UWTASP tele-antimicrobial stewardship program | echo

December 9, 2025

Agenda

- Speaker: *Probiotics*
- Facility Question

Project ECHO

Disclosures

Today's speaker has no financial relationships with an ineligible company relevant to this presentation to disclose.

None of the planners have relevant financial relationship(s) to disclose with ineligible companies whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients

All relevant financial relationships have been mitigated

I would recommend probiotics in the following scenarios (select all that apply)

- Inpatients on antibiotics
- Outpatients on antibiotics
- For myself or a loved one on antibiotics
- I would not recommend probiotics while on antibiotics
- I would not recommend probiotics at all

We talked about this before....
But there's more to Probiotics than CDI

UWTASP
tele-antimicrobial stewardship program

Probiotics and CDI

7/15/25

Other indications explored for probiotics

- Atopic dermatitis
- Antibiotic associated diarrhea
- *H. pylori* eradication
- Hyperlipidemia
- Inflammatory bowel disease
- Irritable bowel syndrome
- Necrotizing enterocolitis

Guarner F, et al. 2023. World Gastroenterology Organisation Global Guidelines. Probiotics and prebiotics. https://www.worldgastroenterology.org/guidelines/probiotics-and-prebiotics/probiotics-and-prebiotics-english#Ref010. Accessed 1 Dec 2025.
NIH. Probiotics fact sheet for healthcare professionals. https://ods.od.nih.gov/factsheets/Probiotics-HealthProfessional/. Accessed 1 Dec 2025.

Definitions

- Probiotics: live microorganisms to confer health benefit when given in sufficient quantity.
  - Generally bacteria but may include yeasts

- Prebiotics: Ingredients – usually complex carbs - that feed and therefore alter composition or activity of GI microbiome to confer health benefit

- Live biotherapeutic Products (LBPs) – FDA-designated biological product that contains live organisms for prevention or treatment of a condition and is not a vaccine

Guarner F, et al. 2023. World Gastroenterology Organisation Global Guidelines. Probiotics and prebiotics. https://www.worldgastroenterology.org/guidelines/probiotics-and-prebiotics/probiotics-and-prebiotics-english#Ref010. Accessed 1 Dec 2025.

Agagunduz D et al. J Tranl Med. 2022 Oct 8;20:460. doi: 10.1186/s12967-022-03609-y

NIH. Probiotics fact sheet for healthcare professionals. https://ods.od.nih.gov/factsheets/Probiotics-HealthProfessional/. Accessed 1 Dec 2025.

Disclaimer: Caution with probiotics in these patients

- Immunosuppression
  - severe neutropenia (ANC <500)
  - active chemotherapy
  - active mucositis
  - bone marrow or solid organ transplant
  - other immunosuppression including high-dose steroids or biologics
- Organ dysfunction or Anatomical concerns
  - acute colitis; ileus or perforation
  - ileostomy; acute pancreatitis
- CVC
  - Data demonstrated greater risk of probiotic associated CLABSI in crit ill patients with CVCs

Heil et al. 2021. Clin Infect Dis; 73(8):1330 37. https://doi.org/10.1093/cid/ciab417
Mayer et al. 2023. Crit Care Med. 51(11):1469-1478. doi: 10.1097/CCM.0000000000005953.

Probiotic Sources

- Foods
  - Fermented products – e.g. yogurt but not sourdough bread
  - Non-fermented products with added probiotics – e.g. milks, juices, infant formula, nutrition bars
- Dietary supplements
  - Label regulations require total weight of micro-organisms
    - Doesn't have to specify living or dead
  - CFUs = number of viable cells, range 1-50+ billion CFUs
    - Optional for manufacturers to include this but many do
    - Check for this number at the end of shelf life

NIH. Probiotics fact sheet for healthcare professionals. https://ods.od.nih.gov/factsheets/Probiotics-HealthProfessional/. Accessed 1 Dec 2025.

Some recent, compelling, evidence

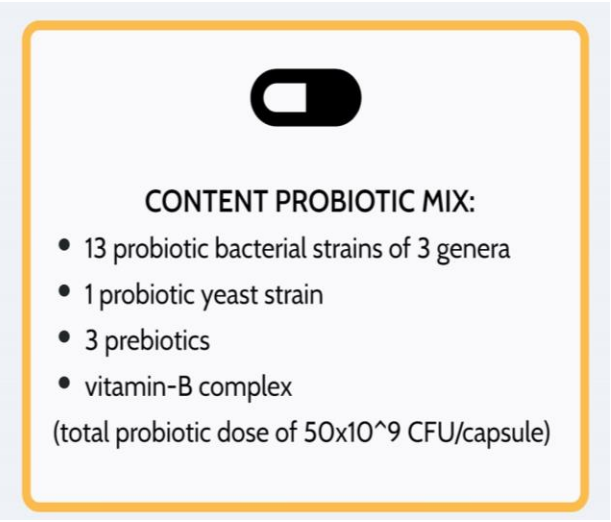
- SPAADA Trial, 2024: High-dose probiotics to prevent antibiotic associated diarrhea in adults

- Quality of life benefits of LBPs 2023: A secondary analysis of an RCT

Hodzhev V et al. Open Forum Infect Dis. 2024 Oct 21;11(11):ofae615. doi: 10.1093/ofid/ofae615.
Garey et al. JAMA Netw Open. 2023. doi: 10.1001/jamanetworkopen.2022.53570.

