

Eight systemic reviews, one randomized controlled trial, and two clinical practice guidelines (CPGs) were appraised for evidence on the effectiveness of probiotics for radiation-induced diarrhea. Limitations of this literature include heterogeneity of studies, dosages, strains, and frequency of probiotic use and quality concerns. Despite these limitations, a decrease in radiation-induced diarrhea with probiotic use was reported in patients with abdominal and pelvic cancers receiving radiation in six of eight systematic reviews. When adverse events were reported, there was not a significant increase in adverse events in intervention groups compared with controls. Two CPGs support the use of probiotics. One CPG notes the need for additional studies on the safety of use in immunocompromised patients.

	Most Frequent Genus	Most Frequent Species	Other Species Reported
Frequently given in combination	Lactobacillus	L. acidophilus, L. casei	L. delbrueckii, L. rhamnosus
	Bifidobacterium	B. longum, B. bifidum, B. breve	
	Streptococcus	S. thermophilus	

Systematic Reviews

Citation	Design/ Method Sample/Setting	Variables and Intervention	Outcome Measures	Results/Analysis	Limitations	Quality and Nursing Implications
Devaraj, N.K., Suppiah, S., Veetil, S.K., Ching, S.M., Lee, K.W., Menon, R.K. . . . Sivaratnam, D. (2019). The effects of probiotic supplementation on the incidence of diarrhea in cancer patients receiving radiation therapy: A systematic review with meta-analysis and trial sequential analysis of randomized controlled trials. <i>Nutrients</i> , 11(12), 2886. https://doi.org/10.3390/nu11122886	<p>Design/Method Systematic Review and Meta-Analysis: Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA). Database search: Ovid, CENTRAL, Embase®, PubMed®, MEDLINE® for randomized controlled trials (RCTs) of adults undergoing radiation therapy (RT) using probiotic interventions for diarrhea. Dual screening and data extraction. Cochrane risk-of-bias tool used.</p> <p>Sample: 1,116 patients across 8 studies, 5 focused on gynecologic cancers and the remainder focused on other abdominal and pelvic cancers. All participants received RT; 3 trials included participants who also received chemotherapy.</p> <p>Setting: Radiation facilities</p>	<p>Independent Variable (IV): Probiotic use</p> <p>Dependent Variables (DVs): Incidence of diarrhea while undergoing RT with or without chemotherapy and antidiarrheal use</p> <p>Intervention: Probiotic use versus placebo use during treatment</p>	<p>Incidence of diarrhea while undergoing RT with or without chemotherapy measured using Common Terminology Criteria for Adverse Events (CTCAE) or World Health Organization (WHO) grading</p> <p>Secondary outcome: antidiarrheal use</p>	<p>Compared with placebo, probiotics were associated with a lower risk of radiation-induced diarrhea (risk ratio [RR] = 0.62, 95% confidence interval [CI] [0.46, 0.83]).</p> <p>Patients receiving only RT demonstrated significant benefit (RR = 0.61, 95% CI [0.48, 0.78]).</p> <p>Significant differences in antidiarrheal medication were observed with probiotic use (RR = 0.54, 95% CI [0.35, 0.84]).</p>	<p>Heterogeneity of studies</p> <p>Limited number of studies</p> <p>Differences in probiotic dosage and strain and mode and frequency of RT treatment</p> <p>Differences in the study population, (5 studies included only female patients) and other demographic variables (weight, smoking status, co-morbidities), location of studies, and severity of cancer</p>	<p>Findings of this study indicate that probiotic use may decrease the incidence of radiation-induced diarrhea. A subgroup analysis found no changes in incidence of diarrhea with probiotic use during radiation with concurrent chemotherapy. Authors suggest the need for more research in the form of RCTs with patients with various cancer types.</p> <p>Nurses can use this information to discuss current evidence on probiotics with patients and care team members.</p>

