

Probiotic meta-analyses, literature search 2001- February 12, 2013

Title	Citation	Conclusion
Necrotizing enterocolitis, preterm infant		
Probiotic supplement reduces risk of necrotizing enterocolitis and mortality in preterm very low-birth-weight infants: an updated meta-analysis of 20 randomized, controlled trials.	Wang Q, Dong J, Zhu Y. J Pediatr Surg. 2012 Jan;47(1):241-8.	Probiotic supplement can reduce risk of NEC and mortality in preterm VLBW infants. However, the optimum type of probiotic supplement and the long-term effects need further study.
Effect of bifidobacterium animalis subsp lactis supplementation in preterm infants: A systematic review of randomized controlled trials	Szajewska H. Guandalini S. Morelli L. Van Goudoever J.B. Walker A. Journal of Pediatric Gastroenterology and Nutrition (2010) 51:2 (203-209). Date of Publication: August 2010	Evidence regarding the potential beneficial effects of B. lactis supplementation in preterm infants is encouraging. Further studies to assess clinically relevant outcomes are needed.
Updated meta-analysis of probiotics for preventing necrotizing enterocolitis in preterm neonates	Pediatrics, 2010, vol. 125, no. 5, p. 921-30 Deshpande et al.	Results confirm the significant benefits of probiotic supplements in reducing death and disease in preterm neonates. The dramatic effect sizes, tight confidence intervals, extremely low P values, and overall evidence indicate that additional placebo-controlled trials are unnecessary if a suitable probiotic product is available.
Probiotics reduce the risk of necrotizing enterocolitis in preterm infants: a meta-analysis	Neonatology, 2010, vol. 97, no. 2, p. 93-9 Alfaleh	Enteral supplementation of probiotics reduces the risk of severe NEC and mortality in preterm infants. A large randomized controlled trial is required to investigate the benefit and safety profile of probiotics supplementation in ELBW infants
Probiotics for prevention of necrotizing enterocolitis in preterm infants	Cochrane database of systematic reviews (Online), 2008, no. 1, p. CD005496 Alfaleh	Enteral supplementation of probiotics reduced the risk of severe NEC and mortality in preterm infants. This analysis supports a change in practice in premature infants > 1000 g at birth. Data regarding outcome of ELBW infants could not be extracted from the available studies; therefore, a reliable estimate of the safety and efficacy of administration of probiotic supplements cannot be made in this high risk group. A large randomized controlled trial is required to investigate the potential benefits and safety profile of probiotics supplementation in ELBW infants.
Prebiotic supplementation of formula in preterm neonates: a systematic review	Clinical nutrition (Edinburgh Scotland), 2009, vol. 28, no. 3, p.	Prebiotic supplemented formula increased stool colony counts of bifidobacteria and lactobacilli in preterm neonates without

and meta-analysis of randomised controlled trials	237-42 Srinivasjois	adversely affecting weight gain.
Probiotics for necrotizing enterocolitis: A systematic review	Barclay A.R. Stenson B. Simpson J.H. Weaver L.T. Wilson D.C. Journal of Pediatric Gastroenterology and Nutrition (2007) 45:5 (569-576). Date of Publication: November 2007	The data appear to lend support to the use of oral probiotics for the prevention of NEC in preterm infants and those with VLBW. However, the data are insufficient to comment on their short- and long-term safety. Type of probiotics used, as well as the timing and dosage, are still to be optimized.
Infant growth		
The effect of Bifidobacterium lactis on the growth of infants: a pooled analysis of randomized controlled studies	Annals of nutrition & metabolism, 2009, vol. 55, no. 4, p. 334-40 Steenhout	The analysis suggests that B. lactis may have a positive effect on growth in vulnerable populations, specifically in infants born to mothers with HIV (measures: BMI, length, Z-scores)
Acute diarrhea, persistent diarrhea		
A meta-analysis and systematic review on the effect of probiotics in acute diarrhea.	Salari P, Nikfar S, Abdollahi M. Inflamm Allergy Drug Targets. 2012 Feb;11(1):3-14.	Probiotics may reduce duration of diarrhea and fever in children but their exact efficacy in treatment of diarrhea is not obvious yet.
