bacteremia was identified in 22 patients (35.5%) and was significantly more common in group A (60.0% [9/15]) than groups B (43.5% [10/23]) or C (12.5% [3/24]) (P = 0.01). Thirty-day mortality rates were also significantly higher in group A than groups B or C (60.0% [9/15] vs. 13.0% [3/23] and 16.7% [4/24], respectively; P < 0.001; Figure 1). C. difficile bacteremia (P = 0.16), polymicrobial infection (P = 0.91), and antimicrobrial therapy for C. difficile (P = 0.48) were not significantly associated with 30-day mortality. In a multivariate analysis, group A was an independent risk factor for 30-day mortality. (adjusted odds ratio: 7.29 [95% confidence interval: 1.68–31.68], P = 0.01).

**Conclusion.** Extraintestinal C. difficile infection was not commonly associated with C. difficile enterocolitis. Extraintestinal C. difficile infection accompanied by GI disruption with malignancy was associated with significantly poorer outcomes.

**Figure 1.** Kaplan-Meier survival curve of patients up to 30 days after culture, stratified for groups A, B, and C.

**Disclosures.** All authors: No reported disclosures.

2406. Trends of Clostridioides difficile-Associated Diarrhea at a Tertiary Care Center in India

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**Session:** 251. HAI: C. difficile - Epidemiology

**Saturday, October 5, 2019: 10:15 AM**

**Background.** Clostridioides difficile has been recognized as a significant cause of morbidity and mortality globally. Its infection can range from asymptomatic carriage to antibiotic-associated diarrhea and colitis. Reports of outbreak with the hypervirulent strain (N1/NAP1 Ribotype 027) has raised the concern on the magnitude and impact on the recurrence of the infection.

**Methods.** A retrospective analysis was conducted to identify all nosocomial C. difficile-associated diarrhea (CDAD) among the patients at a tertiary care hospital in India.

**Results.** Samples from 1311 patients were received from January 2015-December 2018 and was performed on stool samples positive for toxins A and B. A diagnosis of CDAD was made in all patients with stool samples positive for toxins A and B.

**Conclusion.** Our results show overall variable prevalence of CDAD over the years and was higher in the year 2016. Timely appropriate diagnosis, high index of suspicion in high-risk patients and proper implementation of antimicrobial stewardship programs may help in reducing morbidity and mortality in patients of CDAD.

**Disclosures.** All authors: No reported disclosures.

2407. Overexpression of Virulence Factors in Biofilm from Recurrent Clostridium (Clostridioides) difficile Infection Isolates

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**Session:** 251. HAI: C. difficile - Epidemiology

**Saturday, October 5, 2019: 1:15 PM**

**Background.** Recurrent Clostridium (Clostridioides) difficile infection (R-CDI) remains a significant healthcare problem. Our aim was to analyze virulence/colonization determinants including spore formation, and expression of quorum sensing factors and adhesion capability in C. difficile biofilms, which serve as a potential reservoir for C. difficile in R-CDI.

**Methods.** Isolates obtained from patients with R-CDI (n = 39) and non-recurrent CDI (NR-CDI) (n = 93) were analyzed. Isolates were identified by PCR and MALDI-TOF MS and ribotyped by 16S-RNA amplification and capillary electrophoresis.

**Biofilm production in a C. difficile and in a C. difficile-microbiota (Enterococcus and Lactobacillus species) model was assessed by the crystal violet method. Spore counts were determined both in planktonic and biofilm growth.**

RNA was extracted from a selection of strains from R-CDI (n = 10) and NR-CDI (n = 10) isolate biofilms and relative expression levels of: spo0A, sigH, nspA, cwp84, agrD1 and luxS were determined.

**Results.** All NR-CDI and R-CDI isolates were biofilm producers and most were strongly adherent (90.90%) and 027 ribotype (81.37%).

In the C. difficile biofilm model, spore formation was higher in R-CDI than in the NR-CDI isolates (P = 0.015). In the biofilm of C. difficile-microbiota, no difference was detected in spore formation between the R-CDI and NR-CDI isolates (P = 0.677).

Expression of sigH (P = 0.007), spo0A (P = 0.003), cwp84 (P = 0.001) and agrD1 (P = 0.001) was higher in R-CDI than NR-CDI isolates. No difference was shown in spo0A (P = 0.466) and luxS (P = 0.603).

**Conclusion.** Our data suggest that expression of sporulating pathway genes, sigH, spo0A, the quorum sensing gene, agrD1 and adhesion-associated gene, cwp84 is higher in R-CDI isolates, in addition to elevated spore formation, which may have an impact on the recurrence of the infection.

