



A global evaluation of the use of faecal microbiota transplant (FMT)

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ABSTRACT

Background: Faecal microbiota transplant (FMT) is an effective therapy for recurrent *Clostridioides difficile* infection (CDI); its use is increasingly being investigated for other indications. Although regional surveys and national registries have provided insight into local practices, a comprehensive global overview of FMT access, implementation and governance is lacking.

Methods: A survey regarding key aspects related to FMT use was disseminated electronically to members of the World Gastroenterology Organization, European FMT Network and International Society of Infectious Diseases. Responses were analysed both descriptively and using appropriate statistical methods.

Findings: A total of 80 responses were obtained from 55 countries. FMT was available in significantly more Tier 1/2 than Tier 3/4 nations (24/28 vs 8/27; $P < 0.001$). In countries lacking access to FMT, reasons included: lack of expertise/infrastructure; financial constraints; regulatory uncertainty; and perceived lack of clinical need. Most countries using FMT employed both upper and lower gastrointestinal administration routes; 18/32 (56%) used capsulised FMT. Almost all countries with access to FMT used it to treat CDI, albeit with different thresholds for the number of CDI episodes prior to use. There were many non-CDI indications for FMT in current use. Payment for stool donation was reported by 10 countries.

Interpretation: This is the first global overview of FMT availability and governance, highlighting substantial international inequities and considerable heterogeneity in regulation, clinical use, donor screening and cost. Standardization of practice and targeted support for lower-income countries is needed to ensure equitable access and to promote safe, high-quality delivery as FMT and microbiome-based therapeutics continue to evolve.

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Introduction

Faecal microbiota transplant (FMT) is a highly-effective treatment for recurrent *Clostridioides difficile* infection (CDI), demonstrating superior efficacy to standard antibiotic therapy alone in preventing recurrent disease, and treating CDI refractory to standard anti-CDI antibiotic management [1,2]. It is recommended by

numerous national and international guidelines [2–4]. In recent years, the therapeutic potential of FMT has expanded beyond CDI, with growing interest in its application in other clinical contexts (albeit primarily still in a research setting), including inflammatory bowel disease (IBD), metabolic syndrome and hepatic encephalopathy [5,6].

Despite robust evidence of patient benefit, the implementation of FMT in clinical practice varies widely across regions. A Europe-wide survey provided valuable insight into European activity, revealing considerable disparities in access and utilisation [7]. The study also highlighted potential underuse of FMT in certain areas. However, countries with no established activity were not repre-

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sented, leaving gaps in understanding of true geographical variability across the continent and regarding potential barriers to implementation.

Within nations, studies have explored local variation in FMT provision [8] and the establishment of national registries – such as those coordinated by the American Gastroenterological Association [9] – has begun to illuminate patterns of use, safety outcomes and long-term effectiveness at the national level. A bibliometric analysis has further characterised global research trends and hotspots in FMT, underscoring growing academic and clinical interest [10]. Across-territory multi-disciplinary specialist expert groups related to FMT have also arisen (including the ‘EurFMT’ [European FMT Network] group, <https://www.eurfmt.com/>), allowing sharing of expertise, experience and best practice between different centres [11].

Yet, despite these important contributions, a comprehensive global perspective on the clinical use and governance of FMT is lacking. Understanding international variation in FMT practice is critical to ensuring equitable access, promoting standardisation and identifying opportunities for research, education and policy development.

We aimed to address this gap by conducting an international survey to capture a global overview of FMT practice. Our primary aim was to gauge the availability of FMT in countries around the world and to document any barriers to FMT provision in countries where it is not available. From countries where FMT is available, we sought further detail about provision and governance. By mapping patterns of activity, infrastructure and real and perceived barriers, this work looks to highlight the potential for wider dissemination of this evidence-based therapy and to inform strategies for standardisation and quality improvement across healthcare systems. Such findings are relevant to multiple stakeholders, including clinicians developing and running FMT services, healthcare policy-makers and regulators responsible for governance frameworks, and professional societies seeking to support equitable access and harmonisation of best practices.