Meta-analysis: the effects of Lactobacillus rhamnosus GG supplementation for the prevention of healthcare-associated diarrhoea in children.	Szajewska H, Wanke M, Patro B. Aliment Pharmacol Ther. 2011 Nov;34(9):1079-87.	In hospitalised children, the administration of Lactobacillus rhamnosus GG compared with placebo has the potential to reduce the overall incidence of healthcare-associated diarrhoea, including rotavirus gastroenteritis.
Saccharomyces boulardii for treating acute gastroenteritis in children: updated meta-analysis of randomized controlled trials.	Aliment Pharmacol Ther. 2009 Nov 1;30(9):960-1. Szajewska H, Skórka A.	In otherwise healthy infants and children, the use of S. boulardii is associated with clinical benefits in the treatment of acute gastroenteritis (AGE), specifically a reduction in the duration of diarrhoea by approximately 1 day. The available evidence supports recent recommendations from two European societies that selected probiotics with proven clinical efficacy, such as S. boulardii or Lactobacillus GG that are administered in appropriate dosages, according to the strain and the patient population, may be used as an adjunct to rehydration therapy for the management of AGE in children
Meta-analysis: Lactobacillus GG for treating acute diarrhoea in children	Szajewska H. Skorka A. Rusczyński M. Gieruszczak-BiaŁek D. Alimentary Pharmacology and Therapeutics (2007) 25:8 (871-881).	The use of LGG is associated with moderate clinical benefits in the treatment of acute diarrhoea in children. These findings should be interpreted with caution due to the important methodological limitations and heterogeneity of most of the studies.
Meta-analysis: Saccharomyces boulardii for treating acute diarrhoea in children	Szajewska H. Skorka A. Dylag M. Alimentary Pharmacology and	There exists a moderate clinical benefit of S. boulardii therapy in otherwise healthy infants and children with acute gastroenteritis,

	Therapeutics (2007) 25:3 (257-264).	mainly a shorter duration of diarrhoea. However, these results should be interpreted with caution due to methodological limitations of the included studies.
Lactobacillus GG for treating acute diarrhea in children: Updated meta-analysis of randomized controlled trials	Pediatrica Polska, { 2008, vol. 83, no. 4, p. 330–336 Szajewska	The use of LGG is associated with clinical benefits in the treatment of acute diarrhea in children.
Lactobacillus reuteri strain ATCC 55730 for the treatment of acute infectious diarrhoea in children: A meta-analysis of randomized controlled trials	Pediatrica Wspolczesna, 2008, vol. 10, no. 1, p. 32–36 Chmielewska	There exists a moderate clinical effect of Lactobacillus reuteri ATCC 55730 in treating acute infectious diarrhoea in otherwise healthy children. The results should be interpreted with caution due to limited number of studies included into analysis and their methodological limitation
Probiotics for treating persistent diarrhoea in children	Cochrane Database of Systematic Reviews, 2008, no. 4, article number: CD007401 Aponte	There is limited evidence suggesting probiotics may be effective in treating persistent diarrhoea in children. This review found four trials involving children with persistent diarrhoea. Two studies with a combined total of 324, showed that probiotics shorten the duration of diarrhoea and reduce the stool frequency on day 5. One study (235 children) suggested that probiotics reduce the hospital stay. Three out of four trials reported that no adverse events occurred. However, this review is limited by few trials with small number of participants, and therefore may not represent a reliable estimate of probiotics' effect.
Efficacy of probiotic use in acute diarrhea in children: A meta-analysis	Huang J.S. Bousvaros A. Lee J.W. Diaz A. Davidson E.J. Digestive Diseases and Sciences (2002) 47:11 (2625-2634).	Bacterial probiotic therapy shortens the duration of acute diarrheal illness in children by approximately one day.
Probiotics for treating persistent diarrhoea in children.	Bernaola Aponte G, Bada Mancilla CA, Carreazo Pariasca NY, Rojas Galarza RA. Cochrane Database Syst Rev. 2010 Nov 10;(11):CD007401. Review.	There is limited evidence suggesting probiotics may be effective in treating persistent diarrhoea in children.
