ACE agency for care effectiveness

VALUE-BASED HEALTHCARE CONFERENCE 2024

22-23 AUGUST 2024

COST-EFFECTIVENESS ANALYSIS OF FAECAL MICROBIOTA TRANSPLANTATION (FMT) FOR THE TREATMENT OF CLOSTRIDIOIDES DIFFICILE INFECTION (CDI) IN SINGAPORE

Authors: Preben Teng Xiang Long[1], Toh Kai Yees[2], Liu Lin[1], Lionel Lum[1], Jonathan Lee Weijie[1,2], Jeremy Lim[1,2], Wang Yi[1]

Aim

The study aims to determine if incorporating faecal microbiota transplantation (FMT) in the local treatment regimen for *Clostridioides difficile* infection (CDI) is cost-effective.

Background

CDI is associated with significant morbidity and healthcare burden, compounded by its high recurrence rates. In other countries, FMT has been shown to be more effective compared with antibiotics, in treating patients with multiple recurrences and is cost-saving to the healthcare system.

Methods

(a) CDI treatment regimens

Algorithm	Initial CDI	1st Recurrence	2nd Recurrence and Beyond
1	Metronidazole	Vancomycin	Vancomycin Pulse-Taper
2	Vancomycin	Vancomycin	Vancomycin Pulse-Taper
3	Vancomycin	Vancomycin Pulse-Taper	Vancomycin Pulse-Taper
4	Vancomycin	Vancomycin Pulse-Taper	FMT

(b) Markov model of treatment regimens for patients with initial CDI

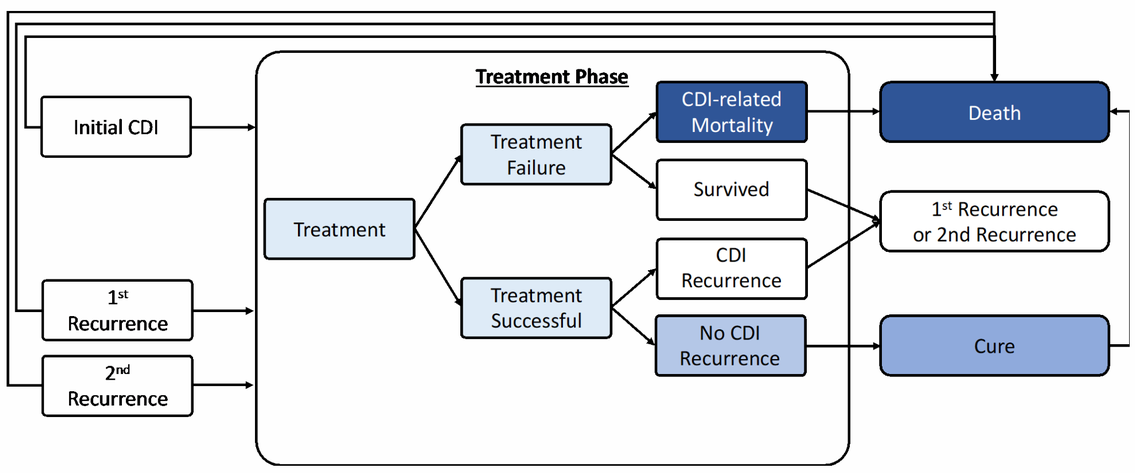


Figure 1

Panel (a): Four treatment regimens informed by clinical guidelines, with FMT used to treat patients with second or more recurrences in treatment regimen 4.

Panel (b): Markov model overview of patients with initial CDI, of which patients were simulated to experience a likelihood of cure, recurrence and death with each episode.

Model inputs for transitional probabilities of clinical cure, recurrence and mortality were obtained from published literature and Singstat. Relevant costs and hospitalisation data were obtained from National University Hospital, Singapore.