SPAADA Trial

High-dose Probiotic Mix of *Lactobacillus* spp., *Bifidobacterium* spp., *Bacillus coagulans*, and *Saccharomyces boulardii* to Prevent Antibiotic-associated Diarrhea in Adults: A Multicenter, Randomized, Double-blind, Placebo-controlled Trial



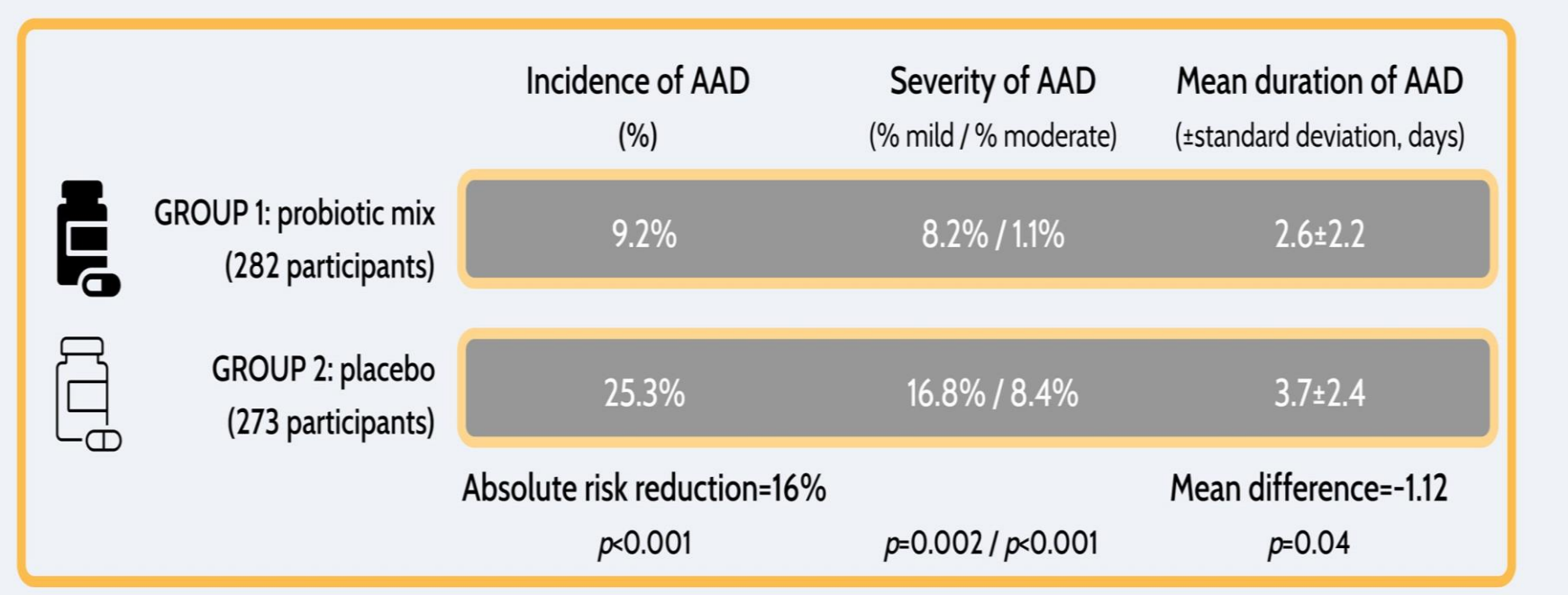
Population	Outpatients presenting to ENT or Pulmonary clinic in Bulgaria
Intervention	Randomized, double-blinded, probiotic or placebo 2 caps daily for the duration of antibiotics then 1cap daily x 14 days after
Primary outcome	Incidence of Antibiotic Assoc Diarrhea (AAD): ≥3 loose or liquid stool in 24h
Secondary outcomes	Mild 3-4 | Mod 5-6 | Severe ≥7 Duration of diarrhea Other GI symptoms (nausea, abd pain, gas)

Top 3 Antibiotic indications: Bronchitis (38%), Rhinosinusitis (11.9%), Otitis (9.5%)

Open Forum Infect Dis, Volume 11, Issue 11, November 2024, ofae615, https://doi.org/10.1093/ofid/ofae615