Materials and methods

The survey questionnaire (see Supplementary Material) was devised through extensive consultation within the World Gastroenterology Organization (WGO) Clinical Research Committee (GM, HW, SK and with thanks to the other committee members), and members of the UK Healthcare Infection Society (BM, SG) and British Society of Gastroenterology (BHM). It was also reviewed and enhanced by international experts in FMT with expertise in survey development (CH, VA).

Our aim was to strike a balance between the inclusion of an appropriate level of detail regarding FMT use worldwide and survey user acceptability, particularly for clinicians for whom English is not their first language.

The focus was on worldwide use in clinical practice, as opposed to clinical trials or experimental usage.

The questionnaire was disseminated via email and Jotform [12] to WGO committee members, and to the individual WGO member societies, as well as to committee members of EurFMT, and to the membership of the International Society for Infectious Diseases. Questionnaires were distributed between April and June 2025.

Data were collated and analysed in Microsoft Excel for Mac (version 16.102.2) and RStudio (version 2023.06.0 + 421). Fisher's exact test was used to assess for differences between proportions.

Results

There were 80 unique responses from 55 countries. A total of 25/55 (45%) were from Europe. A total of 19 of the nations are clas-

Table 1
Countries by World Bank Tier.

Country	Tier	No. responses	Population
Argentina	2	1	45,459,024
Australia	1	2	26,320,802
Austria	1	2	9136,103
Belgium	1	1	11,698,104
Burkina Faso	4	1	22,765,636
Canada	1	1	39,059,725
Chile	3	4	19,603,239
China	3	1	1424,260,946
Croatia	2	2	3902,712
Czechia	2	2	10,827,878
Denmark	1	3	5932,370
Egypt	3	1	113,493,134
Ethiopia	4	1	127,028,360
Fiji	3	1	921,747
Finland	1	2	5590,327
France	1	1	66,381,485
Germany	1	2	84,400,899
Greece	3	1	10,349,296
Hungary	3	1	9683,205
India	3	2	1431,702,948
Indonesia	3	1	280,026,489
Iran	3	2	90,102,637
Israel	2	3	9190,811
Italy	1	1	59,563,765
Japan	1	1	124,670,714
Kazakhstan	3	1	20,196,000
Latvia	2	1	1885,099
Lithuania	2	1	2841,385
North Macedonia	3	1	1836,091
Malaysia	3	1	34,908,354
Mali	4	1	23,415,909
Malta	2	1	529,518
Morocco	3	1	37,523,726
Netherlands	1	1	18,019,495
New Zealand	1	1	5151,357
Nigeria	3	1	225,494,749
Norway	1	1	5488,555
Oman	1	2	4933,394
Pakistan	3	2	245,673,401
Peru	3	1	33,656,344
Republic of Moldova	3	2	3080,724
Romania	3	2	19,169,119
Russian Federation	3	1	145,675,420
Slovakia	2	1	5516,536
South Africa	3	1	62,796,883
Spain	2	1	47,907,344
Sri Lanka	3	1	22,904,797
Sweden	1	3	10,521,910
Switzerland	1	1	8843,053
Turkey	3	1	87,169,328
United Arab Emirates	1	1	10,445,031
United Kingdom	1	4	68,442,882
Uruguay	3	1	3388,682
United States of America	1	2	342,475,098
Zambia	3	1	20,430,382