Citation	Design/Method Sample/Setting	Variables and Intervention	Outcome Measures	Results/Analysis	Limitations	Quality and Nursing Implications
<p>Qiu, G., Yu, Y., Wang, Y., & Wang, X. (2019). The significance of probiotics in preventing radiotherapy-induced diarrhea in patients with cervical cancer: A systematic review and meta-analysis. <i>International Journal of Surgery</i>, 65, 61–69.</p> <p>https://doi.org/10.1016/j.ijso.2019.03.015</p>	<p>Design/Method Systematic Review and Meta-Analysis: PRISMA. Database search: Cochrane Library, PubMed®, Embase®, and Web of Science® for placebo-controlled trials with probiotic comparison for radiation-induced diarrhea. Dual screening and data extraction. Cochrane risk-of-bias tool used.</p> <p>Sample: 9 studies (N = 1,508) assessed efficacy of probiotics, 8 studies included 1,410 participants (726 consuming probiotics, 657 consuming placebo, 27 lost to follow-up) for safety analysis. The primary patient population was patients with cervical cancer receiving radiation treatment. Some studies included patients with other abdominal/pelvic cancers.</p> <p>Setting: Radiation</p>	<p>IV: Probiotic use</p> <p>DVs: Radiation-induced diarrhea, use of antidiarrheals, abdominal pain</p> <p>Intervention: Probiotic use impact on radiation-induced diarrhea prevention</p>	<p>CTCAE-graded diarrhea, adverse events (AEs), loperamide use, abdominal pain</p>	<p>Compared with placebo, probiotic groups had reduced incidence of diarrhea (RR = 0.61, 95% CI [0.46-0.81]).</p> <p>Subgroup analysis found increased incidence for grade 1 diarrhea in probiotic group (RR = 1.63, 95% CI [0.1.17-2.27], p = 0.004) but decreased incidence in subgroups of grade two or greater (RR = 0.25, 95% CI [0.06-0.97], p = 0.04), grade 3 or greater (RR = 0.52, 95% CI [0.3, 0.89]) and grade 4 (RR = 0.32, 95% CI [0.12, 0.82], p = 0.02), respectively.</p> <p>4 of 8 studies had no AEs related to probiotics, and another 4 reported an unclear number of AEs. The incidence of AEs was 35.8% in intervention group compared to 39.3% in placebo group.</p>	<p>Small sample sizes in included trials</p> <p>Inconsistent probiotic intervention and no subgroup analysis of probiotic strain</p> <p>Unclear duration of treatment</p> <p>Limited analysis of confounding patient factors</p>	<p>Methodology was valid, and results were reported with reliability. Intervention is feasible to implement in practice.</p> <p>Nurses can use this information to discuss current evidence on probiotic use for patients with cervical cancer receiving radiation with the care team.</p> <p>Clarification of benefits balanced with harm is needed given reporting of intervention-related AEs among 4 studies.</p>

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<p>Liu, M.M., Li, S.-T., Shu, Y., & Zhan, H.-Q. (2017). Probiotics for prevention of radiation-induced diarrhea: A meta-analysis of randomized controlled trials. <i>PLOS ONE</i>, 12(6), e0178870. https://doi.org/10.1371/journal.pone.0178870</p>	<p>Design/Method Systematic Review and Meta-Analysis: PRISMA. Database search: PubMed®, Embase®, and Cochrane Library for studies in radiation setting with intervention of probiotics for radiation-induced diarrhea with a control group. Dual screening and data extraction. Cochrane risk-of-bias tool used.</p> <p>Sample: 6 RCTs with a total of 917 patients</p> <ul style="list-style-type: none"> • Patients receiving RT with or without chemotherapy • Patients receiving probiotics or placebo <p>Setting: Radiation facilities</p>	<p>IV: Probiotic supplementation</p> <p>DVs: Incidence of diarrhea, incidence of antidiarrheal medication use</p> <p>Intervention: Probiotic supplementation</p>	<p>Primary: Incidence of radiation-induced diarrhea</p> <p>Secondary: Improvement on antidiarrheal medication use</p> <p>Improvement on Bristol Stool Form Sale</p>	<p>Compared with control groups, probiotic interventions were associated with a lower risk of radiation-induced diarrhea (RR = 0.55, 95% CI [0.34, 0.88], p = 0.01). Significant heterogeneity noted (I² = 87%).</p> <p>No significant improvement was found on antidiarrheal medication use (RR = 0.68, 95% CI [0.4, 1.14], p = 0.14).</p> <p>No significant improvement was found on Bristol Stool Form Scale (RR = 0.64; 95% CI [0.3, 1.17], p = 0.14).</p>	<p>Small number of studies; n = 6</p> <p>Dosage and strain of probiotic were varied.</p> <p>Optimal dosing time for probiotic needs to be evaluated further.</p> <p>Variability among populations and in RT/technique</p> <p>Criteria of diagnosis of diarrhea varied among studies</p>	<p>Findings of this meta-analysis illustrate that probiotic use in patients with abdominal or pelvic cancers undergoing RT may decrease the incidence of radiation-induced diarrhea. The authors suggest there is a need for more research that is well-designed, properly powered, and in the form of RCTs. Nurses can use information from this study to discuss current evidence on probiotics with patients and care team members. Although probiotics are accepted as an easy and safe option, more studies need to be completed to conclude a more definitive benefit.</p>

