Methods.** The study was approved by the hospital’s IRB. Patients 65 years of age and older with refractory or recurrent CDI who received FMT administered via colonoscopy or oral capsules were included. Patients with severe-complicated infection were excluded and ineligible to receive FMT. Each patient was evaluated 8 weeks post-transplant to assess for sustained clinical response and adverse events. Data collection included patient demographics, number of recurrent CDI episodes, CDI severity, previous antibiotic treatment regimens, clinical cure, adverse events, and donor information.

**Results.** Thirty-five patients were enrolled (23 colonoscopy FMT vs. 13 oral capsule FMT). One patient received FMT via colonoscopy twice. Mean age was 77 years (65–93), female 60%, median recurrent episode was 3, and median CDI severity score was 2. Total success rate was 69.4% (25/36), 60.9% (14/23) via colonoscopy vs. 84.6% (11/13) via capsule. Total success rate for female 67% vs. 73% male and age group of 65–75 vs 60% vs. 76% in age group > 75+. For capsules only, cure rate was 80% in female vs. 100% in male and 75% in 65–75 age group vs. 89% in patients older than 75 while in colonoscopy only group, success rate was 55% in female vs. 67% in males and 46% in 65–75 age group vs. 67% in age group > 75+. There did not seem to be a correlation between FMT donor and success rate. No serious adverse events were reported in the study population.

**Conclusion.** FMT may be considered a potentially useful therapy for the treatment of refractory or recurrent CDI cases in patients 65 years of age and older. Further studies are needed to confirm the above findings.

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1123. Individual and Household Risk Factors for Symptomatic Cholera Infection: A Systematic Review and Meta-Analysis

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**Background.** Cholera has caused seven global pandemics, including the current one which has been ongoing since 1961. A systematic review of risk factors for symptomatic cholera infection has not been previously published.

**Methods.** In accordance with PRISMA guidelines, we performed a systematic review and meta-analysis of individual and household risk factors for symptomatic cholera infection.

**Results.** We identified 110 studies eligible for inclusion in qualitative synthesis. Factors associated with symptomatic cholera that were eligible for meta-analysis included education less than secondary level (summary OR 2.64, 95% CI 1.41–4.92, I^2 = 8%), improved water source (summary OR 4.78, 95% CI 3.02–7.57, I^2 = 49%), open container water storage (summary OR 2.51, 95% CI 1.57–4.01, I^2 = 33%), consumption of food outside the home (summary OR 5.02, 95% CI 2.34–10.76, I^2 = 61%), household contact with cholera (summary OR 3.99, 95% CI 2.03–7.87, I^2 = 89%), water treatment (summary OR 0.32, 95% CI 0.13–0.76, I^2 = 37%), and handwashing (summary OR 0.17, 95% CI 0.10–0.30, I^2 = 37%). Other notable associations with symptomatic infection included income/wealth, blood group, gastric acidity, infant breastfeeding status, and HIV infection.

**Conclusion.** We identified potential risk factors for symptomatic cholera infection including environmental characteristics, socioeconomic factors, and intrinsic patient factors. Ultimately, a combination of interventional approaches targeting various groups with risk-adapted intensities may prove to be the optimal strategy for cholera control.

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1124. Effects of Co-infection on the Severity, Response to Treatment and Duration of Hospital Stay in Patients with Clostridium difficile Infection
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Background. According to the multicenter evaluation of the FilmArray® multiplex gastrointestinal (GI) panel for etiologic diagnosis of infectious gastroenteritis, the GI panel detected at least one potential pathogen in 53.5% of the stool specimens that were collected. Out of the positive samples, 31.5% tested positive for more than one potential pathogen. The samples that were co-infected showed that Clostridium difficile infection (CDI) was present in 53.4% of them. This lead to the idea of our project to determine whether the presence of another GI infection affects CDI outcomes in terms of severity, treatment escalation, duration of hospital stay and recurrence.

Methods. Inclusion criteria: 18-year-old and above patients. Exclusion criteria are GI panel performed on outpatient basis, presence of any co-founder that had independent effect on the outcomes such as end-stage renal disease, cirrhosis, presence of non-GI infection (pneumonia, urinary tract infection, osteomyelitis etc.), and recurrent CDI.

Out of the 2,576 GI panels performed from January 1, 2015 until December 31, 2016: only 235 patients were selected for retrospective chart review based on the above criteria. Out of 235 patients, 38 patients had co-infection (CDI + another GI infection = Group A) and reminder had only CDI (Group B). Chi-square test, Fisher’s exact test (for severity, treatment escalation and recurrence) and Independent T-test (for duration of hospital stay) were used to compare Group A with Group B. Alpha criterion was 0.05.

Results. The P-values for each outcome are given below: (a) 0.16 for severity according to definition of American College of Gastroenterology. (b) 0.77 for severity according to definition of Infectious Disease Society of America. (c) 0.43 for treatment escalation. (d) 0.41 for duration of hospital stay. (e) 0.49 for CDI recurrence.

Conclusion. All the resulted P-values are greater than 0.05. These results are suggestive of the fact that presence of another GI infection does not affect the outcomes for CDI in terms of severity, treatment escalation, duration of hospital stay and recurrence. As there were only 38 patients in co-infection group, it limits the ability to determine the effect of individual infectious agent on the outcomes of CDI.

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1125. Reduced Time to Pathogen Identification and Antibiotic Prescription Using Multiplex Molecular Testing for Gastrointestinal Infections
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Background. A variety of microbial pathogens causes diarrhea which remains a significant global concern. The ability to rapidly identify the pathogen impacts the decision to treat, change antimicrobial stewardship, and assists with infection control and prevention. The objective of the study was to compare the time it took for rapid identification of microbial pathogens via a stool-culture based testing vs. real-time PCR using a Verigene Enteric Pathogens (EP) test.