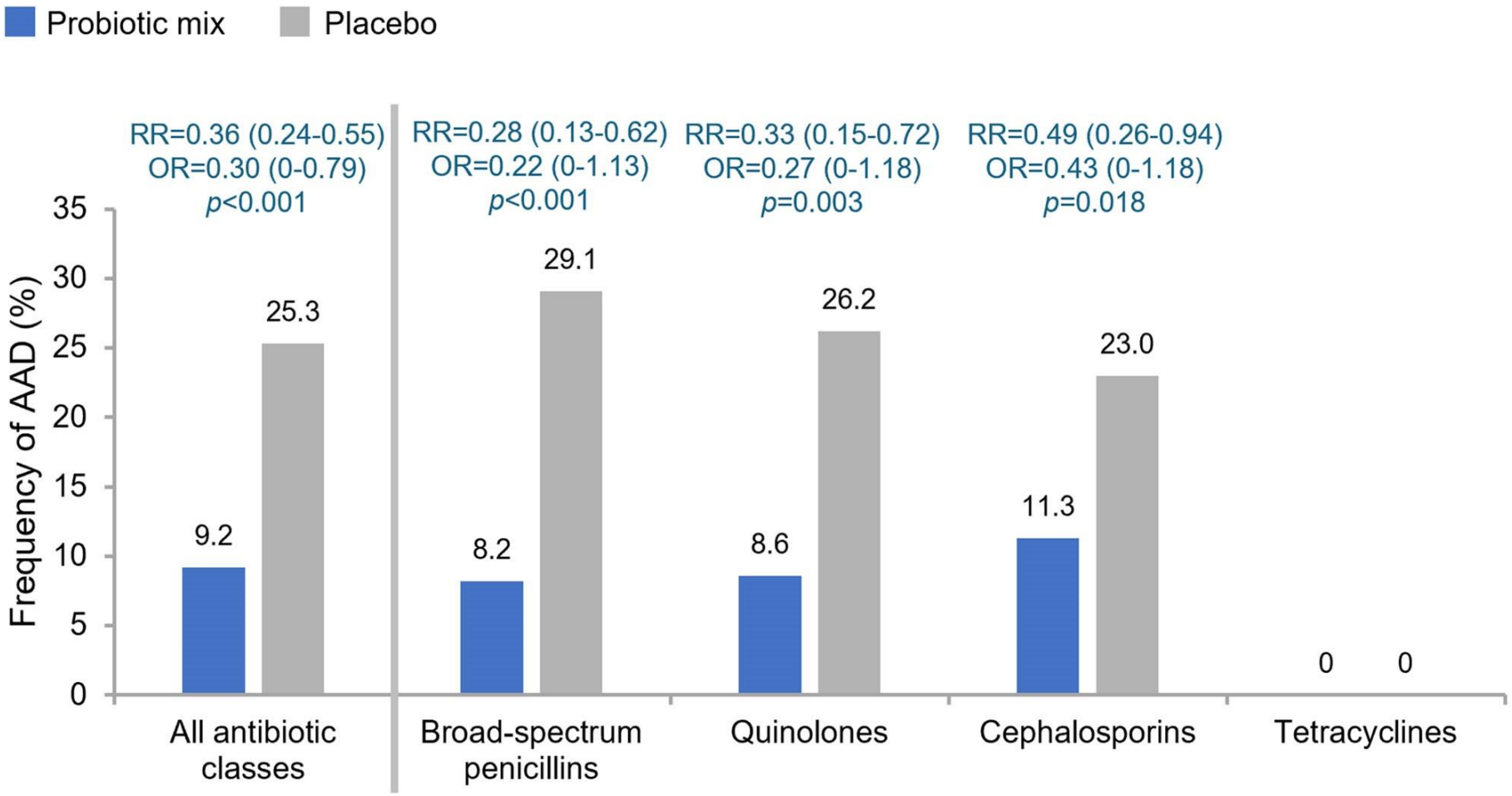
Results: Primary outcome

N = 564 enrolled → 555 completed trial
Average age = 41 years, 62.5% Female



Open Forum Infect Dis, Volume 11, Issue 11, November 2024, ofae615, https://doi.org/10.1093/ofid/ofae615

NNT = 6 people to prevent 1 case of AAD



Open Forum Infect Dis, Volume 11, Issue 11, November 2024, ofae615, https://doi.org/10.1093/ofid/ofae615

Duration of AAD

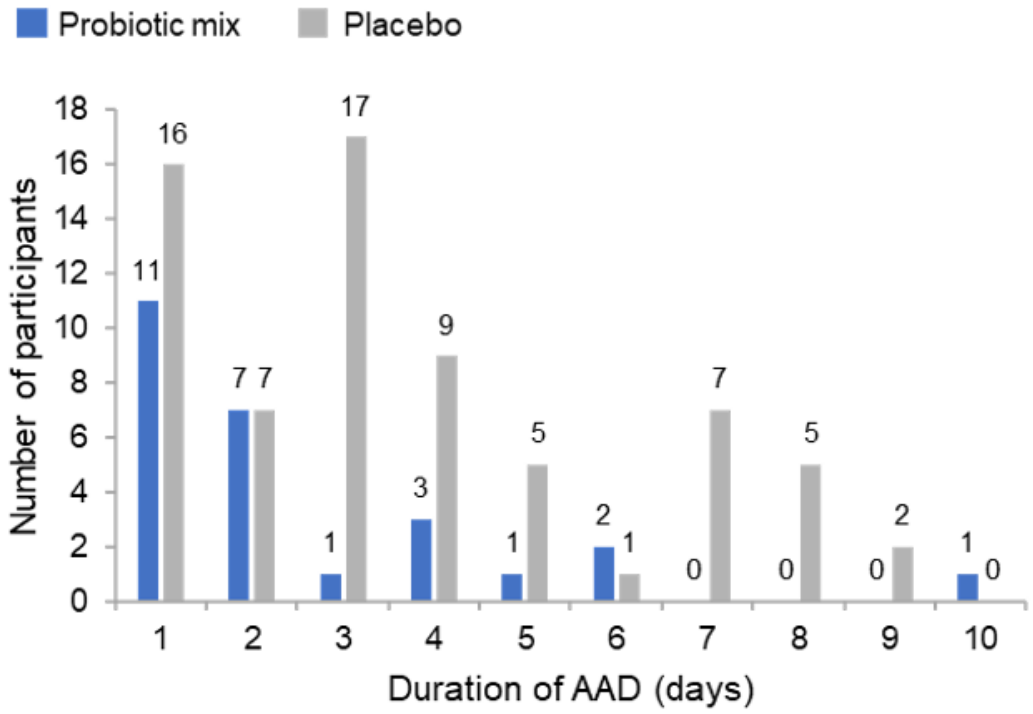


Figure S1. Frequency of duration of AAD in days. Only participants with AAD were included in this analysis (n=95 [probiotic mix/placebo: 26/69]).