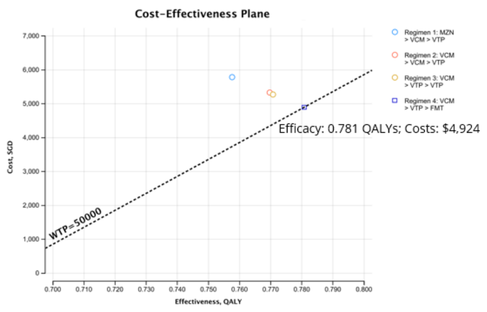
Outcomes were measured in quality-adjusted life years (QALYs), costs and incremental cost-effectiveness ratios (ICERs). The analysis was conducted from the health system perspective, at a willingness-to-pay threshold of S$50,000 (approximately £30,000) per QALY. The time horizon is one year.

Results

(a) FMT-containing regimen dominates

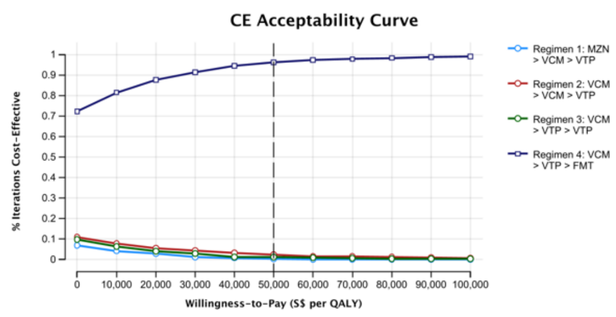
Regimen	Costs	QALYs	ΔCosts	ΔQALYs	ICER
4	$4,924	0.781	-	-	Reference
3	$5,319	0.771	$395	-0.010	Dominated
2	$5,373	0.770	$449	-0.011	Dominated
1	$5,817	0.758	$893	-0.023	Dominated

Regimen	Hospitalisation costs	%
4	$3,990	81.0
3	$5,021	94.4
2	$5,116	95.2
1	$5,658	97.3



Abbreviations – FMT: fecal microbiota transplantation; MZN: metronidazole; QALY: quality-adjusted life years; VCM: vancomycin; VTP: vancomycin pulse-taper; WTP: willingness-to-pay threshold

(b) Probabilistic Sensitivity Analysis



Abbreviations – FMT: fecal microbiota transplantation; MZN: metronidazole; VCM: vancomycin; VTP: vancomycin pulse-taper

Figure 2

Panel (a): In the base case analysis, treatment regimen 4, vancomycin for treatment of initial CDI, vancomycin taper-pulse for first recurrent CDI and FMT colonoscopy for subsequent recurrences, dominated other treatment regimens which did not incorporate FMT. Despite a higher upfront treatment cost with FMT, this was offset by a greater reduction in costs associated with re-hospitalisations.

Panel (b): Sensitivity analysis demonstrated that treatment regimen 4 remained cost-effective with probabilities higher than 70% over a range of willingness-to-pay threshold from S$0 to S$100,000.

Study Limitations

1. Model structure:
   - ❑ Patients were not stratified based on disease severity (non-severe, severe, fulminant colitis).
   - ❑ Possible complications from CDI (e.g. need for colectomy) were not included due to data availability.
   - ❑ Model did not consider disutilities from adverse event given they are typically short-lived for these treatments.
2. Model inputs:
   - ❑ Transitional probabilities were informed by studies with heterogeneous trial design and outcome measures.
   - ❑ Hospitalisation costs were based on inputs obtained from secondary sources.
   - ❑ Efficacy of antibiotics and FMT were obtained from overseas/international studies, which may not be generalisable to the local setting, given the heterogeneous global distribution of *C. difficile* subtypes.

Conclusion

Despite the high treatment cost associated with FMT, the treatment regimen incorporating FMT is cost-effective compared to the treatment regimens without FMT in the management of CDI in the Singapore context.

Reference

Gupta A et al. *Therap Adv Gastroenterol*. 2021

Al-Eidan FA, et al. *J Clin Pharm Ther*. 2000

Acknowledgements: National University Hospital, Singapore for hospitalisation and costs data

MINISTRY OF HEALTH SINGAPORE