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<p>Wardill, H.R., Van Sebille, Y.Z.A., Ciorba, M.A., & Bowen, J.M. (2018). Prophylactic probiotics for cancer therapy-induced diarrhoea: A meta-analysis. <i>Current Opinion in Supportive and Palliative Care</i>, 12(2), 187–197. https://doi.org/10.1097/SPC.0000000000000338</p>	<p>Design/Method Systematic Review and Meta-Analysis: PRISMA. Database search: PubMed®, Embase®, CINAHL®, and CENTRAL for studies investigating probiotic interventions for any cancer therapy and effect on diarrhea outcomes. Dual screening and data extraction, risk-of-bias analysis.</p> <p>Sample: 7 RCTs included 1,091 participants across studies with sample range of control group 23-239 and probiotic group 23-243. Adults aged 18 years or older with gynecologic, colorectal, and lung cancer.</p> <p>Setting: Treatment with radiation, chemotherapy and radiation therapy, chemotherapy, and targeted therapy</p>	<p>IV: Prophylactic probiotics for gastrointestinal side effects</p> <p>DV: Incidence of diarrhea, severe diarrhea, and use of rescue medications</p> <p>Intervention: A range of probiotic formulations were used in the studies; the majority contained Lactobacillus strains.</p>	<p>Incidence of diarrhea</p> <p>Incidence of severe diarrhea (grade 3 or greater) measured using CTCAE scale of chemotherapy-induced diarrhea</p> <p>Use of rescue medications</p>	<p>Overall incidence of diarrhea (6 studies): RR = 0.81, 95% CI [0.6, 1.09], p = 0.1.6</p> <p>Prevention of severe diarrhea: RR = 0.54, 95% CI [0.25, 1.16] p = 0.11.</p> <p>Use of rescue medications (3 studies): RR = 0.93, 95% CI [0.53, 1.65], p = 0.81.</p>	<p>Small number of RCTs with high heterogeneity</p> <p>Potential publication bias</p>	<p>Findings are clinically relevant and can be easily understood. Findings of this meta-analysis on the use of probiotics on broad diarrhea prevention revealed no significant differences in overall incidence of diarrhea, prevention of diarrhea, or use of rescue medications. Consistent, standardized, and objective measures for diarrhea are needed and should be sought when documenting cancer treatment-related diarrhea.</p>

