Antimicrobial-Resistant Organisms and Enteric Pathogens in Stool Donors

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ABSTRACT

Background: Fecal microbiota transplantation (FMT) is a recommended treatment for recurrent Clostridioides difficile infection. Many FMT programs employ universal stool donors who undergo screening on regular intervals to ensure they remain healthy and do not carry antimicrobial-resistant organisms (ARO) and enteric pathogens (EP). We describe the prevalence of intermittent, asymptomatic carriage of ARO and EP in donated stool and determine the optimal frequency of donor rescreening required to detect such carriage.

Methods: Stool aliquots from all FMT donor stool samples were screened for methicillin-resistant Staphylococcus aureus (MRSA), vancomycin-resistant enterococci (VRE), extended-spectrum β-lactamase or AmpC-producing organisms, and carbapenemase-producing organisms using standard culture methods, and 22 EP using a multiplex polymerase chain reaction platform. The prevalence of ARO and EP positivity and the optimal frequency of donor rescreening to detect carriage was determined.

Results: Of 146 donor stool samples, 12 (8.2%; 95% confidence interval [CI], 4.6%-13.9%) were positive for ARO or EP. Donor rescreening every 2 months would detect only 25% of ARO and EP in this donor population. Rescreening every 2 weeks increased detection yield to 83.3%. It is only with screening every donation that 100% of all ARO and EP could be detected.

Conclusions: Transient carriage of AROs and EP in healthy prescreened stool donors occurs frequently. FMT programs need to recognize the risk of ARO and EP transmission through FMT and optimize the frequency of screening to reduce the risk of transmission to patients.

INTRODUCTION

FMT is a recommended treatment option for recurrent C. difficile infections. Although uncommon, serious adverse events following FMT have been described, including a recent report of two cases of enteric infection, and research using FMT methods. We sought to determine the prevalence of ARO and EP in donated stool and ascertain the optimal frequency of donor rescreening to detect asymptomatic carriage.

METHODS

- All active donors between March 2017 and June 2019 included and interrogated for risk factors for ARO and EP acquisition.
- Donor stool aliquots were tested for MRSA, VRE, ESBL, AmpC, and CPO using standard laboratory methods and 22 pathogens commonly associated with gastroenteritis using the BioFire FilmArray Gastrointestinal Panel.
- One-month post-FMT follow-up records for patients who received ARO- or EP-positive FMT were reviewed.
- Different donor rescreening frequencies were applied to the data set to determine the optimal frequency of donor rescreening.

RESULTS

Of the 146 donor stool samples, 12 (8.2%; 95% CI, 4.6%-13.9%) were positive for either ARO or EP. Donor rescreening every 2 months would detect only 25% of ARO and EP in this donor population. Rescreening every 2 weeks increased detection yield to 83.3%. It is only with screening every donation that 100% of all ARO and EP could be detected.

The proportion of donor stool positive for EP that would have been detectable if bookend screening occurred every 3 months, every 2 months, every month, every 2 weeks, and every donation in our dataset was 33.3% (95% CI 13.6-61.2%), 25.0% (95% CI 8.3-53.9%), 75.0% (46.2-91.7%), 83.3% (95% CI 54.0-96.5%), and 100% (95% CI 71.8-100%), respectively (Table 1).

Table 1. Proportion of Donor Stool Positive for Antimicrobial-Resistant Organisms (ARO) and Enteric Pathogens (EP) Detectable using Different Donor Rescreening (Bookend Testing) Frequencies

<table>
<thead>
<tr>
<th>Donor Rescreening Frequency</th>
<th>ARO Positive</th>
<th>EP Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every Donations</td>
<td>100% (95% CI 71.8-100%)</td>
<td>100% (95% CI 71.8-100%)</td>
</tr>
<tr>
<td>Every 2 Weeks</td>
<td>83.3% (95% CI 54.0-96.5%)</td>
<td>75.0% (46.2-91.7%)</td>
</tr>
<tr>
<td>Every Month</td>
<td>62.5% (33.3-91.7%)</td>
<td>50.0% (0-88.2%)</td>
</tr>
<tr>
<td>Every 2 Weeks</td>
<td>62.5% (33.3-91.7%)</td>
<td>50.0% (0-88.2%)</td>
</tr>
<tr>
<td>Every Donation</td>
<td>100% (95% CI 71.8-100%)</td>
<td>100% (95% CI 71.8-100%)</td>
</tr>
</tbody>
</table>

DISCUSSION & CONCLUSIONS

- In this cohort of 7 health, asymptomatic, pre-screened universal FMT donors, 8.2% of FMT donations tested positive for common AROs or EPs.
- The optimal frequency of donor screening in universal FMT stool banks is controversial, partly due to paucity of data informing risk of transient, asymptomatic ARO and EP carriage.
- Recent serious infections, including one death in a FMT recipient who acquired bacteremia with a FMT transmitted ESBL-producing E. coli, highlights the importance of testing for ARO in donor stool.
- Our data support the recommendation for more frequent testing, and suggest that bookend screening every 2 months may not be adequate. Rescreening every 2 weeks increased detection yield to 83.3%, but only with screening every donation would 100% of all ARO and EP have been detected.
- The cost impact of screening every donation should be balanced against the potential for harm caused by exposing FMT recipients to stool from a donor carrying an ARO or EP.
- FMT programs need to recognize the risk of ARO and EP transmission through FMT and recognize the limitations of rescreening at frequencies less than every donation.

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