

Patient Perspectives on Fecal Microbiota Transplantation for *Clostridium Difficile* Infection

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ABSTRACT

Introduction: *Clostridium difficile* infection (CDI) is a severe and increasingly frequent healthcare-associated infection that develops after disruption of the gut microbiota. Immunocompromised, hospitalized patients have an increased likelihood of acquiring CDI, leading to lengthened hospital stays, increased medical fees, and higher rates of morbidity and mortality. Treatment of CDI is challenging because of limited treatment options and a 19–20% recurrence rate. Thus, there is a need for effective, affordable and safe treatments for

CDI. Fecal microbiota transplantation (FMT) is the transplantation of donor stool into the intestine of a CDI patient to restore the structure and function of the gut microbiota and eradicate CDI. Recently, FMT has become an attractive alternative treatment for CDI due to its overwhelming success rate. However, the patient perspective on the effect of CDI and the role of FMT in that context is lacking.

Methods: We undertook a patient survey to gather qualitative and quantitative data on the short-term social, physical, emotional outcomes for patients with CDI who have undergone FMT.

Results: We found in all patients interviewed that the social implications of CDI were generally more severe than the emotional and physical aspects.

Conclusion: Future studies should consider evaluating these important patient-centered factors as outcomes. Moreover, patients are willing to undergo FMT as treatment for CDI.

Keywords: *Clostridium difficile* infection; Fecal microbiota; Fecal transplant; Patient perspectives; Patient reported outcomes; Questionnaire

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INTRODUCTION

Clostridium difficile is a major cause of nosocomial diarrhea and pseudomembranous colitis in healthcare settings [1, 2]. Its opportunistic nature combined with its resistance to antibiotics allow *C. difficile* to proliferate in the patient's gut during antibiotic treatment, resulting in a *C. difficile* infection (CDI) [3, 4]. With the recent increase in *C. difficile* prevalence and 19–20% of patients experiencing recurring disease, *C. difficile* has posed significant challenges to the healthcare system [5]. In fact, *C. difficile* now rivals methicillin-resistant *Staphylococcus aureus* as the most common organism to cause healthcare-associated infection in the United States [6]. Patients who suffer from CDI are almost two times as likely to be discharged to a long-term care facility [7]. These increased hospital stays contribute to the US\$1–4.9 billion spent each year on CDI management [8].

The prevention and treatment of CDI is a major challenge. While the antibiotics metronidazole and vancomycin are the most commonly used treatments for CDI, recurrences occur in 25% of patients treated with these antibiotics [3]. Approximately 12% of these patients experience at least two recurrences and 6% experience more than two [9]. The social impact of CDI and the corresponding treatment options are unknown and are an important implication in the care and quality of life for patients with CDI. Fecal microbiota transplantation (FMT), which involves the transplantation of donor stool into the intestine of a patient with CDI, is a promising treatment [10, 11]. FMT is thought to treat CDI by reestablishing the structure and function of the disrupted microbiota after an antibiotic treatment [12]. With an average success rate of 92%, FMT has gained mainstream acceptance as

a highly effective treatment [13]. However, FMT aesthetics have been identified by physicians as a reason to pursue this therapy only after other options have failed [14]. Our research group conducted a patient survey to gain insight on the short-term social, physical, and emotional outcomes for patients who have experienced CDI and have received FMT.

METHODS

The study protocol was reviewed and considered exempt by the University of Wisconsin—Madison Institutional Review Board as quality improvement. Beginning in December of 2013, our institution began performing FMT for patients with CDI. A list of 30 patients who had received one or more FMTs was generated. Questions for the survey were generated based on a literature review of relevant quality of life articles for the CDI patient and treatment experience [15, 16]. The Likert Scale was used for patient responses with 0 representing the most severe response and 6 representing the least severe response. The survey included 56 ordinal scale questions that were administered by a trained interviewer over the phone. From October 27 to November 3, 2014, 17 interviews were conducted with patients independent of a healthcare center or provider visit. Patient interviews were recorded as many patients would discuss the personal details of their CDI and FMT experience. Consent was received from patients included in this study.