Citation	Design/Method Sample/Setting	Variables and Intervention	Outcome Measures	Results/Analysis	Limitations	Quality and Nursing Implications
Lin, S., & Shen, Y. (2020). The efficacy and safety of probiotics for prevention of chemoradiotherapy-induced diarrhea in people with abdominal and pelvic cancer: A systematic review and meta-analysis based on 23 randomized studies. <i>International Journal of Surgery</i> , 84, 69–77. https://doi.org/10.1016/j.ijssu.2020.10.012	<p>Design/Method Systematic Review and Meta-Analysis: Database search: Cochrane Library, PubMed®, Embase®, Web of Science®, Chinese National Knowledge Infrastructure, Wanfang, and VIP for studies evaluating the safety and efficacy of probiotic use for chemotherapy and radiation-induced diarrhea. Dual screening and data extraction. Cochrane risk-of-bias tool used.</p> <p>Sample: 23 studies (RCTs and non-RCTs included); 2,570 patients included in the review. Sample range across studies 24–490. Patients with a diagnosis of abdominal or pelvic cancer receiving RT, chemotherapy, or concurrent therapy and probiotics or placebo.</p> <p>Setting: Radiation facilities</p>	<p>IV: Probiotic supplementation</p> <p>DVs: Incidence of all grades of chemotherapy and radiation-induced diarrhea</p> <p>Response rate</p> <p>Adverse events from probiotics</p> <p>Antidiarrheal use on Bristol Stool Form Scale</p>	<p>CTCAE</p> <p>Bristol Stool Form Scale</p>	<p>Meta-analysis included 16 RCTs reporting efficacy of intervention. The incidence of all diarrhea (RR = 0.16, 95% CI [0.51, 0.73]), grade 3 or greater diarrhea (RR = 0.36, 95% CI [0.18, 0.72]), and grade 2 or greater diarrhea (RR = 0.65, 95% CI [0.54, 0.78]), but not that of less than grade 2 diarrhea (RR = 1.07, 95% CI [0.95, 1.21]), was significantly reduced in the probiotics compared to the placebo groups.</p> <p>The incidence of chemotherapy-induced and RT-induced diarrhea was significantly reduced in the probiotics group (pooled RRs = 0.53, 95% CI [0.39, 0.71] and 0.67, 95% CI [0.51, 0.88]).</p>	<p>Dosage, treatment duration, and strain of probiotic different in the studies</p> <p>Complex probiotic regimens versus single agent</p> <p>Risk of bias in the form of performance and attrition bias</p> <p>Definition of AE was unclear in most of the included studies</p> <p>Variability in patients' ages, comorbidities, tumor types, therapies received, surgery, and patient outcomes among the studies</p>	<p>This meta-analysis is limited by inclusion of non-RCTs. Probiotic use in patients decreased the incidence of chemotherapy and RT-induced diarrhea notably in grades 2 or 3 diarrhea. Probiotics were not found to decrease the frequency of lesser grades of chemotherapy and RT-induced diarrhea. The authors suggest there is a need for research focused on the dose–effect relationship of probiotics for chemotherapy and RT-induced diarrhea. Nurses can use this information to discuss current evidence on probiotics for patients with abdominal or pelvic cancers receiving RT, chemotherapy, and concurrent therapy. More studies need to be completed to conclude a more definitive benefit. There was unclear definition of AEs as it varied between studies, but when measured no increased incidence of AEs was noted with intervention groups compared to controls.</p>

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Hassan, H., Rompola, M., Glaser, A.W., Kinsey, S.E., & Phillips, R.S. (2018). Systematic review and meta-analysis investigating the efficacy and safety of probiotics in people with cancer. <i>Supportive Care in Cancer</i> , 26(8), 2503–2509. https://doi.org/10.1007/s00520-018-4216-z	<p>Design/Method Systematic Review and Meta-Analysis: Database search: MEDLINE®, Embase®, and AMED for RCTs investigating the efficacy of probiotics as an intervention for gastrointestinal-associated effects. Additional studies and case reports included for safety analysis. Dual screening and data extraction. Cochrane risk-of-bias tool used. Loke method used for quality assessment.</p> <p>Sample: 21 RCTs included in efficacy analysis, 25 non-RCTs and case reports used for safety analysis. N = 2,982 for efficacy and 2,242 for safety. Sample range across safety studies was 10–205. Sample range across efficacy studies was not reported in supplement. Sample included pediatric to adult patients receiving chemotherapy or RT and probiotics as an intervention.</p> <p>Setting: RT (n = 9 studies), chemotherapy (n = 7 studies), and surgical intervention (n = 11 studies) in 14 different countries, primarily China</p>	<p>IV: Probiotics</p> <p>DVs: Efficacy measured incidence of diarrhea and duration of pyrexia with use of probiotics.</p> <p>Intervention: Probiotics</p>	<p>Incidence of diarrhea, pyrexia duration, severity of diarrhea, and septicemia, central line infections.</p>	<p>Reduction incidence of diarrhea with use of probiotics (5 studies, n = 496) (OR = 0.52, 95% CI [0.34, 0.78], I² = 36.9%).</p> <p>Reduced duration of pyrexia with use of probiotics (5 studies) (mean difference = 0.39 days, 95% CI [0.35, 0.43], I² = 0.01%).</p> <p>25 studies reviewed in safety analysis of probiotics: data of AEs inconclusive and not consistent to determine safety.</p>	<p>Limited number of studies</p> <p>High heterogeneity</p> <p>Limited search</p> <p>Limited data in pediatrics</p>	<p>Rigorous systematic review, inconclusive evidence on AEs and quality concerns limiting applicability. Chemotherapy and RT can alter gut flora. Diarrhea is a common side effect from many chemotherapy and RT treatments. Probiotics may be beneficial in decreasing diarrhea and grade of diarrhea, and potentially reducing pyrexia. Insufficient data and guidelines exist to support specific recommendations. More data are needed on AEs.</p>