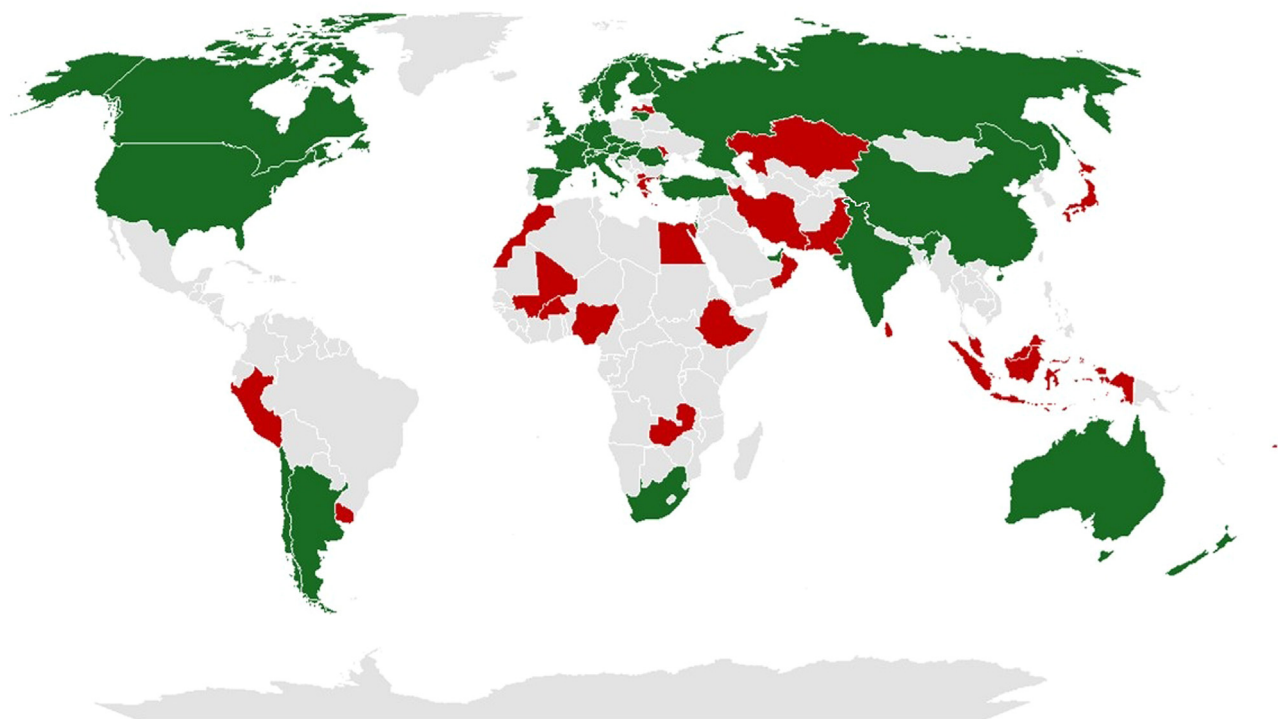
Population estimates from 1 January 2023 as per United Nations [33].

sified as ‘Tier one’ (high-income, according to the World Bank System), nine Tier two (upper-middle income), 24 Tier three (lower-middle income) and three Tier four (low-income) (Table 1) [13]. Responses were received mainly from physicians in Gastroenterology (63, 79%) and Infection specialties (13, 16%), with a small number from specialties such as Internal Medicine and Public Health (4, 5%). Responses were received from up to four individuals for each country (‘within country’ responses). ‘Within country’ duplicates were received from 18 nations, and allowed comparison, corroboration and validation of responses from the same country for most fields. In other fields, such duplicates demonstrated where uncertainty exists, even within the same country – examples of this are discussed below. A summary of key study findings is presented in Table 2.

Table 2

Summary of key study findings.

Domain	Key findings
FMT availability	Available in 32/55 (58%) countries; significantly more likely to be available in Tier 1-2 vs 3-4 countries ($P < 0.001$)
Barriers to availability	Lack of expertise/infrastructure; financial constraints; regulatory uncertainty; perceived lack of need
Administration routes	Colonoscopy in 30/32 countries (94%), nasoenteral (59%), capsules (56%), flexible sigmoidoscopy (50%), enema (63%)
Primary indication	Recurrent/refractory CDI in 31/32 (97%) countries
Other indications	MDRO colonisation, IBD, GvHD, IBS
Donor compensation	Expenses in 21/54 (39%) centres; payment in 10 countries (31%)
Recipient follow-up	Median 3 months; registries uncommon outside N America/Europe
Estimated cost	Median US\$880 (IQR US\$438-1268)

**Figure 1.** Global heatmap demonstrating countries with access to FMT. Green: access possible; red: no access; no colour: no data available.

FMT availability

The primary focus of the study was to evaluate the availability of FMT around the world. FMT was available in 32/55 (58%) of the surveyed countries. This is represented in Figure 1.

It was available in none of the Tier 4 nations (0/3), and 8/24 (33%) of the Tier 3 nations. The 'within country' responses from 18 nations all concurred as to whether FMT was available. FMT was more likely to be available in Tier 1 and 2 nations (24/28) compared to Tier 3 or 4 nations (8/27) ($P < 0.001$).