Descriptive statistics of survey responses regarding the social, physical, and emotional outcomes of CDI and FMT were compared. The median and quartiles (Q_1 , Q_2 , and Q_3) of all Likert Scale responses for each category were calculated. Statistical Analysis Software v.9.4

(SAS Institute, Cary, NC, USA) was used for all median and quartile calculations.

RESULTS

At the time of project completion, 30 patients had had CDI and undergone FMT at our institution. However, some patients declined interview or were unable to participate due to cognitive impairment, lack of interest or death. The majority of participants were 65 or older, living independently, and retired when interviewed (Table 1). FMT was performed on the participants 6–172 days prior to the interview process. At the time of the interviews, 13 had recovered from CDI, 2 patients still had CDI, and 2 patients were unsure of their CDI status.

The social implications of CDI were highlighted using patient feedback and commentary with the related survey questions (Table 2). The majority of patients were not working; however, one patient commented that they were at work but “not fully functioning” (Table 1). Six patients stated that cancelling their social engagements was not necessary because they “were not socially active at that time” (Table 2). One patient said they generally felt “dumpy” while they had CDI and underwent various treatment regimes. One patient was “up and down” and was often thinking: “am I ever going to get over this?”

Patients with CDI avoided events outside their home, such as weddings, vacations, funerals, or other events without a readily available bathroom. Patients “did not dare” go to an event where they did not know if there would be a bathroom available and subsequently had to be “very careful, didn’t want to take a chance” regarding leaving their home. One patient said they “couldn’t be sure

Table 1 Patient demographics

Characteristic	Patient population (n = 17)
Sex	
Female	10 (58.8%)
Male	7 (41.1%)
Age (years)	
18–29	0 (0%)
30–39	2 (11.8%)
40–49	2 (11.8%)
50–64	3 (17.6%)
65–75	6 (35.3%)
75–85	3 (17.6%)
Older than 85	1 (5.9%)
Level of education	
Did not complete high school	0 (0%)
Completed HS/GED	7 (41.2%)
Some undergraduate	4 (23.5%)
Undergraduate degree	5 (29.4%)
Graduate degree	1 (5.9%)
Employment status	
Retired	9 (52.9%)
Hardly unable to attend school/work	3 (17.7%)
Two weeks off over 6 months	1 (5.9%)
Hospitalized	2 (11.8%)
Unable to work	1 (5.9%)
At work but “not fully functioning”	1 (5.9%)
Living status	
Nursing home/assisted living	1 (5.9%)
Independently	16 (94.1%)

GED general education development test, *HS* high school

of when [I], would need to go” and “it just came [and] didn’t give you any warning.” Another patient commented that they “can go [to the bathroom] all the time” and subsequently wore diapers to try and contain any accidents.

Table 2 Patient perspectives on the social implications of CDI

Category	# Responses	Median	Quartile		
			Q ₁	Q ₂	Q ₃
Inability to attend school or work	17	7	6	7	7
Cancellation of social engagements	17	2	0	2	6
Difficulty in activity participation	17	1	0	1	3.25
Avoidance of events with no bathroom	16	2	0	2	6
Extent of limited sexual activity	17	3	0	3	6
Extent of the lack of understanding from others	16	0	0	0	1
Satisfaction with personal life	16	4	0	4	1

For each survey question, $n = 16\text{--}17$

CDI *Clostridium difficile* infection

Many other patients said they wore diapers so that they would not be troubled by a feeling of needing to go to the bathroom if the need arose. This lifestyle caused one patient to feel they were “not having a life all the way” and that their situation was “depressing, discouraging.” These sentiments were echoed in the related survey questions (Table 2), revealing that the typical patient was intentionally taking steps to evade certain social situations. The most severe social response was obtained for the extent to which sexual activity was limited due to CDI.