**Disclosures.** All authors: No reported disclosures.

2408. Genotypic Corroboration of Epidemiologically Linked Clusters to Detect Outbreaks of C. difficile at a Tertiary Care Hospital

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**Session:** 251. HAI: C. difficile - Epidemiology

**Saturday, October 5, 2019: 12:15 PM**

**Background.** The Society for Healthcare Epidemiology of America (SHEA) recommends that surveillance for healthcare facility-onset C. difficile infections (HO CDI) be conducted to detect elevated rates or outbreaks of CDI and stratify data by hospital unit when possible to facilitate detection of clusters. At Memorial Sloan Kettering Cancer Center, strain typing of isolates using multi-locus sequence typing (MLST) is performed routinely and in real time to inform control efforts. Genotyping can conclusively establish or debunk transmission events based on routine surveillance. Management of C. difficile outbreaks is time and resource intensive.

**Methods.** A retrospective analysis was conducted to identify all nosocomial C. difficile cases between July 2013 and July 2018. Based on Memorial Sloan Kettering’s baseline surveillance data, a cluster of C. difficile was defined as three or more hospital-acquired cases (as defined by NHSN) on the same inpatient unit within a 7-day period. Data were analyzed to quantify the number of clusters observed and determine genetic relatedness among cases to detect an outbreak.

**Results.** A total of 1,116 HO CDI cases occurred during the 5-year time period. Annual nosocomial rates of CDI remained stable (P = 0.052). Fifty clusters were identified; 63 clusters had 3 cases within each cluster, 16 were each made up of 4 cases, and 1 cluster consisted of 5 cases. Two clusters had strain typing concordance amongst all cases; strain type 42 and strain type 1. Among all the epidemiologically linked clusters over the 5-year period, only 2.5% were genetically linked suggestive of true outbreaks.

**Conclusion.** The majority of HO-CDI clusters detected on clinical surveillance are non-clonal. Genotyping should be routinely used to corroborate clusters identified on microbiological surveillance before costly outbreak control interventions are deployed.

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2409. External Validation and Comparison of Clostridioides difficile Severity Scoring Systems

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Background. Annually in the US alone, *Clostridioides difficile* infection (CDI) afflicts nearly 500,000 patients causing 29,000 deaths. Since early and aggressive interventions could save lives but are not optimally deployed in all patients, numerous studies have published predictive models for adverse outcomes. These models are usually developed at a single institution, and largely are not externally validated. This aim of this study was to validate the predictability for severe CDI with previously published risk scores in a multicenter cohort of patients with CDI.

Methods. We conducted a retrospective study on four separate inpatient cohorts with CDI from three distinct sites: the Universities of Michigan (2010–2012 and 2016), Chicago (2012), and Wisconsin (2012). The primary composite outcome was admission to an intensive care unit, colectomy, and/or death attributed to CDI within 30 days of positive test. Structured query and manual chart review abstracted data from the medical record at each site. Published CDI severity scores were assessed and compared with each other and the IDSA guideline definition of severe CDI. Sensitivity, specificity, area under the receiver-operator characteristic curve (AUC), precision-recall curves, and net reclassification index (NRI) were calculated to compare models.

Results. We included 3,775 patients from the four cohorts (Table 1) and evaluated eight severity scores (Table 2). The IDSA (baseline comparator) model showed poor performance across cohorts (Table 3). Of the binary classification models, including those that were most predictive of the primary composite outcome, Jardin, performed poorly with minimal to no NRI improvement compared with IDSA. The continuous score models, Tora and ATLAS, performed better, but the AUROC varied by site up to 17% (Table 3). The Gujja model varied the most: from most predictive in the University of Michigan 2010–2012 cohort to having no predictive value in the 2016 cohort (Table 3).

Conclusion. No published CDI severity score showed stable, acceptable predictive ability across multiple cohorts/institutions. To maximize performance and clinical utility, future efforts should focus on a multicenter-derived and validated scoring system, and/or incorporate novel biomarkers.

Table 1. Characteristics of the study population.

