

The power of probiotics



Latest research and thinking into the power of probiotics

Self-care and disease prevention are playing an increasingly important role in the delivery of healthcare in the United Kingdom. These are themes that run through many government initiatives and strategy documents including The NHS Improvement Plan (DOH, 2004), Creating a Patient-Led NHS (DOH, 2005) and Our Health, Our Care, Our Say: A New Direction for Community Services (DOH, 2006), to name a few. Even with the consistent prevention push, the concept of patient self-care is relatively new to many health and social care managers in the UK. One area of recent interest within this scope is the use of functional foods, such as probiotic drinks, to help improve and maintain good health. As individuals take an increasingly proactive approach to their own health, nurses have a unique role to play in providing dietary and lifestyle advice to help maintain patient wellbeing. With the potential benefit of probiotics clearly demonstrated through a

growing body of evidence, the question is 'should healthcare professionals, such as nurses, be recommending probiotics to patients to maintain general health and provide support for their natural defences?' The aim of this report is to examine the latest data and expert thinking that currently exists on probiotics as well as examine which patient groups can benefit from taking them.

Did you know? Seventy per cent of the immune system exists within the gut.

The role of natural defences

The body's natural defence system protects the body from the outside world, including the invasion of microorganisms such as viruses and bacteria. This defence system is often influenced by a person's lifestyle and there are many things that can be done to strengthen it such as maintaining a balanced diet, ensuring sufficient rest and

regular physical activity. Regardless, people face several physiopathological and environmental conditions that may impair their defence system. These include stress,^{1,2} both psychological and physiological, poor diet,^{3,4,5} and exposure to pathogens or cold weather.^{6,7} In addition, some groups of people are more likely to have weakened defences such as children, people with chronic diseases, drug or alcohol addiction, older people⁸ or people taking antibiotics.^{9,10} In order to maintain health and wellbeing, the human body has evolved a complex natural defence system to protect itself from such challenges.

There are two types of immune response:

Innate

- Natural immunity you are born with
- Within minutes of an invasion
- Pathogens recognised and engulfed by immune system cells (phagocytosis)

Adaptive

- If pathogen escapes the

In light of the growing bank of data supporting the health benefits of probiotics, a multidisciplinary group of health experts recently met in a patient-centred roundtable discussion, held at the Royal Society of Medicine, to discuss how or if probiotic drinks should fit into preventative healthcare. Proceedings from the meeting, sponsored by Danone are highlighted in this report.

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Factors that can challenge the body's defences

- Viruses & bacteria
- Age (young children or older persons)
- Cold weather
- Intense exercise
- Stress
- Poor diet
- Lack of sleep
- Too much alcohol
- Poor hygiene
- Antibiotics

innate response (several days later)

- Immune system produces antibodies to target specific molecules on the pathogen's surface (antigens)
- The antibodies then inactivate the pathogen and mark it for destruction by immune system cells

Just how serious is *C. difficile*?

On 11 October 2007, a watchdog report released by the Health Commission revealed that the superbug *C. difficile* was responsible for 90 deaths at Kent's Maidstone and Tunbridge Wells NHS Trust. The report also stated it was definitely a contributing factor in the deaths of a further 124 and a probable factor in another 55 patients.¹⁴

The report recommended carefully considered protocols for antibiotic prescribing as they can destroy many of the normal bacteria that live in the intestine, making it easier for *C. difficile* to thrive. The report's lead author, Heather Wood, commented: "I think it's certainly a call to arms for the National Health Service. I would think the lessons, not just about cleanliness, hygiene and infection control,

- Immune memory makes the response to the same pathogen in the future more efficient

There are many factors indicative of a weakened defence system:

- Fatigue
- Lethargy
- Repeated infections
- Slow wound healing
- Allergies
- Thrush
- Colds and flu

There are simple steps your patients can take to help reinforce & support their body's defences:

Lifestyle

- Exercise (30min x 5 days/week)
- Sleep (6-8 hours per night)

Did you know?

The surface area of the mucosa is over 300m², roughly the size of a tennis court.

Diet and Nutrition

- Balanced and varied diet
- Five pieces of fruit and vegetable per day
- Fresh, whole foods, fibre
- Less saturated fat, processed foods
- Recommended Daily Amount (RDA) of essential vitamins and minerals (a supplement can help)

Hydration

- Drink plenty of fluids

What are probiotics?

The term probiotic, which means 'for life' in Greek, is often applied to food supplements containing live bacteria that provide a health benefit. According to an expert committee of the Food and Agriculture Organization (FAO) of the United Nations and the World Health Organization (WHO), probiotics are "live organisms

CASE STUDY 1:

Mrs Caroline Smith, 55

Observations:

Overweight mother of three

Presentation:

Expected hospital stay

Diagnosis and treatment:

Prescribed course of antibiotics for after operation

Considerations:

Concerned about superbugs and wants to know what she can do to limit risk

Supporting data presented:

- More than 20 clinical studies have looked at probiotics effects on antibiotic-associated diarrhoea
- Probiotics, especially *Lactobacillus GG*, *Saccharomyces boulardii*, prevent antibiotic-associated diarrhoea¹ (RR= 0.43, 95% CI 0.31, 0.58, $p < 0.001$)
- Only *S. boulardii*¹ and more recently *L. casei* DN-114 0012 were effective against *C. difficile*
- For the over 50s, taking a probiotic drinking yogurt containing *L. casei* DN-114 001 twice a day while on antibiotics in hospital significantly reduces the incidence of diarrhoea by 22% and *C. difficile*-associated diarrhoea by 17%²

1. McFarland LV1. *Am J Gastro* 2006;101:812-22.

2. Hickson M et al. *BMJ* published online 29 Jun 2007.

Panel advice

Patients like Mrs Caroline Smith should take probiotics during and after their hospital stay to reduce the risk of acquiring antibiotic-associated diarrhoea or, if acquired, its severity and duration. This may be particularly useful for reducing the incidence, severity and duration of *C. difficile*-associated diarrhoea in the hospital setting.

which, when administered in adequate quantities, confer a health benefit to the host".¹¹

The growing probiotic evidence base

Probiotics have been the subject of international studies since the middle of the twentieth century. Between 1961 and 1998, 143

clinical trials with probiotics were conducted involving more than 7,500 subjects, none of whom reported any side effects.¹² Since then, examining the health benefits and mechanism of action of probiotics has become an increasingly active field of research. There is growing evidence that probiotics may produce beneficial effects such as reducing one or more risk factors for disease and they may also improve bodily functions.¹³

In order to support the expert's debate, three typical patient case studies were presented and in turn relevant data was examined to reach a consensus on whether these patients could benefit from a taking a daily probiotic yogurt drink.

A probiotic food should meet the following criteria:

- Contain sufficient live, active 'good' bacteria
- Be stable and viable for the life of the product
- Survive stomach acids
- Provide clinically proven health benefits
- Be safe and palatable for human consumption

CASE STUDY 2:**Mr Sydney Rochdale, 76****Observations:**

Catches cold or flu every winter, poor diet due to lack of appetite

Presentation:

Annual flu jab

Considerations

Asks what he can do to avoid or diminish colds like those that debilitated him last year in spite of the flu jab

Supporting data presented:

■ Probiotics (*L. rhamnosus*, *Bif. lactis*) exert immunostimulatory action and help to restore depressed function, as can occur in older persons¹ - 15 other studies have investigated this

■ Five clinical studies have looked at probiotics effects on older person infection rates, for example:

■ *L. johnsonii* La1 reduced infection rates in enterally fed older (>70) in-patients 5.7% vs. 15.4%

■ For independent-living people over 60 years old, *L. casei* DN-114 001 administered 2x day shortened the duration of winter infections (7.0 vs. 8.7d)²

1. Gill HS et al. *J Clin Immunol* 2001;21:264-71.

2. Turchet P et al. *J Nutr Health Aging* 2003;7:75-7.

Panel advice

Patients like Mr Sydney Rochdale would benefit most from general lifestyle advice that empowered them to do something for themselves. This includes counselling on diet, exercise, smoking cessation and getting sun to improve vitamin D levels. While recognising that probiotics are not harmful to patients, the panel recommends more research to confirm the benefits of probiotics suggested by current evidence for patients like Sydney.

The aging immune system

Age can weaken the body's natural defences, which explains why people over the age of 60 have an increased susceptibility to infectious and non-infectious disease, such as the flu. The decline in lymphoid cell activity, known as immunosenescence, the loss of cell proliferation capacities and degeneration of tissues and organs are among the most important phenomena of the ageing process. These may have an impact on the integrity of the intestinal epithelium. World Health Organization (WHO) data show a 400-fold increase in the mortality rate secondary to gastrointestinal infections in older persons compared to young adults.

In addition, older persons experience a large drop in their gastrointestinal microbiota, typically with a 1000-fold decrease in 'good' bacteria when compared to younger adults. Thus, a non-invasive means of enhancing cellular immunity is desirable in this patient population,



especially as they are more susceptible to serious complications of seasonal colds and flu.

The developing natural defences

When a baby is born, the digestive tract is sterile, but it soon proves to be the perfect ecological environment for microbiotic growth as it contains ample nutrients for bacteria. Consequently, an early microbiota is installed very soon after birth, originating from the immediate surrounding world. This evolves over time to become highly complex in adults. Before the gastrointestinal microbiota fully develops in children, diarrhoea commonly occurs and the consequences of a severe case of acute paediatric diarrhoea can be serious.

In the United Kingdom and many other parts of the world, rotavirus infections are the main cause of inflammation of the gastrointestinal tract, known as gastroenteritis, in infants and children. It is expected that by the age of five years, nearly every child will have experienced at least one episode of rotavirus gastroenteritis.²⁰ The WHO estimates that in 2004, 527,000 children died from rotavirus infection.²¹ While severe cases are hospitalised,

Just how serious is the flu?