Probiotics for treating acute infectious diarrhoea.	Allen SJ, Martinez EG, Gregorio GV, Dans LF. Cochrane Database Syst Rev. 2010 Nov 10;(11):CD003048. Review.	Used alongside rehydration therapy, probiotics appear to be safe and have clear beneficial effects in shortening the duration and reducing stool frequency in acute infectious diarrhoea. However, more research is needed to guide the use of particular probiotic

		regimens in specific patient groups.
Radiation-induced diarrhea		
Effects of probiotics for the prevention and treatment of radiation-induced diarrhea	Journal of Clinical Gastroenterology, 2009, vol. 43, no. 6, p. 506–13 Fuccio	Probiotic supplementation showed beneficial effect in the prevention and treatment of radiation-induced diarrhea in experimental animal studies. Encouraging results have been observed in humans; however, the few available clinical studies do not allow firm conclusions.
Antibiotic-associated diarrhea		
Meta-analysis: probiotics in antibiotic-associated diarrhoea.	Vidlock EJ, Cremonini F. Aliment Pharmacol Ther. 2012 Jun;35(12):1355-69.	This updated meta-analysis confirms earlier results supporting the preventive effects of probiotics in AAD.
Probiotics for the prevention and treatment of antibiotic-associated diarrhea: a systematic review and meta-analysis.	Hempel S, Newberry SJ, Maher AR, Wang Z, Miles JN, Shanman R, Johnsen B, Shekelle PG. JAMA. 2012 May 9;307(18):1959-69.	The pooled evidence suggests that probiotics are associated with a reduction in AAD. More research is needed to determine which probiotics are associated with the greatest efficacy and for which patients receiving which specific antibiotics.
Probiotics for the prevention of pediatric antibiotic-associated diarrhea.	Johnston BC, Goldenberg JZ, Vandvik PO, Sun X, Guyatt GH. Cochrane Database Syst Rev. 2011 Nov 9;(11):CD004827.	Despite heterogeneity in probiotic strain, dose, and duration, as well as in study quality, the overall evidence suggests a protective effect of probiotics in preventing AAD.
Systematic review and meta-analysis of <i>Saccharomyces boulardii</i> in adult patients	World Journal of Gastroenterology, 2010, vol. 16, no. 18, p. 2202–22 McFarland	A meta-analysis found a significant therapeutic efficacy for <i>S. boulardii</i> in the prevention of antibiotic-associated diarrhea
Role of <i>Lactobacillus</i> in the prevention of antibiotic-associated diarrhea: a meta-analysis	Pharmacotherapy, 2010, vol. 30, no. 2, p. 119–26 Kale	Administration of a <i>Lactobacillus</i> single-agent regimen as a prophylactic agent during antibiotic treatment reduced the risk of developing AAD compared with placebo in adults but not pediatric patients
Probiotics for the treatment of antibiotic-associated diarrhea. Updated meta-analysis of randomized controlled trials	Pediatrica Wspolczesna, 2008, vol. 10, no. 2, p. 96–104 Ruszczynski	Selected probiotics effectively reduce the risk of AAD in children
Probiotics for prevention of antibiotic-associated diarrhea and <i>Clostridium difficile</i> -associated disease in hospitalized adults-A meta-analysis	Avadhani A, Miley H. Journal of the American Academy of Nurse Practitioners (2011) 23:6 (269-274).	Meta-analysis showed that administration of probiotics led to a statistically significant relative risk reduction of 44% for AAD and 71% for CDAD.

Probiotics in the prevention of antibiotic-associated diarrhea in children: A meta-analysis of randomized controlled trials	Szajewska H. Ruzczynski M. Radzikowski A. Journal of Pediatrics (2006) 149:3 (367-372.e1).	Probiotics reduce the risk of AAD in children. For every 7 patients that would develop diarrhea while being treated with antibiotics, one fewer will develop AAD if also receiving probiotics.