Abbreviations: AAD, antibiotic-associated diarrhea; n, number of participants.

Open Forum Infect Dis, Volume 11, Issue 11, November 2024, ofae615, https://doi.org/10.1093/ofid/ofae615

Summary

- This study demonstrates that probiotics targeted to reduce AAD were effective
- Proprietary product = limited info about the mechanisms and rationale for each strain inclusion
  - Links to online pharmacies from the company website, so presumably can purchase it
- Unknown impact on CDI
- Patients instructed to avoid fermented foods and other supplements but diet not fully controlled

Rao et al. 2024 Oct 21;11(11):ofae616. doi: 10.1093/ofid/ofae616

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Garey et al. JAMA Netw Open. 2023. doi: 10.1001/jamanetworkopen.2022.53570.

JAMA Network | Open

RCT: Quality of Life Among Patients with Recurrent *C difficile* Treated With Investigational Oral Microbiome Therapeutic SER-109: Secondary Analysis of a Randomized Clinical Trial

POPULATION

73 Men, 109 Women

Adults with ≥3 episodes of *Clostridioides difficile* infection, inclusive of the qualifying episode

Mean (SD) age, 65.5 (16.5) y

INTERVENTION

182 Patients randomized

89 SER-109
4 oral capsules (~3×10^7 spore colony-forming units) administered once daily for 3 consecutive days

93 Placebo
4 oral capsules administered once daily for 3 consecutive days

SETTINGS / LOCATIONS

56 Sites in the US and Canada

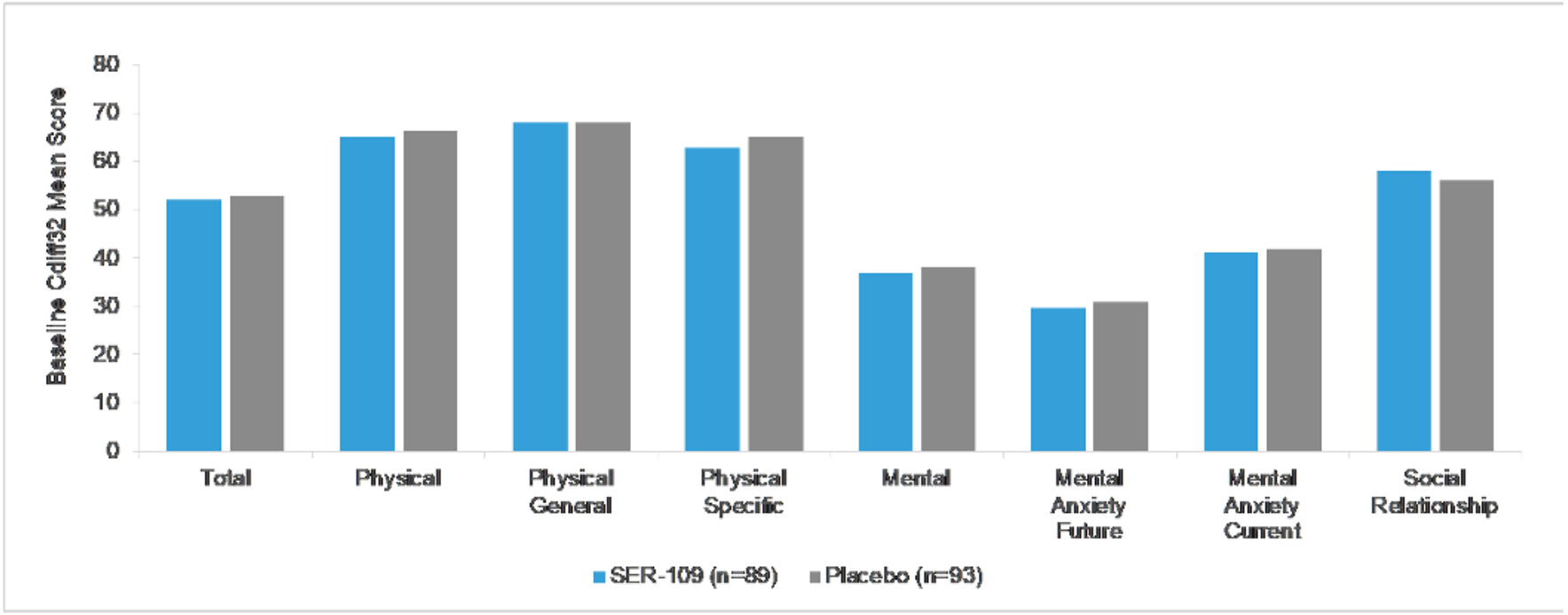
PRIMARY OUTCOME

Exploratory analysis of physical, mental, and social well-being via the *Clostridioides difficile* Quality of Life Survey (Cdiff32) at baseline, weeks 1 and 8. Total and domain scores (0 [worst]-100 [best]) were recorded