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<p>Lawrie, T.A., Green, J.T., Beresford, M., Wedlake, L., Burden, S., Davidson, S.E. . . . Andreyev, H.J.N. (2018). Interventions to reduce acute and late adverse gastrointestinal effects of pelvic radiotherapy for primary pelvic cancers. <i>Cochrane Database of Systematic Reviews</i>, 1(1), CD012529. https://doi.org/10.1002/14651858.CD012529.pub2</p>	<p>Design/Method Systematic Review and Meta-Analysis: Systematic review and meta-analysis of RCTs. Database search of CENTRAL, MEDLINE®, Embase®, and clinical trials registries for RCTs of interventions to prevent GI effects associated with radiation treatment to for primary pelvic cancers.</p> <p>Sample: 92 RCTs with 44 interventions for prevention of gastrointestinal toxicity for adults at risk for acute and late effects associated with radiation to the pelvis. 8 probiotic intervention studies with date ranges from 1988 to 2016. Probiotic study pooled sample: 983 participants; 3 studies in gynecologic populations, 4 studies of RT for pelvic cancers, 1 study in men receiving RT for prostate cancer</p> <p>Setting: Radiation, tertiary care settings</p>	<p>IV: Probiotic or placebo supplementati-on</p> <p>DVs: Acute and late gastrointestinal toxicity, quality-of-life scores</p>	<p>Outcomes studied: diarrhea (n = 5 studies), weight loss grade 2 or greater (n = 1 study), medication for gastrointestinal symptom control (n = 6 studies)</p>	<p>Findings specific to probiotic interventions: Low certainty of evidence that probiotics decrease acute radiation-induced diarrhea grade 2 or greater (RR = 0.43, 95% CI [0.22, 0.82]; participants = 923; studies = 5; I² = 91%).</p> <p>In 6 studies on medication for symptom control, low certainty of evidence that use of probiotics reduces use of other medications for gastrointestinal symptom control (RR = 0.53, 95% CI [0.32, 0.88]; participants = 507; I² = 57%).</p>	<p>Doses and strains of probiotics were varied across all studies. Most studies compared probiotics to placebo</p>	<p>Low quality and certainty of evidence on the effectiveness of probiotics on diarrhea reduction and/or reduction of medication for gastrointestinal symptom control for radiation-induced diarrhea. Probiotics may be beneficial to reducing acute radiation-induced diarrhea during or after treatment, but evidence is low quality and of low certainty. More research is needed to make a definitive recommendation.</p>