Meta-analysis of probiotics for the prevention of antibiotic associated diarrhea and the treatment of Clostridium difficile disease	McFarland L.V. American Journal of Gastroenterology (2006) 101:4 (812-822).	A variety of different types of probiotics show promise as effective therapies for these two diseases. Using meta-analyses, three types of probiotics (Saccharomyces boulardii, Lactobacillus rhamnosus GG, and probiotic mixtures) significantly reduced the development of antibiotic-associated diarrhea. Only S. boulardii was effective for CDD.
Meta-analysis: The effect of probiotic administration on antibiotic-associated diarrhoea	Cremonini F. Di Caro S. Nista E.C. Bartolozzi F. Capelli G. Gasbarrini G. Gasbarrini A. Alimentary Pharmacology and Therapeutics (2002) 16:8 (1461-1467).	The results suggest a strong benefit of probiotic administration on antibiotic-associated diarrhoea, but further data are needed. The evidence for beneficial effects is still not definitive. Published studies are flawed by the lack of a placebo design and by peculiar population features.
Probiotics in prevention of antibiotic associated diarrhoea: Meta-analysis	D'Souza A.L. Rajkumar C. Cooke J. Bulpitt C.J. British Medical Journal (2002) 324:7350 (1361-1364)	The meta-analysis suggests that probiotics can be used to prevent antibiotic associated diarrhoea and that S boulardii and lactobacilli have the potential to be used in this situation. The efficacy of probiotics in treating antibiotic associated diarrhoea remains to be proved. A further large trial in which probiotics are used as preventive agents should look at the costs of and need for routine use of these agents.
Traveler's diarrhea		
Meta-analysis of probiotics for the prevention of traveler's diarrhea	McFarland L.V. Travel Medicine and Infectious Disease (2007) 5:2 SPEC. ISS. (97-105). Date of Publication: March 2007	Several probiotics (Saccharomyces boulardii and a mixture of Lactobacillus acidophilus and Bifidobacterium bifidum) had significant efficacy. No serious adverse reactions were reported in the 12 trials. Probiotics may offer a safe and effective method to prevent TD.
Crohn's, ulcerative colitis, pouchitis		
Probiotics for maintenance of remission in ulcerative colitis.	Naidoo K, Gordon M, Fagbemi AO, Thomas AG, Akobeng AK. Cochrane Database Syst Rev. 2011 Dec 7;(12):CD007443.	Given the relatively small number of patients in the pooled analysis, the small number of events and the high risk and unclear risk of bias in the included studies, there is insufficient evidence to make conclusions about the efficacy of probiotics for maintenance of remission in UC.

Remission induction and maintenance effect of probiotics on ulcerative colitis: a meta-analysis.	Sang LX, Chang B, Zhang WL, Wu XM, Li XH, Jiang M. World J Gastroenterol. 2010 Apr 21;16(15):1908-15.	Probiotic treatment was more effective than placebo in maintaining remission in ulcerative colitis.
Meta-analysis: Targeting the intestinal microbiota in prophylaxis for post-operative Crohn's disease	Alimentary Pharmacology and Therapeutics, 2010, vol. 31, no. 8, p. 802-809 Doherty	Probiotics have failed to show efficacy for post-operative prophylaxis, but may merit further study
A meta-analysis of the benefit of probiotics in maintaining remission of human ulcerative colitis: Evidence for prevention of disease relapse and maintenance of remission	Archives of Medical Science, 2008, vol. 4, no. 2, p. 185-190 Rahimi	Probiotics are effective in maintaining remission of ulcerative colitis and their effect in preventing relapse is comparable with mesalazine
A meta-analysis on the efficacy of probiotics for maintenance of remission and prevention of clinical and endoscopic relapse in Crohn's disease	Digestive diseases and sciences, 2008, vol. 53, no. 9, p. 2524-31 Rahimi	This meta-analysis fails to demonstrate the efficacy of probiotics in maintaining remission and preventing clinical and endoscopic recurrence in CD.