Garey KW, Jo J, Gonzales-Luna AJ, et al. Assessment of quality of life among patients with recurrent *Clostridioides difficile* infection treated with investigational oral microbiome therapeutic SER-109: secondary analysis of a randomized clinical trial. *JAMA Netw Open*. 2023;6(1):e2253570. doi:10.1001/jamanetworkopen.2022.53570

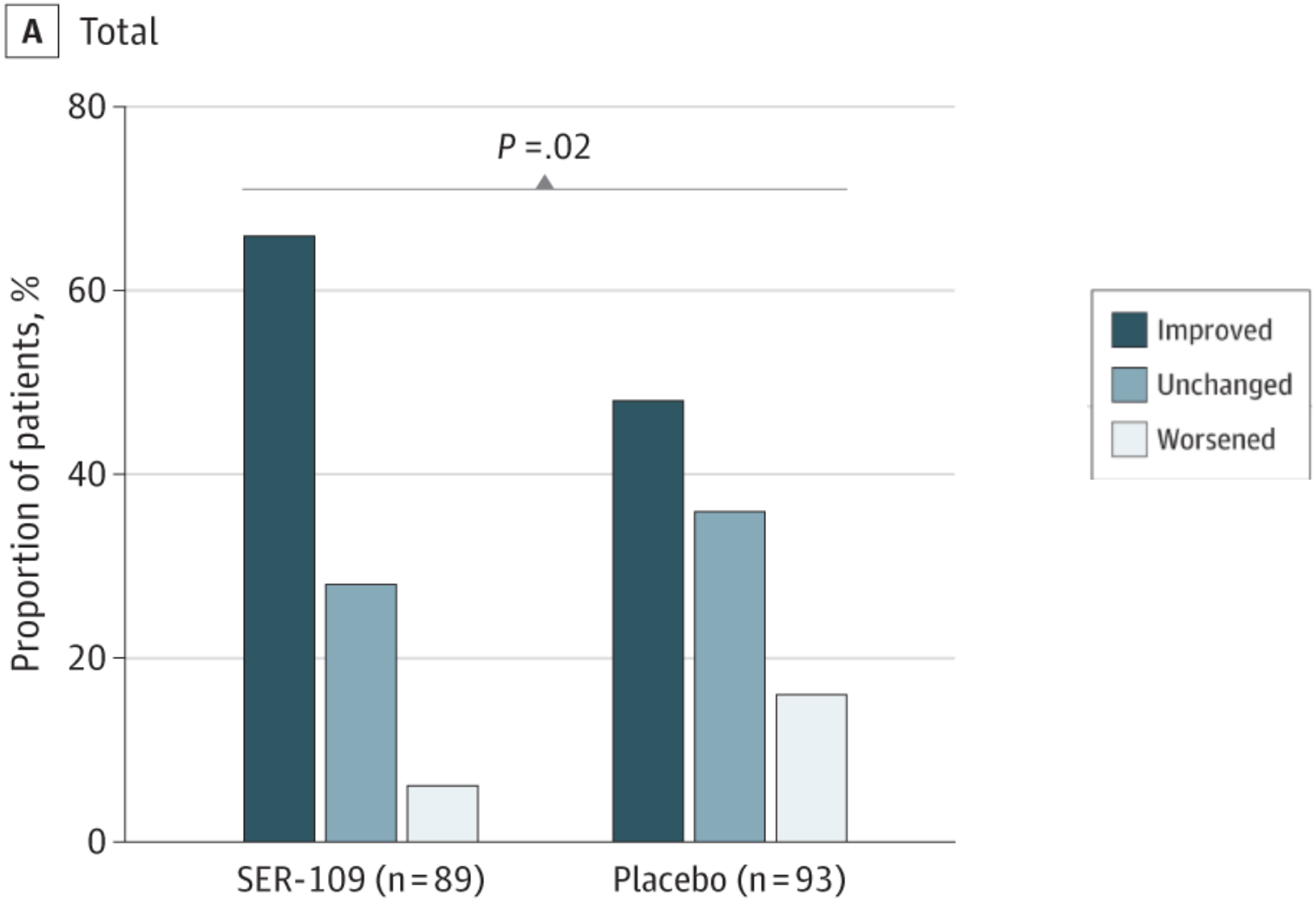
Baseline Health-related quality of life (HRQOL) scores

eFigure 2. Baseline Cdiff32 HRQOL Questionnaire Scores by Treatment Arm, ITT Population

