

Clinical Question & PICOT

In patients receiving antibiotic therapy, does administration of probiotics aid in reducing the rates of *Clostridium difficile*, as compared to taking no probiotics during antibiotic therapy?

P- Patients on antibiotic therapy

I - Administration of probiotics during antibiotic therapy

C - Taking no probiotics

O - Decrease rates of *Clostridium difficile*

Background and Significance

- *Clostridium difficile* (*C. diff*) is an opportunistic bacteria that can be naturally found in gut microbiota and can cause infection of the colon.
- Approximately 500,000 people are infected with CDI each year in the United States. About 30,000 people die each year from CDIs (Feuerstadt, et. al, 2023).
- CDIs cost US healthcare an estimated \$5 billion per year (Malone, et. al, 2023).
- Symptoms can include diarrhea, dehydration, weight loss, sepsis, and death (Mayo, 2023).
- Antibiotics have the ability to deplete normal gut flora including “good” bacteria, allowing for opportunistic bacterium, like *C. diff*, to overpopulate and cause illness (How, 2022).
- There are currently no implemented medical practices in place to reduce the risk of *C. diff* for patients on an antibiotic therapy regimen.
- The only treatment for *C. diff* are more antibiotics.
- Probiotics are considered “good” bacteria naturally found in your gut.
- Probiotics can be supplemented, found in foods, and can restore gut flora when taking antibiotics.

Purpose

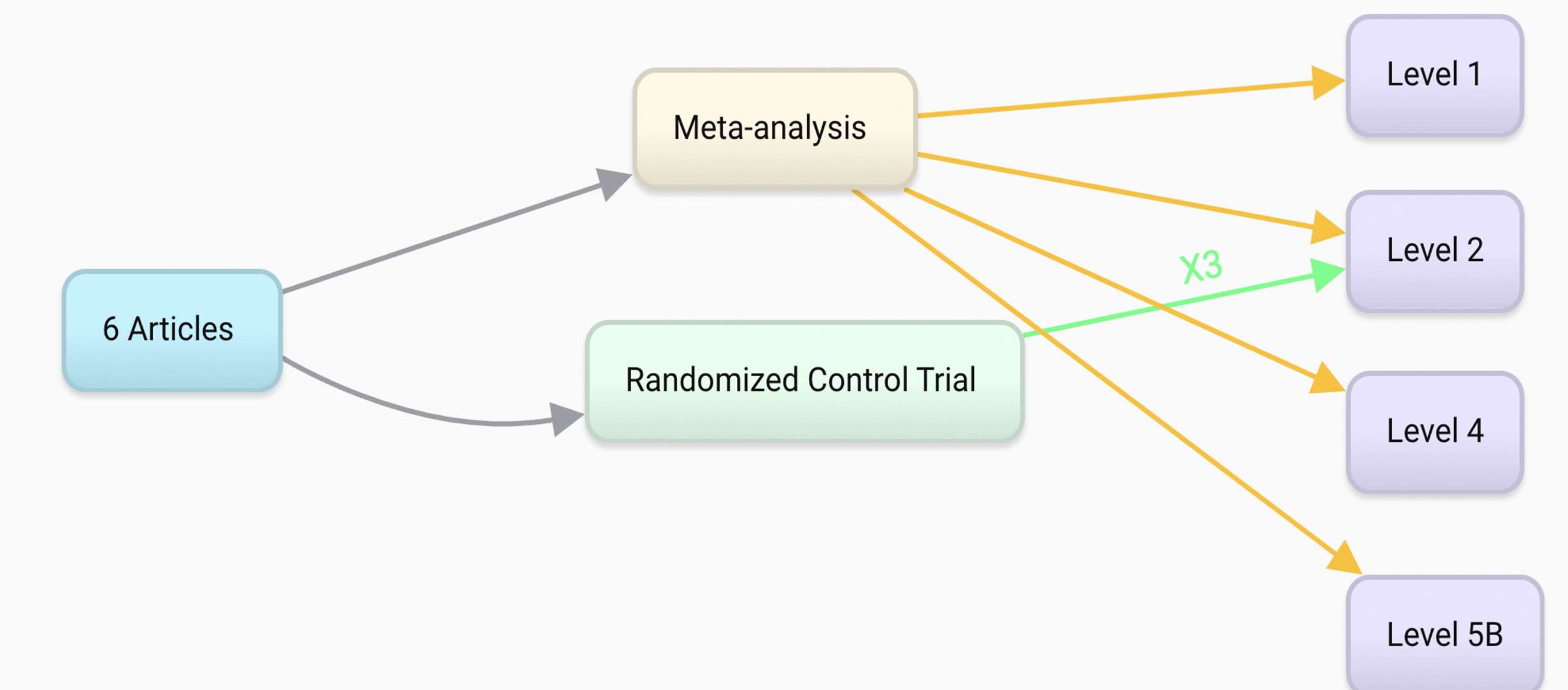
- Improper antibiotic use, unnecessary prescribing, and long-term use of antibiotics can increase the risk of contracting *C. diff*.
- *C. diff* is an intractable infection and is more harmful and difficult to treat in those that are immunocompromised and/or 65 years or older.
- The purpose of this project is to determine whether previously conducted studies support the use of probiotics in reducing the risk of *C. diff*.