On the benefit of probiotics in the management of pouchitis in patients underwent ileal pouch anal anastomosis: a meta-analysis of controlled clinical trials	Digestive diseases and sciences, 2008, vol. 53, no. 5, p. 1278-84 Elahi	The benefit of probiotics in the management of pouchitis after IPAA operation was confirmed by the meta-analysis
Meta-analysis: The effect and adverse events of Lactobacilli versus placebo in maintenance therapy for Crohn disease	Internal Medicine Journal, 2009, vol. 39, no. 2, p. 103-109 Shen	Our meta-analysis suggests that compared with placebo, administration of L. rhamnosus strain GG as maintenance therapy may increase the relapse rates of Crohn disease
Remission induction and maintenance effect of probiotics on ulcerative colitis: a meta-analysis	World Journal of Gastroenterology, 2010, vol. 16, no. 15, p. 1908-15 Sang	Probiotic treatment was more effective than placebo in maintaining remission in ulcerative colitis.
Probiotics for maintenance of remission in Crohn's disease.	Cochrane Database Syst Rev. 2006 Oct 18;(4):CD004826. Rolfe VE, Fortun PJ, Hawkey CJ, Bath-Hextall F.	There is no evidence to support the use of probiotics for the maintenance treatment of Crohn's disease. It is possible that larger studies might show that this approach to treatment is effective.
Irritable bowel syndrome		
Meta-analysis of probiotics for the treatment of irritable bowel syndrome	World Journal of Gastroenterology, 2008, vol. 14, no. 17, p. 2650-61 McFarland	Probiotic use was associated with improvement in global IBS symptoms compared to placebo. Probiotics were also associated with less abdominal pain compared to placebo. These results

		should be interpreted with caution, given the methodological limitations of contributing studies.
The efficacy of probiotics in the treatment of irritable bowel syndrome: a systematic review	Gut, 2010 vol. 59, no. 3, p. 325–32 Moayyedi	Probiotics appear to be efficacious in IBS, but the magnitude of benefit and the most effective species and strain are uncertain. Number needed to treat (NNT)=4.
Efficacy of probiotics in irritable bowel syndrome: a meta-analysis of randomized, controlled trials	Diseases of the Colon and Rectum, 2008, vol. 51, no. 12, p. 1775–80 Nikfar	Probiotics may improve symptoms of irritable bowel syndrome and can be used as supplement to standard therapy
A systematic review and meta-analysis: probiotics in the treatment of irritable bowel syndrome	BMC gastroenterology, 2009, vol. 9, p. 15 Hoveyda	Probiotics may have a role in alleviating some of the symptoms of IBS, a condition for which currently evidence of efficacy of drug therapies is weak. However, as IBS is a condition that is chronic and usually intermittent longer term trials are recommended. Such research should focus on the type, optimal dose of probiotics and the subgroups of patients who are likely to benefit the most.
The utility of probiotics in the treatment of irritable bowel syndrome: A systematic review	American Journal of Gastroenterology, 2009, vol. 104, no. 4, p. 1033–1049 Brenner	<i>B. infantis</i> 35624 has shown efficacy for improvement of IBS symptoms. Most RCTs about the utility of probiotics in IBS have not used an appropriate study design and do not adequately report adverse events. Therefore, there is inadequate data to comment on the efficacy of other probiotics.
<i>H. pylori</i>		
Meta-analysis: the effects of <i>Saccharomyces boulardii</i> supplementation on <i>Helicobacter pylori</i> eradication rates and side effects during treatment.	Aliment Pharmacol Ther. 2010 Nov;32(9):1069-79 Szajewska H, Horvath A, Piwowarczyk A.	Compared with placebo or no intervention, <i>S. boulardii</i> given along with triple therapy significantly increased the eradication rate and reduced the risk of overall <i>H. pylori</i> therapy-related adverse effects, particularly of diarrhea.
Meta-analysis: Lactobacillus containing quadruple therapy versus standard triple first-line therapy for <i>Helicobacter pylori</i> eradication	<i>Helicobacter</i> , Oct 2009, vol. 14, no. 5, p. 97–107. Zou	Supplementation with Lactobacilli could be effective in increasing eradication rates of anti- <i>H. pylori</i> therapy for first-treated patients. Furthermore, Lactobacilli showed a positive impact on some <i>H. pylori</i> therapy-related side effects.