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<p>Wei, D., Heus, P., van de Wetering, F.T., van Tienhoven, G., Verleye, L., & Scholten, R.J. (2018). Probiotics for the prevention or treatment of chemotherapy- or radiotherapy-related diarrhoea in people with cancer. <i>Cochrane Database of Systematic Reviews</i>, 8(8), CD008831. https://doi.org/10.1002/14651858.CD008831.pub3</p>	<p>Design/Method Systematic Review and Meta-Analysis: Systematic review of RCTs. Database search of CENTRAL, MEDLINE®, Embase®, ClinicalTrials.gov, and International Clinical Trials Registry Platform for studies of probiotics with or without intervention comparison for the treatment of RT with or without chemotherapy-induced diarrhea. Dual screening and data extraction. Cochrane risk-of-bias tool used.</p> <p>Sample: 12 studies (N = 1,554 participants); 11 studies were prevention (7 with placebo comparison)</p> <p>Setting: Secondary care setting, RT with or without chemotherapy</p>	<p>IV: Probiotics versus placebo</p> <p>DVs: RT with or without chemotherapy-induced diarrhea (any diarrhea, grade 2 or higher diarrhea, grade 3 or higher diarrhea), required rescue medications for diarrhea</p>	<p>Primary: Proportion of participants with diarrhea in prevention studies, reduction in severity of diarrhea in treatment studies using CTCAE, quality of life validated scales</p> <p>Secondary: Severity of diarrhea in prevention studies, time to rescue medications for diarrhea, use of rescue medications, AEs, diarrhea-related mortality (grade 3 or 4 at time of death)</p>	<p>Proportion of participants with diarrhea (probiotics vs. placebo): RT alone (1 study, N = 482) (RR = 0.35, 95% CI [0.26, 0.47]). Chemotherapy and RT (N = 63; no significant differences) (RR = 1, 95% CI [0.94, 1.06]), Standard vs. high dose RT (N = 167; RR = 0.92, 95% CI [0.82-1.02] versus RR = 0.89, 95% CI [0.78-1.02]).</p> <p>Quality of life: no significant differences.</p> <p>Findings in 4 studies of probiotics (N = 420) examining Grade 2 or greater diarrhea with radiation therapy with or without chemotherapy were not statistically significant, (RR = 0.75, 95% CI [0.55, 1.03]).</p> <p>Findings in 3 studies of probiotics (N = 793) examining Grade 3 or greater diarrhea with radiation therapy with or without chemotherapy were not statistically significant, (RR = 0.11, 95% CI [0.11, 1.24] and noted high heterogeneity ($I^2 = 91\%$). Findings in 3 studies (N = 194) examining use of rescue medications for diarrhea in probiotic versus placebo groups were not statistically significant (RR = 0.50, 95% CI [0.15, 1.66]).</p>	<p>Heterogeneity between studies, high risk of bias mainly associated with nonblinded studies, detection bias, and insufficient information</p>	<p>Evidence was inconclusive on probiotics and prevention and treatment of RT- or chemotherapy-induced diarrhea. Evidence was low to very low certainty. No severe side effects were observed in the probiotics group. Evidence on the use of probiotics for prevention and treatment of RT- and/or chemotherapy-induced diarrhea was low or very low certainty with high risk of bias. More well-powered RCTs with uniform outcome measures are needed to draw conclusions on benefits. Nurses can use these results to discuss findings with patients and other healthcare professionals.</p>

Randomized Controlled Trial

Citation	Design/Method Sample/Setting	Variables and Intervention	Outcome Measures	Results/Analysis	Limitations	Quality of Evidence and Worth to Practice
<p>Linn, Y.H., Thu, K.K., & Win, N.H.H. (2019). Effect of probiotics for the prevention of acute radiation-induced diarrhoea among cervical cancer patients: A randomized double-blind placebo-controlled study. <i>Probiotics and Antimicrobial Proteins</i>, 11(2), 638–647. https://doi.org/10.1007/s12602-018-9408-9</p>	<p>Design/Method Systematic Review and Meta-Analysis: Randomized Double-Blind Placebo-Controlled Study</p> <p>Sample: N = 54 women with cervical cancer undergoing RT (standard dose 50 Gy) or combination chemotherapy and RT</p> <p>Setting: Single center outpatient radiation oncology</p>	<p>IV: Probiotic use</p> <p>DVs: Radiation-induced diarrhea, abdominal pain severity</p> <p>Intervention: Probiotic use 1 capsule Biogurt® containing 1.75 billion L. acidophilus LA-5 and B. Animalis lactis taken 3 times per day starting on the first day of RT through the last day of RT.</p>	<p>Incidence of diarrhea</p> <p>Diarrhea onset</p> <p>Severity of radiation-induced diarrhea assessed using CTCAE, version 4.0</p> <p>Abdominal pain severity assessed with the CTCAE, version 4.0</p>	<p>Incidence of diarrhea reduced in probiotic group ($p < 0.05$) absolute risk reduction 38.3%; mild to moderate and severe diarrhea reduced in probiotic group ($p < 0.05$); grade 1 abdominal pain differences were not statistically significant. Grade 2 abdominal pain was significantly less in placebo group ($p < 0.001$) and length of days with pain was less. No statistically significant differences in grade 3 or time to onset of diarrhea between groups. Loperamide use was significantly lower in probiotic group than placebo group ($p = 0.005$), with no difference in start of use. No difference in treatment interruption.</p>	<p>No quantifiable biomarker to diagnose and assess degree of radiation enteritis; small sample size (less than 100)</p>	<p>Methodology was sound. Results of the study were reliable despite small sample size. Study specific to type of cancer diagnosis and findings can be applied to population of interest. The study findings suggest continued studies in the use of probiotics in prevention and/or reduction of radiation-induced diarrhea are warranted. However, there is opportunity for continued nursing research and education about supplementation with probiotics to manage and/or reduce radiation-induced gastrointestinal symptoms such a diarrhea and abdominal pain experienced by patients undergoing RT or chemotherapy and RT for cervical cancer.</p>