For the nations in which FMT was not available, the reasons given were broad. They included lack of expertise (five responses) or necessary technology or infrastructure (seven), financial constraints (two), an opaque regulatory landscape (two) and (in three) a perceived absence of clinical need.

FMT was principally procured from university hospitals (29/32, 91%) followed by non-university hospitals (14/32, 44%) and private providers (12/32, 38%).

FMT regulation

FMT is most often classified as a human tissue (18/54 responses, 33%) or as a medicinal product (15/54, 27%). Other classifications included therapeutic intervention, medical technology and

'unclassified'. There was discordance in within-country responses for 7/18 (39%) countries.

Administration of FMT

FMT is administered via the lower gastrointestinal tract (GIT) route in all 32 countries, with delivery by colonoscopy in all but two (New Zealand and Hungary), where enema delivery was commonly used. In around half of the surveyed nations, it may also be administered by flexible sigmoidoscopy (16/32, 50%) or enema (20/32, 63%). It is delivered via the upper GIT route in all but three countries (Austria, Chile and New Zealand), most frequently via the naso-enteral route (19/32, 59%), followed by capsules (18/32, 56%) – with similar use of non-lyophilized (12/32, 38%) and lyophilized (13/32, 41%) formulations – and gastroscopy (15/32, 47%).

Indications for FMT

All but one nation, Turkey (31/32, 97%), stated FMT was used to treat CDI, albeit across varying disease contexts. Three nations (China, Croatia, Denmark) used it for the first presentation of CDI, while an additional 20 nations (63%) use it at first recurrence (i.e. second episode). Four responses (13%, two from the UK and one each from Italy and Switzerland) stated that FMT is given for mul-

tively recurrent disease (i.e. third episode onwards). A total of 28 nations (88%) used FMT for refractory/fulminant CDI.

Beyond CDI, seven countries (22%) each used FMT, outside of a clinical trial setting, in the management of multidrug-resistant organisms (MDROs) (Belgium, Croatia, Denmark, Finland, France, Russia and UK), IBD (Australia, China, India, New Zealand, Russia, Turkey and UK), and graft-versus-host disease (GvHD) (Belgium, France, Netherlands, Russia, Spain, Switzerland and UK). Five nations (16%) (India, New Zealand, Norway, Russia and Turkey) use FMT for the management of irritable bowel syndrome (IBS). Other indications include immune-checkpoint inhibitor colitis (Netherlands), and chronic enteric infections, e.g. norovirus (Switzerland) or enteropathogenic *Escherichia coli* (Austria).

Patient follow-up

Most respondents (45/54, 83%) arranged follow-up for FMT recipients, for a median of 3 months (IQR 2-6 months). The longest follow-up period was 5 years. Record keeping was mostly at a local level (37/54, 69%), with a minority collating data regionally (3/54, 6%) or nationally (7/54, 13%). Six centres (11%) kept no follow-up documentation.

FMT donors

Respondents from 10 nations stated donors were paid for donations, though this may differ within the same country. Reimbursement of travel expenses by centres is more common than payment (21/54, 39%). A total of 27 respondents (from 24 centres) said that there was no form of compensation.

Relatives of recipients are permitted to donate in 22 centres (25 responses), friends in 24 centres (30 responses) and hospital staff in 25 centres (26 responses). A total of 49/54 (91%) responses said that a formal donor questionnaire is part of the screening process; for 24/49 (49%) this is based on national or international guidelines. A total of 22 centres (23 responses) stated that donor screening was adapted to local requirements.

FMT cost

A figure for the cost of preparing and producing FMT was estimated by 32/54 participants. It ranged from 'no cost' to procedural-related costs only, e.g. colonoscopy (six responses), through to nearly US\$5000 (or US\$7500 if manufactured under Good Manufacturing Practice – GMP). Median cost was US\$880 (IQR US\$438-1268). For a sizeable minority of respondents (16, 30%), the cost was unknown.

Availability of microbiome therapeutics

Two stool-based microbiome therapeutics – Rebyota and Vowst – are licensed for use in adults for recurrent CDI prevention after standard antibiotic treatment. Both are available across North America (USA and Canada). Respondents from several other countries mentioned that they were taking part in trials of microbiome therapeutics for CDI, e.g. Vedanta investigational product, VE303.