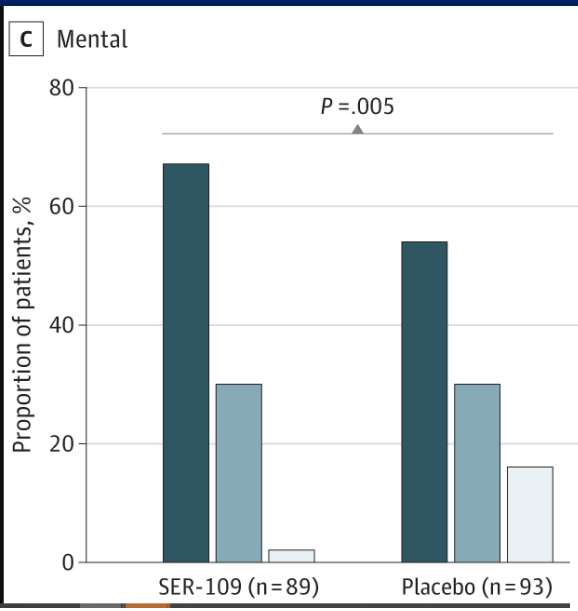


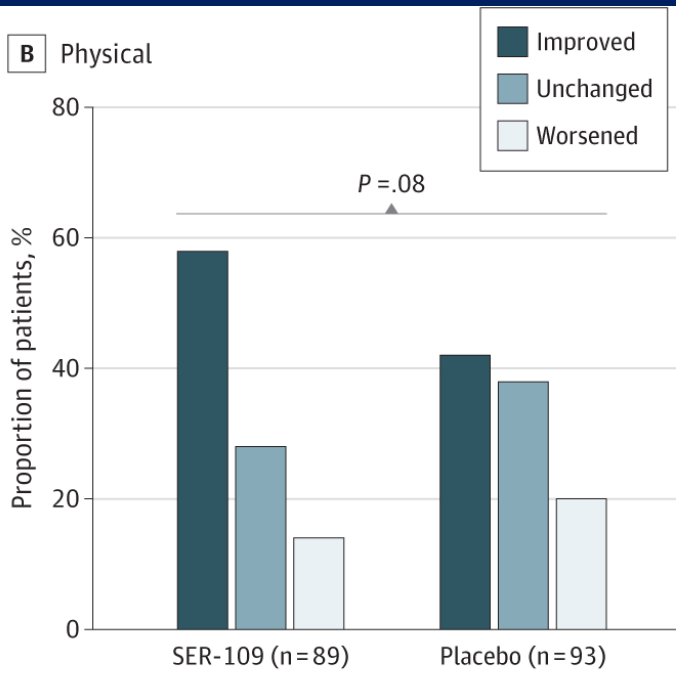
Abbreviations: Cdiff32 HRQOL=*Clostridioides difficile* Health-Related Quality-of-Life; ITT=intent-to-treat

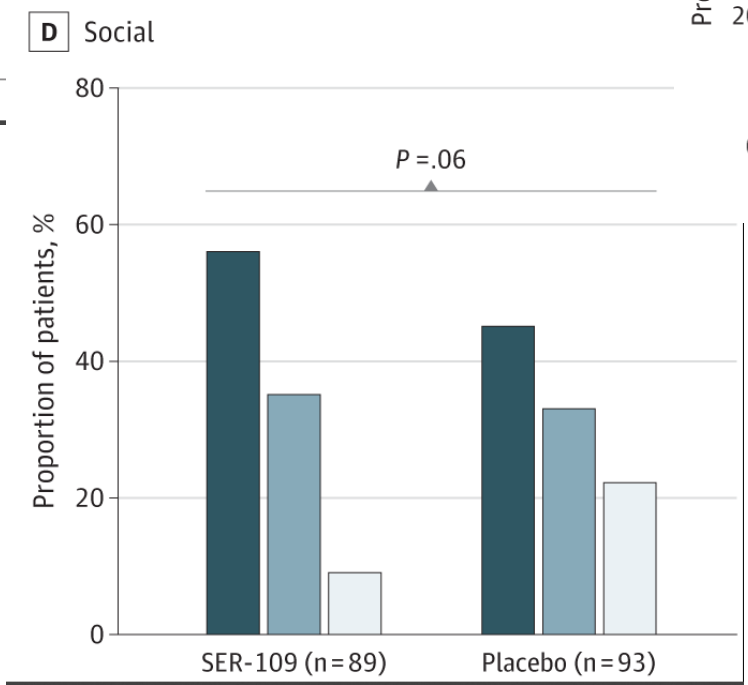
By week 8: greater improvement with SER-109 vs. placebo