The physical implications of CDI were repeatedly highlighted in patient commentary and feedback in the patient survey (Table 3). On the Likert Scale questions, many patients responded that they had trouble getting a full night’s sleep, reduced energy, and that they generally felt unwell (Table 3). Many patients experienced fatigue and commented that it was “hard to go upstairs.” Some observed that the more active they were, the worse their CDI got, so they “didn’t even try.” Patients said the frequent diarrhea episodes “take everything out of you” and that it was “terrible, couldn’t hold

it.” Daily existence was “exhausting” and one patient said they often felt like “a limp noodle.” The ease with which CDI spreads was of concern as one was “afraid I would pass it on.” Another individual was “terrified” of having a second child due to the necessitation of antibiotic treatment and potential of CDI recurrence. This conveyed a significant anxiety among patients regarding the possibility of CDI recurrence.

Two patients noticed no improvement in their diarrhea after their FMT procedure. Nine individuals reported that their diarrhea improved after the FMT. Six individuals felt their diarrhea was resolved after FMT. One patient commented that their diarrhea improved within 1 day and another said it took 3 weeks after the FMT. For six individuals, their abdominal pain was resolved after the FMT. Five patients reported that their abdominal pain was improved. Four patients did not have abdominal pain prior to the FMT. For two individuals, their abdominal pain did not improve after receiving the FMT. Some patients commented that, after undergoing the FMT procedure, their abdominal pain improved

Table 3 Patient perspectives on the physical implications of CDI

Category	# Responses	Median	Quartile		
			Q ₁	Q ₂	Q ₃
Distress of an upset stomach	17	5	3	5	6
Distress of accidental soiling of underwear	17	6	5	6	6
Distress of feeling the necessity to use the bathroom with empty bowels	17	3	0	3	6
Distress of feeling abdominal bloating	15	2	0.5	2	4
Maintenance of goal weight	17	4	1.75	4	6
Trouble of having to pass large amounts of gas	17	3.5	1	3.5	6
Inability to get a good night's sleep, or trouble of restlessness	17	1.5	0	1.5	3
Distress of abdominal pain	8	6	3	6	6
Distress of feeling unwell	17	0	0	0	1
Frequency of abdominal cramps	16	3	0	3	0
Extent of physical energy	17	1	0	1	1

For each survey question, $n = 8-17$
CDI Clostridium difficile infection

within 1 day, with another patient stating it took 1 week.

The emotional implications of CDI were evident in patient responses to the survey questions and corroborated by patient commentary (Table 4). Patients stated that they “keep it [their emotions] contained” and “the ones around [them] understand”. Five of 16 patients reported that their well-being did not improve after FMT. Six of 16 patients stated that their well-being improved after receiving FMT. Within 1 day of their FMT, two of eight patients stated that their well-being improved. For two of eight patients, their well-being improved within 1 week of their FMT. In interviews, patients also said they were conscious of the additional burden that their CDI and FMT placed on their loved ones when evaluating their own emotional status (i.e., tearful or upset). For this reason, some patients chose to only share their diagnosis with a small

group of immediate family or friends. The secrecy around many patients' CDI diagnoses may have contributed to many patients commenting that they felt depressed and discouraged due to their condition (Table 4).

Survey questions about the FMT experience revealed varying results. Ten patients responded that they would prefer to select their FMT stool donor. Two patients had no preference for where the donor stool came from. Finding a donor from a stool bank was the preferred method for five patients. Patients generally did not find the need to discuss their illness with their donor to be difficult (Table 5). One patient said a stool bank would be their preferred method for obtaining a donor because it would be “awesome” and “faster” than engaging in the uncomfortable conversations with individuals that patients would like to have donate stool on their behalf. For 13 patients, the donor for their FMT was a

Table 4 Patient perspectives on the emotional implications of CDI

Category	# Responses	Median	Quartile		
			Q ₁	Q ₂	Q ₃
Frequency of irritable feelings	17	3	0.75	3	5.25
Frequency of anger due to bowel problems	17	3	2	3	6
Frequency of feeling tearful or upset	17	2	0	2	5
Frequency of feeling embarrassed due to soiling or unpleasant odors caused by a bowel movement	17	5	4	5	6
Frequency of feeling relaxed and free of tension	17	6	2.5	6	6
Frequency of feeling worried or anxious	17	1	0	1	5
Frequency of feeling depressed or discouraged	17	1	0	1	3
Anxiety for fear of not finding a bathroom	17	4	0	4	5

For each survey question, $n = 17$
 CDI *Clostridium difficile* infection

relative. For two individuals, their FMT donor was a spouse. One patient said that the process of finding a FMT donor would have been much more difficult had their spouse not been able to donate. Another patient said they had great apprehension about finding a stool donor and were very embarrassed about their FMT diagnosis until a family member had volunteered. One individual utilized a friend as a stool donor. A healthcare worker donated stool for one patient. At the time of the patient interviews, 12 individuals were not living with their stool donors.