Discussion

This global survey provides the most comprehensive snapshot to date of the clinical use, governance and accessibility of FMT across diverse healthcare systems. Representation from 55 countries across all World Bank system Tiers demonstrates broad international engagement, reflecting the global recognition of FMT as a transformative therapy for CDI. The predominance of Gastroenterology and Infection specialists among respondents mirrors the

clinical communities most actively involved in FMT research and delivery [10].

Whilst it is encouraging that FMT is available in more than half of responding countries, marked geographical and economic disparities persist, with fewer Tier 3 and 4 nations reporting availability. Inequity in access highlights a concentration of FMT programmes in high- and middle-income settings, typically within university hospitals. Such centralisation may facilitate quality assurance and likely reflects clinical need, but it also exacerbates inequalities in access, particularly for patients in rural or resource-limited regions [14]. The absence of FMT in some countries was attributed to lack of expertise, infrastructure or financial support. Additional barriers may include healthcare professional and recipient acceptance [15], emphasising the need for targeted educational and capacity-building initiatives. Knowledge transfer from established programmes to emerging centres – through mentorship, guideline dissemination and collaborative networks – could accelerate global expansion.

Variation in the classification of FMT was observed, with some inconsistent responses from within the same country. This apparent lack of clarity regarding regulatory processes is perhaps unsurprising, given the absence of a global uniform framework and the evolving nature of FMT governance. FMT was most frequently regulated as a human tissue or medicinal product, though some nations reported no formal classification. This inconsistency reflects a broader challenge shared with other biologically-derived therapies, such as convalescent plasma. The lack of regulatory harmonisation can complicate governance, limit international collaboration and potentially compromise patient safety. Within Europe, forthcoming Substances of Human Origin legislation, due to take effect in 2027, is expected to standardize the regulation of FMT as a human-derived substance across the continent [16]. Extending similar frameworks globally could enhance oversight and facilitate cross-border research and clinical practice [17]. A perceived lack of guidance regarding best practice on operational aspects of co-ordinating an FMT service may discourage those interested in starting services, with attempts to share experience in this regard [18].

The overwhelming majority of respondents reported use of FMT for CDI, aligning with established international guidelines [2-4,19-22]. However, variation in its application across the disease spectrum was notable. While guidelines recommend FMT for recurrent or refractory CDI, several nations reported use after a first or second episode, in line with emerging evidence of a potential utility earlier in the disease course [23,24]. Such discrepancies underscore the importance of ongoing education and alignment with international consensus statements.

Beyond CDI, a minority of centres reported use of FMT for MDRO colonisation, IBD, GvHD and IBS. Although some of these emerging indications are supported by preliminary studies [25,26], robust, high-quality evidence remains limited. Continued research in these areas – including well-designed randomised controlled trials – will be critical to delineate efficacy and optimise treatment protocols. Notably, the full spectrum of use for cases within countries was absent, with publications of additional indications beyond those given by respondents, e.g. in the UK [27] and France [28], highlighting underreporting.

Administration practices varied across countries, although procedural delivery via colonoscopy or naso-enteral routes are still the mainstay. Increasing use of capsule-based formulations – both lyophilised and non-lyophilised – represents an important evolution towards greater patient acceptability and procedural simplicity [29]. While equivalence between upper and lower GIT routes has been established for CDI, this may not hold true for other indications, warranting careful consideration of delivery method in

future trials. Standardisation of preparation and delivery protocols will be crucial for both safety and comparability of outcomes.

Patient follow-up was short-term – a median of 3 months – sufficient to capture immediate adverse events and early recurrence but inadequate to detect long-term effects. The limited establishment of national or regional registries outside North America and Europe is a missed opportunity for systematic monitoring of FMT recipients. Expansion of registry participation – particularly in low- and middle-income countries – would enable more robust evaluation of long-term outcomes, safety and real-world effectiveness.