The biggest difference across the domains was in mental health scores



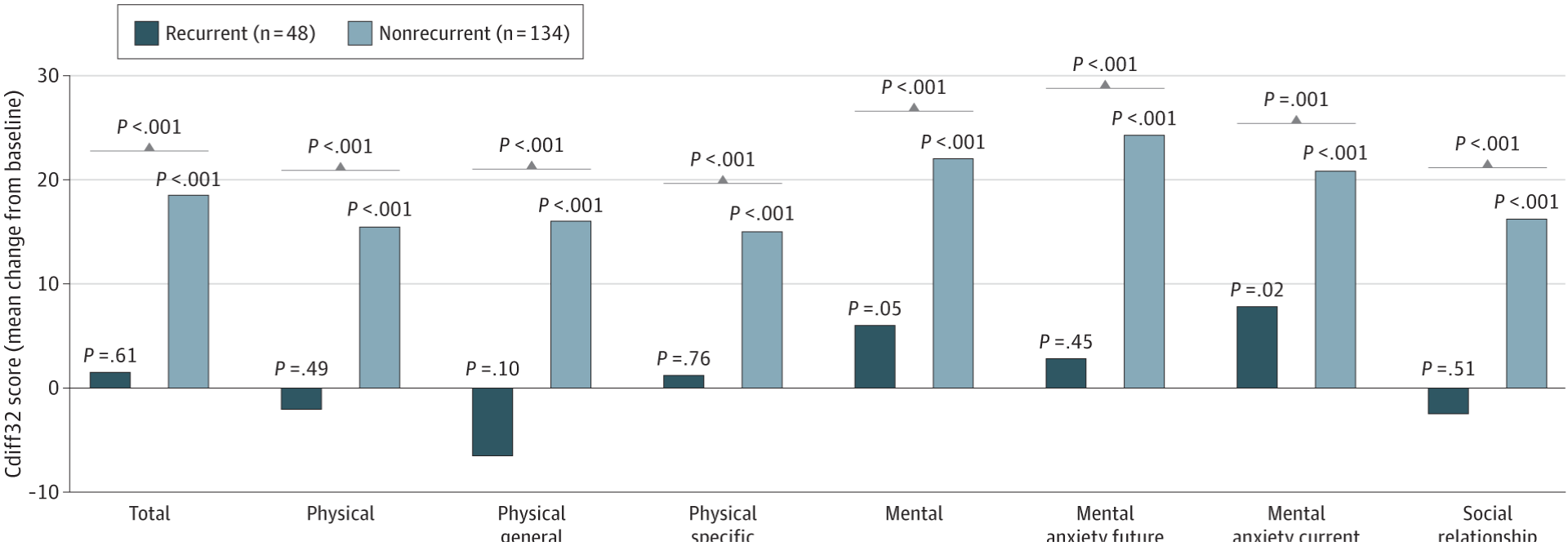




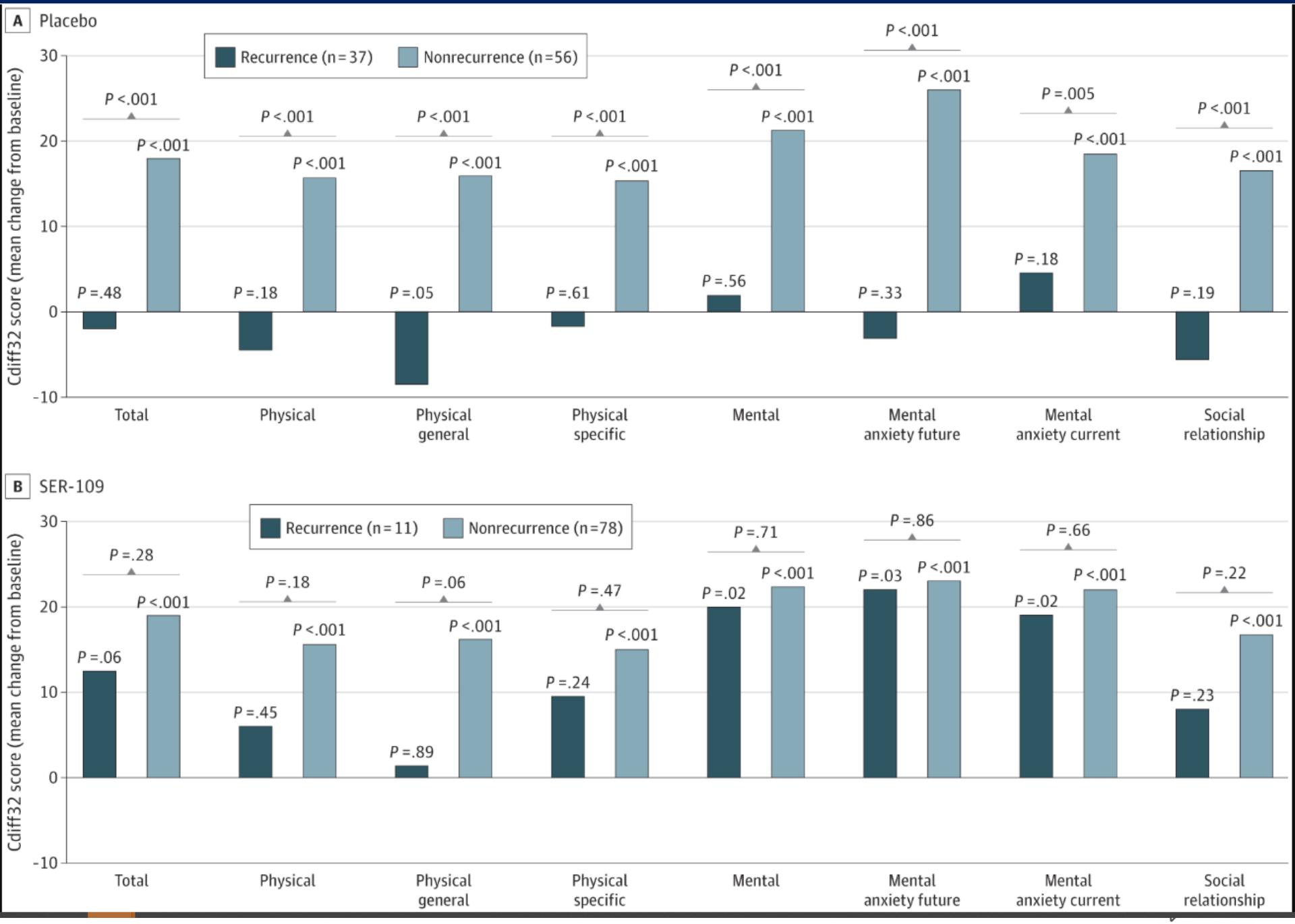
Questions Asked: Mental

Mental	Anxiety future	5. Are you afraid that your *C. diff* infection could come back again?
Mental	Anxiety future	6. Are you afraid that your *C. diff* infection could get worse in the future?
Mental	Anxiety future	7. Are you afraid that the next time you'll need antibiotics, your *C. diff* infection will appear again?
Mental	Anxiety future	8. Have you been worried about not knowing when the next diarrhea would arise?
Mental	Anxiety future	27. I worry about transmitting my *C. diff* infection to my family and/or friends
Mental	Anxiety current	19. Despite my C diff infection, I can live a normal life
Mental	Anxiety current	20. I feel that I am not in control of my *C. diff* infection
Mental	Anxiety current	21. I have no idea what I should do when I have my *C. Diff* infection?
Mental	Anxiety current	22. I believe that any stress can worsen my *C. diff* infection
Mental	Anxiety current	23. I feel irritable because of my *C. diff* infection
Mental	Anxiety current	24. I feel isolated from others because of my *C. diff* infection
Mental	Anxiety current	25. I feel depressed because of my *C. diff* infection
Mental	Anxiety current	26. I feel my life is less enjoyable because of my *C. diff* infection
Mental	Anxiety current	28. I feel much stressed because of my *C. diff* infection

Recurrent disease = worse QOL



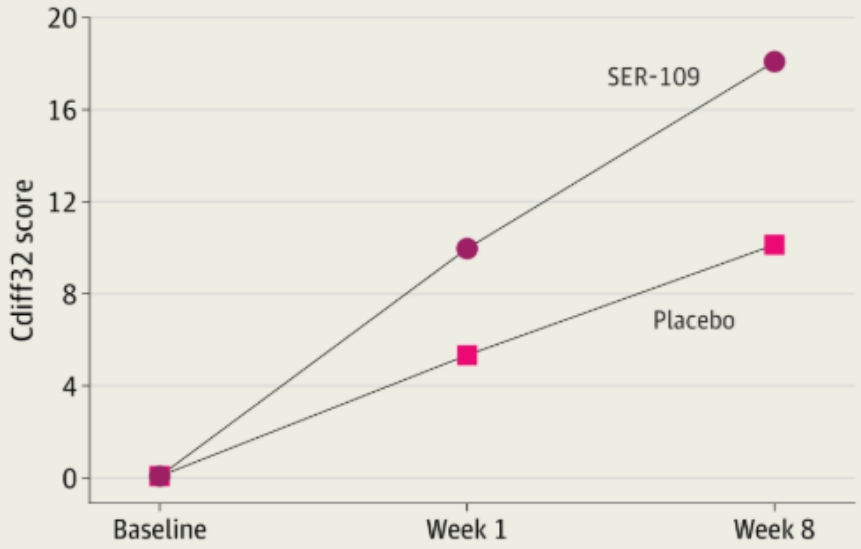
BUT QOL scores were better in pts who received the LBP *even* if they had recurrence


A
Placebo
Recurrence (n = 37)
Nonrecurrence (n = 56)
Cdiff32 score (mean change from baseline)
30
20
10
0
-10
P <.001
P <.001
P =.48
P <.001
P <.001
P =.18
P <.001
P <.001
P =.05
P <.001
P <.001
P =.61
P <.001
P <.001
P =.56
P <.001
P <.001