Literature Review

Author and Year	Type of Study	Methods	Results
E.J.C. Goldstein, S.J. Johnson, P.J. Maziade, et. al. (2017)	Randomized, double-blind control trial	“High risk” population of those taking antibiotics at a hospital in Shanghai	216 patients received a probiotics regimen and 221 patients received a placebo for 21 days after their last dose of antibiotics. The probiotic-treated group had a lower incidence of antibiotic acquired diarrhea (AAD) and CDI vs the placebo group. A cost-effective analysis was used to evaluate the risk of contracting a CDI compared to the cost efficiency of OTC probiotics. The analysis found that taking probiotics with antibiotic therapy saved \$518/patient in 30 days and lowered the risk of CDIs.
Ouwehand, A. C., DongLian, C., Weijian, X., et. al. (2014)	Triple-blind, randomized, placebo controlled, dose-ranging study	In-patients requiring antibiotic therapy	168 patients received high-dose probiotics, 168 patients received low-dose probiotics, and 167 patients received a placebo for 7 days after antibiotic regimen. The high-dose probiotics were shown to reduce the symptoms of AAD and CDAD, including fever, abdominal cramping, and bloating. The number of loose stools per day were also decreased among both probiotic groups.
Hickson, M., D'Souza, A. L., Muthu, et. al. (2007)	Randomized, double-blind, placebo-controlled study	In-patients taking antibiotics	57 patients receiving probiotic therapy and 56 patient in the control group. 34% of the control group contracted AAD compared to 12% in the experimental group. 0% of patient in the experimental group contracted CDIs, but 17% of patients in the control were found to have a CDI. The study shown that consuming a probiotic drink containing L casei, L bulgaricus, and S thermophilus can reduce the incidence of AAD and CDI.

Methods

Keywords: Probiotics, *C. diff*, Antibiotic therapy
Databases: PubMed, Google Scholar, NIH



Results & Synthesis

- High rates of recurrent *C. diff* among patients that did not take probiotics during antibiotic treatment was > 40% in placebo groups.
- The use of probiotics decreased the need for further hospitalization, which decreased the overall cost by \$518 per patient.
- There is no clinically significant data to support a specific strain of bacteria that best replenishes the normal flora; however some studies support the use of Lactobacillus as a suitable option.

Nursing Implications

- Pairing probiotics as a preventative for *C. diff* instead of treating with more antibiotics in turn is more cost effective.
- Prevention of primary *C. diff* cases will decrease reinfection rates and rehospitalizations, positively impacting nursing assignments and patient census.
- Nurses are tasked with collecting stool samples for possible *C. diff* patients, preventing *C. diff* cases reduces the risk of the infection spreading from patient to nurse to patient.
- *C. diff* is a hospital acquired infection (HAI) which is not covered by the patient’s insurance.