Donor screening practices were formalised but inconsistently based on recognised guidelines, and approaches to reimbursement varied substantially. Direct financial compensation raises ethical considerations on disclosure accuracy, while lack of reimbursement for travel or time may reduce donor retention. A balanced approach that supports the integrity of the screening process while minimising donor burden is needed. Standardised international guidance on acceptable forms of donor reimbursement could help ensure equity and sustainability across programmes. Local adaptation of screening protocols was also not universal, which may be prescient with the global variability in pathogen prevalence, new pathogen emergence, and diagnostic accuracy of tests [30].

Reported costs of FMT ranged widely, reflecting differences in health system structure, donor screening requirements, manufacturing processes and difficulty in measuring certain cost variables. The median estimated cost of approximately US\$880 is markedly lower than that of licensed microbiome-based therapeutics such as Rebyota [31] and Vowst [32] (approximately US\$9000–20,000 per treatment, excluding any administration-related costs). However, in many centres, FMT costs were informally absorbed or not systematically assessed, threatening programme sustainability. Comprehensive cost-effectiveness analyses, incorporating both direct and indirect costs, are necessary to guide reimbursement frameworks and secure long-term viability.

Licensed microbiome therapeutics are available in North America for specific indications only. These products offer potential advantages, such as a standardised commercial supply chain and improved manufacturing quality control. However, because they are derived from donor microbiota, they still exhibit biological variability and remain incompletely characterised. Additionally, their significant cost and restricted geographical availability raise concerns regarding equitable access. The lack of head-to-head comparisons with FMT also leaves their relative clinical value uncertain. In settings where such products have supplanted FMT, there is a risk of excluding patients without sufficient funds or insurance coverage. Careful consideration of cost-effectiveness and accessibility should inform future integration of microbiome-based therapeutics into clinical practice.

This study has limitations. Although it is the largest evaluation of FMT worldwide undertaken to date, responses were received from fewer than one-third of the world's countries. This may reflect individuals' perceived ability to respond to the survey. Coverage was greater from a *population* perspective, summing to approximately 5.3 billion (2/3 of the world population). Data may not reflect the breadth of FMT practice within each country, particularly where multiple centres operate independently. Participation bias may have influenced the results: respondents were largely specialists in Gastroenterology or Infectious Diseases, potentially overrepresenting centres already engaged in FMT activity and underrepresenting regions where it is less established. We relied on self-reported data, which can be subject to recall inaccuracies or differing interpretations of survey questions. Finally, while the survey sought to assess international practice at a single time point, the FMT landscape is rapidly evolving. Regulatory frameworks, clinical indications, and the emergence of commercial microbiome thera-

peutics are all changing, meaning that these results represent a snapshot in time. Repeat or longitudinal surveys, will be necessary to capture ongoing developments in practice and policy.

In conclusion, this survey highlights the remarkable global progress in FMT implementation while underscoring persistent disparities in access, regulation and governance. These findings may inform international guideline development, regulatory frameworks, and capacity-building initiatives aimed at expanding equitable access to FMT. Harmonisation of standards, international collaboration, and targeted support for developing programmes are essential to ensure fair access to this life-saving therapy, particularly in view of increasing global disease burden [14]. As the therapeutic landscape evolves, with the advent of defined microbial consortia and regulatory reform, ongoing surveillance and adaptive policy development will be vital to safeguard both innovation and patient safety.

Author contributions

BM: data curation; formal analysis; investigation; writing – original draft; writing – review and editing. BHM: conceptualization; data curation; formal analysis; investigation; methodology; project administration; software; validation; visualization; writing – original draft; writing – review and editing. SDG: investigation; methodology; project administration; writing – review and editing. SK: investigation; project administration; writing – review and editing. VA: data curation; project administration; resources; validation; writing – review and editing. CLH: conceptualization; data curation; methodology; resources; validation; writing – review and editing. GKM: data curation; investigation; methodology; project administration; resources; validation; visualization; writing – review and editing. HRTW: conceptualization; data curation; formal analysis; funding acquisition; investigation; methodology; project administration; supervision; writing – original draft; writing – review and editing.

Ethical approval

Not relevant for this manuscript.

Data availability

Data from this study are not publicly available, but will be provided by the corresponding author on reasonable request.

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Declaration of competing interest

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.ijid.2026.108574](https://doi.org/10.1016/j.ijid.2026.108574).

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