Effect of fermented milk-based probiotic preparations on <i>Helicobacter pylori</i> eradication: a systematic review and meta-analysis of randomized-controlled	European journal of gastroenterology & hepatology, 2009, vol. 21, no. 1, p. 45–53 Sachdeva	Fermented milk-based probiotic preparations improve <i>H. pylori</i> eradication rates by approximately 5–15%, whereas the effect on adverse effects is heterogeneous.

trials		
Meta-analysis: The effect of supplementation with probiotics on eradication rates and adverse events during Helicobacter pylori eradication therapy	Tong J.L. Ran Z.H. Shen J. Zhang C.X. Xiao S.D. Alimentary Pharmacology and Therapeutics (2007) 25:2 (155-168).	Our review suggests that supplementation with probiotics could be effective in increasing eradication rates of anti-H. pylori therapy, and could be considered helpful for patients with eradication failure. Furthermore, probiotics show a positive impact on H. pylori therapy-related side effects.
Functional bowel, digestive symptoms		
Systematic review of randomised controlled trials: Probiotics for functional constipation	World Journal of Gastroenterology, 2010, vol. 16, no. 1, p. 69–75 Chmielewska	The use of probiotics for the treatment of constipation condition should be considered investigational
Meta-analysis: Lactobacillus rhamnosus GG for abdominal pain-related functional gastrointestinal disorders in childhood	Horvath A. Dziechciarz P. Szajewska H. Alimentary Pharmacology and Therapeutics (2011) 33:12 (1302-1310).	The use of Lactobacillus rhamnosus GG moderately increases treatment success in children with abdominal pain-related functional gastrointestinal disorders, particularly among children with IBS.
Allergy		
Probiotics supplementation during pregnancy or infancy for the prevention of atopic dermatitis: a meta-analysis.	Pelucchi C, Chatenoud L, Turati F, Galeone C, Moja L, Bach JF, La Vecchia C. Epidemiology. 2012 May;23(3):402-14.	This meta-analysis provided evidence in support of a moderate role of probiotics in the prevention of atopic dermatitis and IgE-associated atopic dermatitis in infants. The favorable effect was similar regardless of the time of probiotic use (pregnancy or early life) or the subject(s) receiving probiotics (mother, child, or both).
Impact of maternal supplementation with probiotics during pregnancy on atopic eczema in childhood—a meta-analysis.	Doege K, Grajecki D, Zyriax BC, Detinkina E, Zu Eulenburg C, Buhling KJ. Br J Nutr. 2012 Jan;107(1):1-6.	In conclusion, the meta-analysis shows that the administration of lactobacilli during pregnancy prevents atopic eczema in children aged from 2 to 7 years. However, a mixture of various bacterial strains does not affect the development of atopic eczema, independent of whether they contain lactobacilli or not.
Probiotics for the treatment of eczema: A systematic review	Clinical and Experimental Allergy, 2009, vol. 39, no. 8, p. 1117–1127 Boyle	Probiotics cannot be recommended for treating eczema. The heterogeneity between studies may be attributable to probiotic strain-specific effects, which means that novel probiotic strains may still have a role in eczema management
Efficacy of probiotics in the treatment of pediatric atopic dermatitis: a meta-analysis of randomized controlled trials	Annals of allergy asthma & immunology : official publication of the American College of Allergy Asthma & Immunology, 2008, vol. 101, no. 5, p. 508–16	A modest role for probiotics in treatment of pediatric atopic dermatitis. The effect is seen in moderately severe rather than mild disease. There was an overall favoring of probiotics compared with placebo in reducing the SCORAD Severity Index score. Children with moderately severe disease were more likely

	Michail	to benefit.
Probiotics for treating eczema	Cochrane database of systematic reviews (Online), 2008, no. 4, p. CD006135 Boyle	The evidence suggests that probiotics are not an effective treatment for eczema, and probiotic treatment carries a small risk of adverse events.
Meta-analysis of clinical trials of probiotics for prevention and treatment of pediatric atopic dermatitis	The Journal of allergy and clinical immunology, 2008, vol. 121, no. 1, p. 116-121.e11 Lee	Current evidence is more convincing for probiotics' efficacy in prevention than treatment of pediatric atopic dermatitis.