Influenza rapidly spreads around the world in seasonal epidemics and imposes a considerable economic burden in the form of hospital and other health care costs and lost productivity. In annual influenza epidemics, 5-15 per cent of the population are affected with upper respiratory tract infections.¹⁵ Hospitalisation and deaths mainly occur in high-risk groups such as older persons and the chronically ill. Although difficult to assess, these annual epidemics are thought to result in between three and five million cases of severe illness and between 250,000 and 500,000 deaths every year around the world.¹⁶ Most deaths currently associated with influenza in industrialised countries occur among older persons over 65 years of age.

milder disease is either treated at home or by the GP, and as such the true prevalence and burden of disease is unknown. The median cost for a child presenting with rotavirus gastroenteritis in the UK ranges from £59-143 per episode making the estimated cost to society £11.5 million per year.²²

Panel consensus points

Based on the clinical evidence presented, the multidisciplinary panel agreed the points below in answer to the question 'Should we be encouraging the inclusion of probiotic drinks in dietary advice intended to help people stay healthy?'. These panel recommendations are positive steps for healthcare professionals and the public towards a more evidence-based approach to the use of probiotic drinks in health prevention and self-care.

1. Patients receiving antibiotics in hospital, and potentially in the community, should take a probiotic drink with a strain that has a

CASE STUDY 3:

Ben Ramirez, 4

Observations:

Won't eat the healthy food mum prepares, attends daycare centre and often catches stomach bugs from other children

Presentation:

Diarrhoea

Considerations:

Mum wants to know what she can do to reduce his episodes of diarrhoea

Supporting data presented:

■ More than 30 clinical studies have looked at the effects of probiotics on diarrhoea in children

■ *L. rhamnosus* GG reduced duration of diarrhoea 3days vs. 5days in babies with rotavirus infection¹

■ *L. casei* DN-114 001 may reduce the incidence (28% reduction)² and severity (46% reduction in duration)³ of diarrhoea in young children attending daycare centres

■ In Indian children hospitalised with acute diarrhoea, fermented milk Actimel, containing the strain *L. casei* DN-114 001, lowered diarrhoeal morbidity by 40% [4].

1. Isolauri et al. *Pediatrics* 1991;88:90-97.

2. Pedone CA et al. *Int J Clin Practice* 2000;54:568-71.

3. Pedone CA et al. *Int J Clin Practice* 1999;53:179-84.

4. Agarwal KN and Bhasin SK. *Eur J Clin Nut* 2002;56 Suppl 4:S56-9.

Panel advice

Patients like Ben Ramirez may benefit from taking probiotic drinks, especially during diarrhoea episodes, as the use of probiotics may reduce duration and severity of diarrhoea. However, more studies to determine the dosing and the positive effect in children attending daycare would be recommended. Worldwide, paediatric diarrhoea is a serious problem where further studies to examine the benefits of probiotics would be most needed.

proven clinical evidence base during and after the course of antibiotics to reduce the risk of developing, or reduce the severity and duration of antibiotic-associated diarrhoea, especially that caused by *C. difficile* infection.

2. There are no harmful effects from taking probiotic drinks and evidence suggests they may offer health benefits for people taking them. Thus, more studies are encouraged to support healthcare endorsement for use in the general population.

3. Older persons with reduced immune function and poor diet may benefit from the recommendation of a daily probiotic drink as part of general health advice, although more research is needed in this area.

4. Probiotics may reduce the severity and duration

of paediatric diarrhoea, a common problem for children attending daycare centres.

5. The format of probiotic delivery may impact overall effectiveness. Thus, yogurt or fermented milk based probiotics may offer advantages over freeze dried

Paediatric diarrhoea risk factors:

^{17, 18, 19}

- Age under two years old
- Setting (hospital, daycare centres)
- Season (higher in winter)
- Country (underdeveloped)

probiotic capsules in that they also provide potentially beneficial fermentation products.

6. When selecting a probiotic drink, it is best to choose one with a strain that has a proven clinical evidence base.

As the reported effectiveness of probiotics is strain-specific, further studies that evaluate and compare the therapeutic potential of probiotic strains are needed.

7. In order to increase comparability of probiotics as well as improve demonstration of health benefits, efforts should be made in future trials to standardise doses, duration of treatment and study populations.

8. More cost-effectiveness analyses would be helpful in evaluating the role of probiotics within health prevention and treatment efforts.

9. Epidemiological studies evaluating the value of probiotic yogurt drinks in preventing other immune disorders, such as asthma, should be conducted.

Overall conclusions

■ Nurses play a fundamental role in supporting and empowering patients to self-care and are increasingly required to give diet and lifestyle advice.

■ Many factors challenge the immune system.

■ There are clear indicators that a patient's immune system is compromised.

■ There are simple dietary and lifestyle steps patients can take to support their body's defences.

■ Probiotics are live bacteria that when ingested in adequate quantities can increase the proportion of 'good' bacteria in the gut, and confer a health benefit to the host.

■ Probiotics can be taken daily as part of a healthy diet and lifestyle to support the body's defences.

In order to support nurses in their 'probiotic advisory role', Danone, maker of leading probiotic drink, Actimel, is launching an accredited continuing professional

development module for nurses focusing on probiotics and their potential benefits for patients. To register your interest in receiving a CD-ROM, send an email with your name, title, surgery address and telephone number to the following address: actimel@cca-uk.com

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