Methods. The study was performed at Virginia Mason Medical Center, a tertiary medical center in Seattle. A retrospective chart review included the diagnosis of microbial pathogen, antibiotics prescribed (if any), time of prescription, duration of antibiotic course and patients’ outcome if they were hospitalized. Stool specimens from 136 patients in 2015 were analyzed via a stool-culture based method. The results were compared with a molecular-based method used to study specimens from 225 patients in 2017. Years 2015 and 2017 were chosen as in 2016 the culture-dependent testing was replaced by culture independent. T-test was used to examine the difference in time to identification of the pathogen and time to prescription between 2015 and 2017. SAS 9.4 was used for the analysis.

Results. In 2015, 2,194 stool specimens were tested and 136 (6.2%) were positive. In 2017, 2,037 stool specimens were examined and 225 (11%) returned positive. The median time to prescription in 2015 was 53.84 hours in comparison to 21.96 hours in 2017 (P < 0.0001). The median time to identification of the pathogen was 60.05 hours in 2015 vs. 22.53 hours in 2017 (P < 0.0001). The TAT (turnaround time), defined as the time from the specimen being received in the laboratory to the finalized result, was 167.92 hours vs. 156.35 hours, respectively (P = 0.75).

Conclusion. Multiplex PCR assays for enteric pathogens showed higher sensitivity when compared with standard culture-based methods. When the clinician felt antibiotics were indicated, there was a significantly shorter time to antibiotics prescription. Aside from a shorter time to microbial identification, molecular assays detect an increased number of pathogens from a single specimen that has an important impact on infection prevention and appropriate treatment.

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1126. Three Cases of Neutropenic Enterocolitis Following Midostaurin Administration
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Background. Neutropenic enterocolitis is a life-threatening inflammation of the colon with a mortality rate above 50% primarily seen in neutropenic patients on cytotoxic chemotherapy. The following cases illustrate three patients with this condition following midostaurin administration after standard induction chemotherapy with daunorubicin/idarubicin and cytarabine for acute myeloid leukemia (AML). Midostaurin is a multitargeted FMS-Like Tyrosine kinase 3 (FLT3) receptor inhibitor used in AML treatment after induction chemotherapy.

Methods. Review of records of three patients seen by the infectious disease service.

Results. In these cases, patients were diagnosed with AML with FLT3 mutation. All three were admitted and started on standard induction chemotherapy. Midostaurin was started on day 7 and day 8 at which time all patients were neutropenic. The patients developed fevers, abdominal pain, and diarrhea within 36 hours of starting midostaurin and had abdominal CT findings consistent with neutropenic enterocolitis. For two patients, midostaurin was discontinued and symptoms improved upon discontinuation. One patient completed the course of midostaurin with symptom resolution after its completion. Of note, all were started on appropriate prophylactic antibiotics at chemotherapy initiation and were started on broad-spectrum antibiotics at onset of fevers and abdominal symptoms. Appropriate evaluation was also done for each patient to rule out other causes of abdominal pain other than neutropenic enterocolitis.

Conclusion. These cases are significant because they illustrate individuals treated with standard induction chemotherapy for AML and started on midostaurin while neutropenic who began reporting symptoms of neutropenic enterocolitis within 36 hours of receiving midostaurin. This shows a possible increased toxicity when midostaurin is given after induction chemotherapy in the setting of neutropenia. Stone et al. showed increased intestinal symptoms with midostaurin, but no cases of neutropenic enterocolitis have been reported. With increased midostaurin use in the past year, further studies are warranted to establish and raise awareness of a possible direct association between midostaurin and gastrointestinal toxicity.

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1127. Genomic Analysis of Biofilm-Forming Enteroinvasive E. coli Emergent Pathogen
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Background. Enteroinvasive Escherichia coli (EIEC) are involved in dysenteric diarrhea among children in low- and middle-income countries. EIEC strains isolated in Colombia, South America were shown to form biofilms and to be invasive in vitro. The O96:H19 serotypes and biofilm formation (BF) are not common phenotypes among EIEC, and the role they may play in diarrhea is at present unknown. The main goal of this study was to identify virulence and BF genes from EIEC genomic data. We hypothesize that EIEC O96:H19 strain 52.1 originated from horizontal transfer of a Shigella-like virulence plasmid into a non-EIEC pathogenic E coli strain.

Methods. WGS was performed on the BF-EIEC 52.1 strain using NextGen Illumina and Pacific Biosciences (PacBio) platforms. Publically available genomes from other EIEC O96:H19 and Shigella genomes previously published were analyzed using online available software and databases including NCBI, BLAST, Mauve, among others. This analysis was tailored to identify virulence factors from the virulence factor database (VFDB). BLAST was used to determine identity of genes encoding the Shigella virulence factors. EIEC and Shigella genomes were analyzed on a multiple genome alignment software (Mauve) to verify results from BLASTn and to determine pseudogenes.

Results. The genome of EIEC O96:H19 strain 52.1 was 5,193,449 bp in size, containing 5,050 coding DNA sequences (CDSs). O96:H19 strain 52.1 carries three plasmids, the invasion plasmid (pINV) contains all type 3 secretion system (T3SS) and TTS effector genes previously described for Shigella and EIEC O96:H19 CESAN029787 Italian strain. Non-TTSS virulence genes were also identified, including two possible fimbrial gene (lpfA), enterotoxin (senB), and antibiotic resistance genes.

Conclusion. The EIEC O96:H19 strain 52.1 genome carries TTS genes within a virulence plasmid, protein effector genes, and enterotoxin genes known to be