Probiotics in infants for prevention of allergic disease and food hypersensitivity.	Osborn DA, Sinn JK. Cochrane Database Syst Rev. 2007 Oct 17;(4):CD006475.	There is insufficient evidence to recommend the addition of probiotics to infant feeds for prevention of allergic disease or food hypersensitivity. Although there was a reduction in clinical eczema in infants, this effect was not consistent between studies and caution is advised in view of methodological concerns regarding included studies. Further studies are required to determine whether the findings are reproducible.
Critical care, hospital infections		
Methods of preventing bacterial sepsis and wound complications for liver transplantation.	Cochrane database of systematic reviews (Online), 2008, no. 4, p. CD006660 Gurusamy	Currently, there is no clear evidence for any intervention offering significant benefits in the reduction of bacterial infections and wound complications in liver transplantation. Selective bowel decontamination increases the risk of infection and hospital stay compared to prebiotics and probiotics.
Use of pre-, pro- and synbiotics in patients with acute pancreatitis: A meta-analysis	World Journal of Gastroenterology, 2010, vol. 16, no. 31, p. 3970-3978 Zhang	Pre-, pro- or synbiotics treatment shows no significant influence on patients with acute pancreatitis. Main outcome measures were postoperative infections, pancreatic infections, multiple organ failure (MOF), systemic inflammatory response syndrome (SIRS), length of hospital stay, antibiotic therapy and mortality.
Invited review: Probiotics, critical illness, and methodologic bias	Nutrition in Clinical Practice, 2009, vol. 24, no. 1, p. 45-49 Koretz	It is not clear that probiotics are beneficial (and they may even be harmful) in the critically ill patient group
Impact of the administration of probiotics on the incidence of ventilator-associated pneumonia: a meta-analysis of randomized controlled trials	Critical care medicine, 2010, vol. 38, no. 3, p. 954-62 Siempos	Administration of probiotics is associated with lower incidence of ventilator-associated pneumonia than control.
Does the use of probiotics/synbiotics	European journal of clinical	The use of probiotics/synbiotics may reduce postoperative

prevent postoperative infections in patients undergoing abdominal surgery? A meta-analysis of randomized controlled trials	pharmacology, 2009, vol. 65, no. 6, p. 561–70 Pitsouni	infections after abdominal surgery. This is a promising infection-preventive measure that may decrease morbidity, length of antibiotic therapy, duration of hospital stay, and pressure for emergence of antimicrobial resistance. The results of this meta-analysis should be interpreted with caution due to the significant heterogeneity of the studies included.
Probiotics for non-alcoholic fatty liver disease and/or steatohepatitis	Cochrane Database of Systematic Reviews, { 2007, no. 1, article number: CD005165 Lirussi	The lack of randomised clinical trials makes it impossible to support or refute probiotics for patients with non-alcoholic fatty liver disease and non-alcoholic steatohepatitis.
Probiotics in patients with severe acute pancreatitis: a meta-analysis	Langenbeck's archives of surgery / Deutsche Gesellschaft für Chirurgie, 2009, vol. 394, no. 1, p. 171–7 Sun	The present study showed the enteral feeding with probiotic could not reduce the infected necrosis and mortality associated with pancreatitis
Probiotics for treating eczema.	Boyle RJ, Bath-Hextall FJ, Leonardi-Bee J, Murrell DF, Tang ML. Cochrane Database Syst Rev. 2008 Oct 8;(4):CD006135.	The evidence suggests that probiotics are not an effective treatment for eczema, and probiotic treatment carries a small risk of adverse events.
Safety		
Safety of probiotics in patients receiving nutritional support: a systematic review of case reports, randomized controlled trials, and nonrandomized trials.	Am J Clin Nutr. 2010 Mar;91(3):687-703. Whelan K, Myers CE.	There were 20 case reports of adverse events in 32 patients, all of which were infections due to <i>Lactobacillus rhamnosus</i> GG or <i>Saccharomyces boulardii</i> ; the risk factors included central venous catheters and disorders associated with increased bacterial translocation. There were 52 articles reporting 53 trials in which 4131 patients received probiotics. Most trials showed either no effect or a positive effect on outcomes related to safety (eg, mortality and infections). Only 3 trials showed increased complications, which were largely noninfectious in nature and in specific patient groups (eg, transplant and pancreatitis). In 2 of these trials, the probiotic was administered through a postpyloric tube.