Clinical Practice Guidelines

Guideline Citation	Purpose	Sample/Setting	Significant Recommendations	Limitations	Quality and Nursing Implications
<p>Bowen, J.M., Gibson, R.J., Collier, J.K., Blijlevens, N., Bossi, P., Al-Dasooqi, N., . . . Elad, S., (2019). Systematic review of agents for the management of cancer treatment-related gastrointestinal mucositis and clinical practice guidelines. <i>Supportive Care in Cancer</i>, 27(10), 4011–4022. https://doi.org/10.1007/s00520-019-04892-0</p>	<p>To systematically review the latest evidence to update the clinical practice guidelines relevant to prevention and treatment of gastrointestinal mucositis.</p>	<p>25 articles (18 RCTs) were reviewed of studies at various settings covering 13 agents/interventions for humans of all ages</p>	<p>Research is needed for all reviewed agents/interventions to provide further evidence of effectiveness to prevent and treat gastrointestinal mucositis. Expert panel suggests use of probiotics containing <i>Lactobacillus</i> for both RT and concurrent chemotherapy and RT related diarrhea in patients with pelvic malignancy. Hyperbaric oxygen for pelvic RT-related proctitis has been suggested but has conflicting evidence. More RCTs are required for this intervention.</p>	<p>The review did not include articles that reported on agents or interventions for targeted therapy-associated gastrointestinal mucositis</p>	<p>The current evidence does not support specific recommendations for radiation induced diarrhea except for probiotics. Nurses can advocate for patients with pelvic tumors receiving RT/chemotherapy and RT to receive probiotics with <i>Lactobacillus</i> spp. Nurses can participate and lead more research with the interprofessional team to refine dose and formulation for <i>Lactobacillus</i>/probiotics, to further investigate agents that show potential effectiveness, and examine more dietary formulations that can improve radiation-induced diarrhea.</p>

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<p>Bossi, P., Antonuzzo, A., Cherny, N.I., Rosengarten, O., Pernet, S., Trippa, F., . . . Ripamonti, C.I. (2018). Diarrhoea in adult cancer patients: ESMO Clinical Practice Guidelines. <i>Annals of Oncology</i>, 29(Suppl. 4), iv126–iv142. https://doi.org/10.1093/annonc/mdy145</p>	<p>To provide guidance related to the identification, assessment considerations, and treatment options for adult patients with cancer experiencing diarrhea</p>	<p>Adult patients receiving cancer therapy</p>	<p>Thorough assessment of symptoms and severity of symptoms combined with nutritional counseling and diagnostic testing is recommended for diarrhea related to chemotherapy, immunotherapy, and/or RT.</p> <p>Recommendations for prevention of acute radiation-induced diarrhea:</p> <ol style="list-style-type: none"> 1. Dietary and nutritional counseling 2. High-fiber diet 3. Oral supplements (e.g., colessevelam) 4. Probiotic (need for analysis of safety in administration to immunocompromised patients) <p>Treatment of acute RT-induced diarrhea:</p> <ol style="list-style-type: none"> 1. Loperamide 2. Caloric and fluid intake 3. Octreotide (refractory to loperamide) 4. Anticholinergic or antispasmodic agents for cramping 	<p>Most recommendations derived from lower-level evidence with limited clinical benefit with the exception of loperamide</p> <p>References include articles more than 20 years old.</p> <p>Lacking detail on search strategy to determine articles reviewed and included</p>	<p>The recommendations included within the guideline could be applied to the adult population, but not older adults or older adults with advanced disease. Determination of the effectiveness of the recommendations and current relevance would require additional information and statistical analysis of more current literature and studies.</p>