

Recreational water: surfing the bugs

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There are many risks associated with the use of recreational water, including exposure to infectious diseases. Infectious diseases are transmitted either through contact with skin or mucous membranes, inhalation or ingestion. The infectious organisms include bacteria, viruses and parasitic protozoa, which occur naturally in recreational water or water that has been contaminated. Sources for contamination include: sewage effluent, livestock, domestic animals, wildlife, population using the water (bather shedding), industrial processes and farming activities.

Recreational water and infectious diseases

A wide variety of infectious diseases can be transmitted through the use of recreational water including gastrointestinal disease, respiratory disease, ear infections, skin disease, liver or renal disease, central nervous system infections and keratitis. An association between contaminated water and gastrointestinal disease as well as respiratory disease has been shown in randomised controlled trials conducted in the United Kingdom.^{1,2}

A prospective cohort study conducted in Sydney from 1989 to 1990 found that swimmers at Sydney ocean beaches were more likely to report respiratory, ear and eye symptoms than beach-goers who did not swim.³ Since then, the water quality in Sydney has improved due to the commissioning of the deep-water ocean outfalls in the early 1990s. A multi-centre study is now being planned to assess the current water quality and help verify whether current guidelines are applicable to the Australian environment.

Beachwatch programs

'Beachwatch' began in Sydney in 1989 and was expanded to harbour swimming sites in 1994, the Hunter and Illawarra regions in 1996 and regional councils along the NSW coast in 2004 under the 'Beachwatch Partnership Program'.

Water quality samples are collected from swimming locations every six days and analysed for both thermotolerant coliforms and enterococci. These bacteria indicate the presence of sewage and results are usually available within 24–48 hours of sample collection.

The Beachwatch program guidelines are currently based on the *Australian guidelines for recreational use of water*.⁴ A swimming site passes the guidelines if, for five samples collected in one month, the median does not exceed 150 cfu/100 mL thermotolerant coliforms and 35 cfu/100 mL enterococci, and the second highest value is below 600 cfu/100 mL thermotolerant coliforms and 100 cfu/100 mL enterococci.

Providing the community with regular and reliable information on beach water quality is a priority. Beachwatch issues a daily advisory warning, weekly star ratings, monthly media releases and annual State of the Beaches reports, and provides data on the *SoEdirect* website (<http://www.soedirect.nsw.gov.au>).

Information collected by Beachwatch is also used by Sydney Water to prioritise short- and long-term sewerage system maintenance works.

Blue-green algae and its potential health effects

Blue-green algae (BGA) are photosynthetic bacteria that are a natural part of the aquatic environment. They occur in low numbers in even the most pristine quality waters. When there is an excess of nutrients in the water, BGA can form a prolific dense growth or bloom. These blooms mainly occur in freshwater and can pose a public health risk.

Some BGA can produce highly potent toxins. However, not all BGA produce toxins and the same species can be toxic as well as non-toxic depending on the environment, physiology and genetics. The main toxins produced by BGA are hepatotoxins, which damage the liver and other internal organs, or neurotoxins, which can cause paralysis and respiratory arrest. Possible long-term effects include hepatocellular carcinoma.

BGA also produce endotoxins, which are contact irritants. They are generally only a nuisance and can affect around 15% of healthy people coming into contact with them. Symptoms include dermatitis, conjunctivitis, stomach cramps, nausea, fever, headaches and flu-like symptoms.

In Australia, several species can be hepatotoxic, including *Microcystis aeruginosa*, *Microcystis flos-aquae*, *Cylindrospermopsis racaborski* and *Nodularia spumigena*. *Anabaena circinalis* is the main neurotoxin producer in Australia.

A few epidemiological studies conducted in Australia have shown contact irritation following exposure to BGA.^{5–8}

Management of BGA occurs on several levels and varies from reducing nutrients entering the water body, placement of warning signs and BGA cell removal in water filtration plants.

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