| University of Michigan (2010-2012) | University of Michigan (2016) | University of Wisconsin (2014-2015) | University of Michigan (2013-2015) |
|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------------|
| Total Patients                    |                             |                                   |                                   |
| Age (years) [mean SD]             |                             |                                   |                                   |
| 57.3±18.0                        | 57.7±18.2                   | 59.3±16.1                         | 58.7±18.5                        |
| Severe CDI [%]                    |                             |                                   |                                   |
| 90.7 (93)                        | 29.4 (45.3)                 | 35.6 (8.6)                         | 64.8 (5.8)                       |
| Male [%]                          |                             |                                   |                                   |
| 519 (45.3)                       | 330 (47.6)                  | 251 (48.7)                         | 639 (47.8)                       |
| WBC (x10⁶/µl) [mean ± SD]         |                             |                                   |                                   |
| 13.4±12.4                        | 12.2±15.5                   | 12.7±19.5                         | 11.2±11.9                       |
| Baseline Creatinine (mg/dl) [mean SD] |                             |                                   |                                   |
| 1.4±1.7                          | 1.2±1.3                     | N/A                               | 1.6±2.2                          |
| Peak Creatinine (mg/dl) [mean SD] |                             |                                   |                                   |
| 1.6±1.8                          | 1.3±1.8                     | 2.0±2.4                           | 2.1±2.4                          |
| Outcomes                          |                             |                                   |                                   |
| 30 Day Mortality [%]              |                             |                                   |                                   |
| 89.7 (8.7)                       | 41.6 (3.6)                  | 45.8 (7.1)                         | 117.8 (17)                       |
| ICU Transfer [%]                  |                             |                                   |                                   |
| 114 (10.0%)                      | 11 (1.7)                    | 61 (11.8)                          | 846 (63.6)                       |
| Colectomy [%]                     |                             |                                   |                                   |
| 6.0 (5.0%)                       | 3.0 (5.0%)                  | 6.1 (2.1)                          | 21.6 (16)                        |
| Attributable Outcomes             |                             |                                   |                                   |
| 30 Day Mortality [%]              |                             |                                   |                                   |
| 49.3 (4.3)                       | 23.3 (3.6)                  | 17.3 (3.3)                         | 39.0 (2.9)                       |
| ICU Transfer [%]                  |                             |                                   |                                   |
| 49.3 (4.3)                       | 5.0 (6.8)                   | 26.0 (5.0)                         | 18.1 (3.3)                       |
| Colectomy [%]                     |                             |                                   |                                   |
| 4.0 (3.0%)                       | 1.0 (2.0)                   | 51.0 (5)                           | 16.1 (2)                         |

Table 2. Performance measures of the CDI severity scoring systems across cohorts vs. the primary composite outcome (attributable to ICU admission, colectomy, and/or death).

| University of Michigan (2010-2012) | University of Michigan (2016) | University of Wisconsin (2014-2015) | University of Michigan (2013-2015) |
|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------------|
| Sensitivity [%]                   |                             |                                   |                                   |
| frying [mean ± SD]                |                             |                                   |                                   |
| tcdA, tcdB, cdtA, cdtB             |                             |                                   |                                   |
| 0.39 ± 0.70                      | 0.72 ± 067                  | 0.60 ± 0.53                       | 0.33 ± 0.42                      |
| Zr                                |                             |                                   |                                   |
| 0.52 ± 0.74                      | 0.74 ± 0.53                 | 0.17 ± 0.12                       | 0.36 ± 0.42                      |
| Gujja                             |                             |                                   |                                   |
| 0.52 ± 0.98                      | 0.00 ± 1.00                 | 0.16 ± 0.39                       | 0.33 ± 0.40                      |
| Tora                              |                             |                                   |                                   |
| 0.54 ± 0.74                      | 0.58 ± 0.88                 | 0.34 ± 0.35                       | 0.70 ± 0.96                      |
| ATLAS                             |                             |                                   |                                   |
| 0.52 ± 0.71                      | 0.68 ± 0.73                 | 0.77 ± 0.72                       | 0.42 ± 0.42                      |
| Jardin                            |                             |                                   |                                   |
| 0.52 ± 0.94                      | 0.51 ± 0.79                 | 0.21 ± 0.07                       | 0.09 ± 0.07                      |
| ATLAS                             |                             |                                   |                                   |
| 0.46 ± 0.95                      | 0.95 ± 0.97                 | 0.15 ± 0.48                       | 0.45 ± 0.68                      |

Table 3. Performance measures of the CDI severity scoring systems across cohorts vs. the primary composite outcome (attributable to ICU admission, colectomy, and/or death).

| University of Michigan (2010-2012) | University of Michigan (2016) | University of Wisconsin (2014-2015) | University of Michigan (2013-2015) |
|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------------|
| Sensitivity [%]                   |                             |                                   |                                   |
| frying [mean ± SD]                |                             |                                   |                                   |
| tcdA, tcdB, cdtA, cdtB             |                             |                                   |                                   |
| 0.39 ± 0.70                      | 0.72 ± 067                  | 0.60 ± 0.53                       | 0.33 ± 0.42                      |
| Predictive ability [%]            |                             |                                   |                                   |
| 30 Day Mortality [%]              |                             |                                   |                                   |
| 49.3 (4.3)                       | 23.3 (3.6)                  | 17.3 (3.3)                         | 39.0 (2.9)                       |
| ICU Transfer [%]                  |                             |                                   |                                   |
| 49.3 (4.3)                       | 5.0 (6.8)                   | 26.0 (5.0)                         | 18.1 (3.3)                       |
| Colectomy [%]                     |                             |                                   |                                   |
| 4.0 (3.0%)                       | 1.0 (2.0)                   | 51.0 (5)                           | 16.1 (2)                         |