P =.33
P <.001
P =.005
P =.18
P <.001
P <.001
P =.19
P <.001
Total
Physical
Physical general
Physical specific
Mental
Mental anxiety future
Mental anxiety current
Social relationship
B
SER-109
Recurrence (n = 11)
Nonrecurrence (n = 78)
Cdiff32 score (mean change from baseline)
30
20
10
0
-10
P =.28
P <.001
P =.06
P =.18
P <.001
P =.45
P =.06
P <.001
P =.89
P =.47
P <.001
P =.24
P =.71
P <.001
P =.02
P =.86
P <.001
P =.03
P =.66
P <.001
P =.02
P =.22
P <.001
P =.23
Total
Physical
Physical general
Physical specific
Mental
Mental anxiety future
Mental anxiety current
Social relationship

Conclusion:

FINDINGS

Compared to placebo, SER-109 treated patients had significantly greater improvements in total and physical domain and subdomain scores as early as week 1, with continued improvements by week 8



Change in total CDiff32 (Wk 1: +9.9; Wk 8: +18.0)

Wk 1: +5.3; Wk 8: +10.1; *P* = .02 and *P* = .03 group difference

- WOW!
- But this is an LBP not a probiotic
- We're talking about $$$$$$$$$$$$ vs. $ in product cost
- And a much more standardized product compared to probiotics on the market

Summary

- Microbiome therapeutics are growing in product availability and evidence
- Probiotics are widely available but have diverse, non-standardized formulations
- Evidence for probiotics varies but at least from SPAADA, they seem to be effective in reducing AAD (not necessarily CDI) in outpatients who maybe didn't need antibiotics in the first place(?)
- Live biotherapeutic products are in early phases of research and minimally available. But evidence indicates potentially broad applications

I would recommend probiotics in the following scenarios (select all that apply)

- Inpatients on antibiotics
- Outpatients on antibiotics
- For myself or a loved one on antibiotics
- I would not recommend probiotics while on antibiotics
- I would not recommend probiotics at all