The majority of patients did not question the safety of the FMT and expressed strong faith in their providers' recommendations. One patient commented that the process of discussing their FMT with their provider was not a big deal at all as they were willing to do "whatever works" and that they had "faith in the doctors and providers." One patient had safety concerns related to their FMT. Sixteen patients did not have safety concerns related to their FMT. Eleven patients responded that they would be willing to pay out-of-pocket for the FMT. Six

patients stated they would not be willing to pay out-of-pocket for this procedure.

Twelve patients responded that an enema was their favored delivery mode, with one patient choosing this option because "you could do the majority of treatment at home." Two patients stated that they had no preference. Two patients preferred a colonoscopy based on their experience. When asked about their preferred treatment setting, ten patients identified the clinic. One patient said a clinic would be preferred as it is: "remote, away from a lot of sick people, which seems to be a problem" and "clean and nice." Two patients interviewed preferred their home for their treatment setting. Four individuals responded that the hospital was their preferred treatment setting. One patient reported that they had no preference for their treatment setting.

Patients did not find the need to handle fecal material to be that unappealing (Table 5). This was reiterated in their comments as some stated because "[you] got to get it done" and "if you need something it is okay." These comments

Table 5 Patient feedback on FMT experience and outcomes

Category	# Responses	Median	Quartile		
			Q ₁	Q ₂	Q ₃
Satisfaction with FMT	10	5	3.25	5	6
Unappealing nature of handling fecal material	17	4	2	4	6
Unappealing nature of brown color and odor of treatment	17	3.5	1	3.5	6
Unappealing process of finding a donor	17	6	2	6	6
Unappealing nature of discussing illness with the donor	17	6	6	6	6
Unappealing nature of discussing FMT with the donor	17	6	5	6	6

For each survey question, $n = 10$ – 17
FMT fecal microbiota transplantation

reflect the extent to which patients were desperate for a solution to their struggles with CDI. One patient commented on the brown color and odor of the treatment—“what’s your choice.” Another patient indicated that the fecal material was “nasty, but I would rather it went away” and “necessary if it would work.” The process was not appealing for many but was necessary for the “opportunity to have it [CDI] cured.” Two patients commented that initially in the first few days after their FMT their diarrhea seemed to have improved and/or resolved itself; however, as time progressed, such an improvement and/or resolution was apparently not the case and their diarrhea returned. Both patients who felt this way underwent multiple FMTs in an effort to cure their recurrent CDI.

DISCUSSION

Findings from this study reveal the short-term social, physical, and emotional outcomes for patients who have had CDI and the experience of FMT. Several interviews reflected the significant extent to which CDI can contribute to patients’ anxiety and subsequently, their

overall quality of life. This can be worrisome for patients with CDI who live independently and may be less able to self-report changes in their condition that a friend, peer, or family member may have otherwise observed.

Patient commentary on the social implications of CDI confirm findings from the literature that these experiences cause major burdens for the patients [17]. Their ability to engage in social experiences was severely hampered by the fear of needing a bathroom. Subsequently, the social isolation patients with CDI experience could contribute to the feeling of loneliness, anxiety, and depression to which isolated patients are prone [18]. The most severe social implication to CDI and FMT in this survey was the extent to which patients’ sexual activity was limited. No patients were sexually active as a result of their condition, which may cause increased emotional distress during CDI. Currently, there is a lack of data on the impact that CDI may have on patients’ sexual activity and is an area for further study. Providers should consider preemptively addressing these social factors impacting patients with CDI as patients may be reluctant to bring up these issues themselves.

