



Department of Health

Sewage Pollution in Recreational Waters

What are the health effects associated with swimming in water contaminated with sewage?

Sewage pollution of recreational water can lead to a number of health problems due to the presence of pathogenic microorganism. Evidence suggests that the most frequent adverse health effects associated with exposure to recreational waters contaminated with sewage is enteric illness, such as gastroenteritis, which is often short in duration.

The types and numbers of pathogens in sewage will differ depending on the incidence of disease and carriers in the area. Hence, numbers of pathogens will vary greatly across different parts of the world and times of the year.

A general indication of pathogen numbers in raw sewage taken from the World Health Organisation document titled *WHO Guidelines for safe recreational water environments Volume 1 Coastal and Fresh waters 2003*, are listed below;

EXAMPLES OF PATHOGENS AND INDEX ORGANISM CONCENTRATIONS IN RAW SEWAGE

Pathogen/index organism	Disease/role	Numbers per 100ml
Bacteria Campylobacter spp. Clostridium perfringens spores Escherichia coli Sewage streptococci/intestinal enterococci Salmonella spp. Shigella spp.	Gastroenteritis Index organism Index organism (except specific strains) Index organism Gastroenteritis Bacillary dysentery	$10^4 - 10^5$ $6 \times 10^4 - 8 \times 10^4$ $10^6 - 10^7$ $4.7 \times 10^3 - 4 \times 10^5$ 0.2 - 8000 0.1 - 1000
Viruses Polioviruses Rotaviruses Adenoviruses Norwalk viruses Hepatitis A	Index organism (vaccine strains), poliomyelitis Diarrhoea, vomiting Respiratory disease, gastroenteritis Diarrhoea, vomiting Hepatitis	180-500 000 400-85 000 Not enumerated Not enumerated Not enumerated
Parasitic protozoa Cryptosporidium parvum oocysts Entamoeba histolytica Giardia Lamblia cysts	Diarrhoea Amoebic dysentery Diarrhoea	0.1-39 0.4 12.5-20 000
Helminths (ova) Ascaris spp. Ancylostoma spp. And Necator sp. Trichuris spp.	Ascariasis Anaemia Diarrhoea	0.5-11 0.6-19 1-4

Extract from WHO Guidelines for safe recreational water environments Volume 1 Coastal and Fresh waters2003

What is the Department of Health's role in the event of a sewage spill?

Please Note: The following information only applies to sewage spills which occur as a result of a Water Corporation sewage spill in the metropolitan area.

In the event of a sewage spill the Water Corporation will notify officers from the Environmental Health Directorate from the Western Australian Department of Health (DOH). DOH officers will then attend the spill site and assess the size and extent of the spill.

Following this, the spill area will be closed off from public access. This is achieved by the Water Corporation erecting health warning signs advising the public of the spill, and closing off the area with the use of barrier tape.

DOH officers will then conduct sampling of the area to determine the extent of microbiological pollution resulting from the sewage spill. Sampling will continue each consecutive day after the spill until the body of water is back to a safe condition for recreational purposes such as swimming.

The Department of Health will liaise with relevant local governments, and work with the Water Corporation in preparing a press release on the spill size and location to ensure a wider audience of the public are made aware of the spill.



An example of a health warning sign.

What does the Department of Health sample for?

As it is difficult to measure pathogen concentrations, the common practice is to use indicator bacteria. Two indicator organisms routinely used to indicate the possible presence of sewage pathogens are:

Thermotolerant coliforms (also known as faecal coliforms) are a subset of coliforms, and are found in the intestinal tract of humans and other warm blooded animals (eg. dogs, cats, birds). They are a more specific indicator of sewage contamination than total coliforms, as they are much more likely to have originated in the gut; and;

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Enterococci are normally found in the human intestinal tract, and are usually non-pathogenic. Enterococci are the preferred indicator organism for marine waters used for recreational purposes because of their ability to survive in marine waters for extended times compared with Thermotolerant coliforms

What are the results from sampling compared to?

The Department of Health compares the results obtained from the samples to the National Health and Medical Research Council 'Australian Guidelines for Recreational Use of Water'. These Guidelines set the safe acceptable levels for Thermotolerant coliforms and Enterococci for recreational waters.

The National Health and Medical Research Council's bacterial guideline for primary contact recreation in water is a median value which should not exceed:

- "150 faecal coliforms (thermotolerant coliforms) per 100mL for a minimum of 5 samples taken at regular intervals not exceeding 1 month with 4 out of 5 samples containing less than 600 faecal coliforms (thermotolerant coliforms) per 100 mL"
- "33 enterococci per 100mL (maximum number in any one sample 60-100 organisms per 100mL)"

Primary contact recreational activities include activities such as swimming, diving, water skiing, surfing or other direct water contact sports, and should be sufficiently free from faecal contamination, pathogenic organisms and other hazards (e.g poor visibility or toxic chemicals) to protect the health and safety of the user.

What happens once the results comply with the Guidelines?

Once it has been deemed that the results comply with the National Health and Medical Research Council 'Australian Guidelines for Recreational Use of Water' and the water quality is back to normal, the Department of Health will advise the Water Corporation that all health warning signs and barrier tape can be removed.

A press release will be issued to inform the public that the water body is safe for recreational purposes.

How long does the water body remain closed?

Experience has shown that it usually takes up to 48 hours for a water body to return to a safe condition following a sewage spill. However, there are a number of factors which will determine when a water body contaminated with sewage will return back to a safe condition. These include;

- Salinity
- Sunlight
- Tidal movement
- Weather conditions; and
- The volume of the spill.

The Department of Health will not reopen a water body until it is safe for recreational purposes.

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Is it safe to consume fish or shellfish taken from water contaminated with sewage?

It is considered safe to consume fish and crabs taken from water contaminated with sewage. However, it is necessary to wash your hands after handling fish or crabs taken from water contaminated by sewage, as well as washing fish or crabs with clean water before cooking.

It is advisable that you **do not** eat any filter feeding shellfish (e.g. oysters, mussels) taken from water contaminated by sewage because:

1. They feed by drawing water through a membrane and trapping food for digestion. Therefore, they draw contaminated water through the flesh that you'll end up eating - particularly dangerous if consumed raw because of pathogenic bacteria associated with sewage.
2. Organisms like viruses (especially Hepatitis A and Norovirus) are trapped in the flesh of the shellfish and are not killed by the normal cooking process of shellfish.

If I ever see raw sewage entering into recreational waters what should I do?

If you notice sewage draining into a recreational water body via a Water Corporation outlet, you should immediately contact the Water Corporation on their Emergencies and Service Phone line on **13 1375**.

PLEASE NOTE: If you have been swimming in water that is known to be contaminated with sewage and you are experiencing symptoms of an upset stomach and diarrhoea, you are advised to go and see your local medical practitioner for further advice.

For more information, contact the Environmental Health Directorate at the
Department of Health on (08) 9388 4999

or

Your local government Environmental Health Officer.