Background. Recurrent *Clostridium diffcile* infection (rCDI) poses major challenges to healthcare providers and patients. Fecal Microbiota Transplantation (FMT) is an effective therapy for rCDI, but the exact mechanism of its efficacy is unknown. Current metagenomics literature indicates that abundance of Bacteroidetes and Firmicutes may protect against CD proliferation and recurrence. However, this is too broad to be useful for developing refined and targeted microbial-specific therapy for rCDI, because the long-term safety of FMT remains unknown. We examined the phylogeny of bacteria pre- and post- FMT to determine the key organisms associated with successful FMT to the genera level.

Methods. A subset of patient stool samples (n = 35) from a phase 2 study comparing fresh vs. frozen FMT for rCDI was sequenced at four time points: pre-FMT; at day 10; at week 5; and at week 13, following the last FMT. The matching donor stool was sequenced simultaneously with the corresponding patients' pre- and post-FMT samples.

Using the binary outcome to a single FMT as the response, we have developed an in-house machine learning algorithm, Φ-LASSO, to isolate key genera using the bacterial phylogenetic structure.

Engraftment was defined as: newly detected operational taxonomic unit (OTUs) in the patient post-FMT, which were present in the donor but undetected in the patient pre-FMT. Augmentation was defined as: non-donor OTUs whose levels substantially increased post-FMT. Figure 1 (below) displays the distribution of engrafted and augmented OTUs at varying thresholds. We observed increases over time points within each threshold level.

Results. *Akkermansia*, *Blautia* and *Roseburia*appear to be key genera for successful FMT. The Φ-LASSO fits with consistently positive coefficients, see Figure 2.

Conclusion. In this preliminary study, using Φ-LASSO, we have shown that specific microbes to the genera level are uniformly present in successful FMT. This information may lead to developing refined and targeted microbial-therapy for rCDI.

Figure 1: Observed (a) engraftment of distinct donor OTUs on patients and (b) augmentation of distinct OTUs in patients for day 10 (D10), week 5 (W5), and week 13 (W13) post-treatment.

Figure 2: Fitted coefficients for donor OTUs selected by Φ-LASSO.

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1247. Lyophilized Fecal Microbiota Transplantation Capsules for Recurrent *Clostridium difficile* Infection

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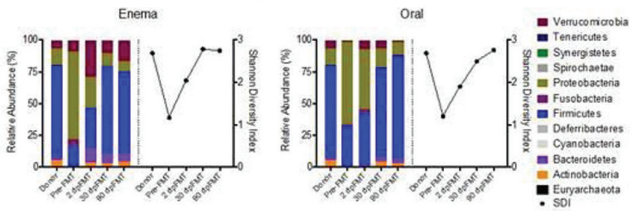
Background. Fecal microbiota (FM) transplantation (FMT) is a highly effective treatment of recurrent *C. difficile* infection (rCDI). We have published data showing efficacy of fresh, frozen and lyophilized donor microbiota administered by colonoscopy. Most groups are moving toward use of frozen product given by enema and in evaluating encapsulated product for oral delivery.

Methods. This was a prospective, randomized study of subjects with rCDI (≥ 3 episodes) treated with encapsulated lyophilized FM 100 g given once or 100 g given on two successive days (total 200 g) vs. frozen FM product 100 g given by single retention enema, between March 2015 and February 2017. The clinical outcome was absence of CDI during the 60 days after FMT. The subjects were followed for 6 months for safety. In a subset recipients, microbiome composition by 16S rRNA gene profiling were analyzed on stools obtained pre- and day 2, 7, 14, 30, 60 and 90 days after FMT.

Results. A total of 54 subjects were enrolled (37/54; 69% female) with a median age of 71 years (range: 20–97). In the first 14 subjects treated, cure rates for oral capsules 100 g FM was 5/8 (63%) vs. 6/6 (100%) for those receiving 100 g frozen FM by enema (P = 0.209). In the second phase of the study cure rate for oral capsules 200 g FM was 17/18 (91%) vs. 20/21 (94%) for the subjects treated by enema by 100 g of frozen product (P = 0.782). No side effects were felt to be related to the procedure or the FMT products were recorded during 6 months follow-up. Two subjects died during follow-up between 3 and 6 months after study due to underlying medical conditions felt to be unrelated to FMT. Microbiota analysis were performed on 40 subjects of which 19/40 (48%) had received capsules. Figure showed that restoration of the intestinal microbiome diversity and Taxa began apparent by 2 days after FMT in both groups and resembled the donor product by 2 weeks with stabilization of the microbiota diversity and Taxa persisting for the 90 days of observation.

Conclusion. Administration of encapsulated, lyophilized FM resulted in durable restoration of intestinal microbiome diversity comparable to results seen with frozen product given by enema.

FIGURE: Gut microbiota relative abundance at phylum level and diversity by Shannon diversity index for donors and fecal microbiota transplantation (FMT) recipients grouped by administration route and treatment days before and after FMT



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

1248. Socioeconomic Status Factors Associated with Increased Incidence of Community-Associated *Clostridium difficile* Infection

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Background. Traditionally a hospital-acquired pathogen, *Clostridium difficile* is increasingly recognized as an important cause of diarrhea in community settings. Health disparities in *C. difficile*infection (CDI) have been reported, but little is known about the social determinants of health that influence community-associated (CA) CDI incidence. We sought to identify socioeconomic status (SES) factors associated with increased CA-CDI incidence.

Methods. Population-based CDI surveillance is conducted in 35 U.S. counties through the Centers for Disease Control and Prevention's Emerging Infections Program. A CA-CDI case is defined as a positive *C. difficile* stool specimen collected as an outpatient or within three days of hospitalization in a person aged ≥ 1 year who did not have a positive test in the prior 8 weeks or an overnight stay in a healthcare facility in the prior 12 weeks. ArcGIS software was used to geocode 2014–2015 CA-CDI case addresses to a 2010 census tract (CT). Incidence rate was calculated using 2010 Census population denominators. CT-level SES factors were obtained from the 2011–2015 American Community Survey 5-year estimates and divided into deciles. To account for CT-level clustering effects, separate generalized linear mixed models with negative binomial distribution were used to evaluate the association between each SES factor and CA-CDI incidence, adjusted by age, sex and race.

Results. Of 9686 CA-CDI cases, 9417 (97%) had addresses geocoded to a CT; of these, 62% were female, 82% were white, and 35% were aged ≥65 years. Annual CA-CDI incidence was 42.9 per 100,000 persons. After adjusting for age, sex and race, CT-level SES factors significantly associated with increased CA-CDI incidence included living under the poverty level (rate ratio [RR] 1.12; 95% confidence interval [CI] 1.09–1.53), crowding in homes (RR 1.11; 95% CI 1.01–1.21), low education (RR 1.11; 95% CI 1.07–1.15), low income (RR 1.15; 95% CI 1.12–1.17), having public health insurance (RR 1.21; 95% CI 1.18–1.24), receiving public assistance income (RR 1.69; 95% CI 1.55–1.84), and unemployment (RR 1.14; 95% CI 1.07–1.22).

Conclusion. Areas with lower SES have modestly increased CA-CDI incidence. Understanding the mechanisms by which SES factors impact CA-CDI incidence could help guide prevention efforts in these higher-risk areas.

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1249. Prevalence of *Clostridium difficile* and Multidrug Resistant Gram-negative Rods in the Soil from Southeastern Wisconsin

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Background. Preliminary data suggests that community-onset *Clostridium difficile* might be more common in rural areas. Thus, farms—specifically livestock