The physical fatigue several patients experienced throughout their CDI was of concern. Patients reported a lack of sleep and reduced energy that may have impacted their ability to attend social engagements and overall quality of life. Previous investigations into CDI patients' quality of life have shown physical suffering to be a severe result of their illness that altered other aspects of their lives [18]. Recognition of the physical burdens and subsequent social isolation that occurs due to CDI needs to be considered when considering treatment. Although it appears that diarrhea and abdominal pain were generally resolved after FMT, patients focused on the severe burden of CDI. Future studies must attempt to address the patients' ability to overcome CDI and whether FMT had the ability to improve their physical burdens.

We observed that patients' emotional experience was impacted by CDI. Responses to the question "How often have you felt embarrassed as the result of soiling or because of an unpleasant odor caused by your bowel movement" had a median response of 5. These types of emotions can cause patients to experience social isolation and anxieties. A study of 24 patients with CDI subjected to semi-structured interviews revealed similar emotional distress and extreme physical exhaustion that is associated with CDI [19]. The isolation and secrecy that we observed could be implicated in the limited sexual activity in the surveyed patients. The inability to share their experience of CDI appears create a feeling of shame, embarrassment, and low self-esteem [18].

Feedback from patients on the overall FMT process reflects their desire for recovery from CDI. The requirement for a fecal donor in order to complete the FMT could potentially add an extra layer of complications and anxieties for an

already emotionally strained patient with CDI. However, the majority of patients in this study indicated that finding a stool donor was not a difficult task and that they preferred to select someone on their own. This finding is not in keeping with the prior social and emotional anxieties that were identified when discussing CDI with family and friends. It is possible that patients who experienced social anxiety during CDI were eager to overcome it by any means necessary. Many patients were in favor of the creation of stool banks to reduce this hurdle as part of the FMT process. Currently, there is interest in expanding safe access to stool for FMT [20]. Nonprofit stool banks eliminate the need for identification of a suitable donor, particularly for patients without family members willing or able to donate stool. Based on our patient responses, the expansion of stool banks would be a welcome option and would reduce the social and emotional burden for some patients undergoing FMT.

The majority of the patients interviewed stated a clinic to be the preferred treatment facility due to facility cleanliness and distance from sick people. These findings may highlight a lack of understanding of CDI as a primarily hospital-acquired illness. Previous studies have found that patients' generally view hospitals and patient care rooms in a positive, clean sense [21]. Therefore, patient education should be an important consideration when physicians are making clinical decisions for the patient.

Overall, patient responses reflected an overall acceptance of FMT as a treatment to rid themselves of CDI. Previous FMT ulcerative colitis patient perspective surveys and focus groups have also found patients are very eager for FMT to become available [22, 23]. Other studies have found that patients would undergo FMT again and would be interested in FMT as their initial CDI therapy [18]. This is most likely

because the prospect of continuing to live with CDI is far worse of an experience than undergoing FMT [22].

While our study provides key information on CDI and FMT patient perspective, our findings have limitations. Our sample size was small and results may not be generalizable. Although the majority of patients interviewed for this study had positive short-term outcomes after the FMT, the long-term outcomes remain unknown. Some patients who were interviewed had received their FMT as little as six days prior to the interview, while others were not interviewed until approximately six months after their FMT. This gap in time could have influenced the interview responses obtained from participants compared to those who were interviewed within one week. Although our survey indicated that patients were interested in FMT, there could exist emotions or perceptions around the acceptance of the FMT that our survey could not identify. Because the interviews took place outside a provider visit, it is possible that patients were not comfortable discussing certain emotions over the phone with someone who is not their physician. The majority of patients interviewed were willing to pay out-of-pocket expenses for the FMT if their insurance did not cover the procedure. This demonstrates significant trust in their physician.

CONCLUSIONS

To conclude, our study has identified short-term social, physical, and emotional outcomes of patients who have experienced CDI and received FMT. Future studies should consider the social, emotional, and physical experience of CDI, as it is isolating and contributes to significant anxiety. Although FMT has unappealing characteristics, patients

are willing to undergo this treatment to treat CDI.

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