Probiotic safety in pregnancy: a systematic review and meta-analysis of randomized controlled trials of <i>Lactobacillus</i> , <i>Bifidobacterium</i> , and <i>Saccharomyces</i> spp	Journal of Obstetrics and Gynaecology Canada, 2009, vol. 31, no. 6, p. 542–52 Dugoua	<i>Lactobacillus</i> and <i>Bifidobacterium</i> had no effect on the incidence of Caesarean section, birth weight, or gestational age. The safety of <i>Saccharomyces</i> during pregnancy is unknown.

Bacterial vaginosis		
Probiotics for the treatment of bacterial vaginosis.	Cochrane Database Syst Rev. 2009 Oct 7;(4):CD006289 Senok AC, Verstraelen H, Temmerman M, Botta GA.	The results do not provide sufficient evidence for or against recommending probiotics for the treatment of BV. The metronidazole/probiotic regimen and probiotic/estriol preparation appear promising but well-designed randomized controlled trials with standardized methodologies and larger patient size are needed.
Preterm labor		
Probiotics for preventing preterm labour.	Othman M, Neilson JP, Alfirevic Z. Cochrane Database Syst Rev. 2007 Jan 24;(1):CD005941.	Although the use of probiotics appears to treat vaginal infections in pregnancy, there are currently insufficient data from trials to assess impact on preterm birth and its complications.
Minimal hepatic encephalopathy		
Probiotics for patients with hepatic encephalopathy.	McGee RG, Bakens A, Wiley K, Riordan SM, Webster AC. Cochrane Database Syst Rev. 2011 Nov 9;(11):CD008716.	The trials we located suffered from a high risk of systematic errors ('bias') and high risk of random errors ('play of chance'). While probiotics appear to reduce plasma ammonia concentration when compared with placebo or no intervention, we are unable to conclude that probiotics are efficacious in altering clinically relevant outcomes. Demonstration of unequivocal efficacy is needed before probiotics can be endorsed as effective therapy for hepatic encephalopathy.
Meta-analysis: the effects of gut flora modulation using prebiotics, probiotics and synbiotics on minimal hepatic encephalopathy.	Aliment Pharmacol Ther. 2011 Mar;33(6):662-71. Shukla S, Shukla A, Mehboob S, Guha S.	The use of prebiotics, probiotics and synbiotics was associated with significant improvement in minimal hepatic encephalopathy. Among individual agents, lactulose appears to have the most beneficial effect, followed closely by probiotics and synbiotics.
Acute respiratory infections		
Probiotics for preventing acute upper respiratory tract infections.	Hao Q, Lu Z, Dong BR, Huang CQ, Wu T. Cochrane Database Syst Rev. 2011 Sep 7;9:CD006895. Review. PMID: 21901706	Probiotics were better than placebo in reducing the number of participants experiencing episodes of acute URTIs, the rate ratio of episodes of acute URTI and reducing antibiotic use. This indicates that probiotics may be more beneficial than placebo for preventing acute URTIs. However, the results have some limitations and there were no data for older people.
Weight gain		
Comparative meta-analysis of the effect of Lactobacillus species on weight gain in humans and animals.	Million M, Angelakis E, Paul M, Armougom F, Leibovici L, Raoult D. Microb Pathog. 2012 Aug;53(2):100-	Different Lactobacillus species are associated different effects on weight change that are host-specific. Further studies are needed to clarify the role of Lactobacillus species in the human energy

	8.	harvest and weight regulation.
Blood lipids		
<u>Influence of consumption of probiotics on the plasma lipid profile: a meta-analysis of randomised controlled trials.</u>	Guo Z, Liu XM, Zhang QX, Shen Z, Tian FW, Zhang H, Sun ZH, Zhang HP, Chen W. Nutr Metab Cardiovasc Dis. 2011 Nov;21(11):844-50.	These results indicate that a diet rich in probiotics decreases total cholesterol and LDL cholesterol concentration in plasma for participants with high, borderline high and normal cholesterol levels.