

Bottled water and bacteria

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Buyers of bottled water, mistakenly believing it “greener” and safer than the tap variety, have had a terrible shock recently. Suddenly, the packaging and long-distance transportation of mineral water in plastic or glass has been recognised as environmentally barmy. Journalists reporting the volte-face have also been pointing out that the product is nothing like as pristine as its purveyors claim. It contains large numbers of bacteria.

It's now two decades since the first detailed demonstration of high bacterial counts in bottled water. One study of 58 different samples revealed not only levels exceeding the European advisory level in water for human consumption but also the presence of specific organisms such as *Staphylococcus epidermidis*, indicating contamination by human skin scales (Hunter PR, Burge SH, *Epidemiol Infect* 1987; **99**: 439).

The environmental case against bottled water is unanswerable—but how concerned should we be about the microbial load? Speaking at a recent Society for Applied Microbiology conference in Belfast (July 7–10), Gilbert Lamothe of the Nestle Quality Assurance Centre at Vittel in France provided enlightening perspective. He pointed out that, within the European Union, natural mineral water cannot be disinfected and comes from underground sources not vulnerable to microbial contamination.



[High-quality image](#) (286K)

Enforcement of appropriate standards ensures that bottled mineral water is distinct from other categories of water “which can be of various origins

and may undergo extensive treatments for potabilisation”, Lamothe said. “The absence of bactericidal measures and the extended shelf-life of bottled water containers largely explain the high level of heterotrophic plate counts commonly found in bottled waters.”

Lamothe cited evidence that the high counts did not pose any health problem for the general population. He then made a stronger statement. He said that there had been no known case, let alone outbreak, of infection attributable to the consumption of bottled mineral water.

This was an interesting claim. One reason it was interesting was because, laid out next-door to the conference room, in a display of journals and laboratory equipment, was a pile of reprints of a paper published this year entitled “An outbreak of hospital-acquired *Pseudomonas aeruginosa* infection caused by contaminated bottled water in intensive care units”. The authors of the report (*Clin Microbiol Infect* 2008; **14**: 454) were Tim Eckmanns and colleagues at the Robert Koch Institute (Berlin, Germany) and other centres in Berlin.

The outbreak occurred in six different intensive care units in Berlin, the organism being identified by amplified fragment-length polymorphism and pulsed-field gel electrophoresis. Clinical specimens from 15 infected and four colonised patients yielded the same *P aeruginosa* strain. Over 100 environmental samples showed the organism, but only the isolate from an unopened bottle of still water was genetically identical with that from the patients.

Discussing the implications of their findings, the investigators recommended that “all untested bottled still water be removed from intensive care units”. It should be replaced by sterile bottled water or filtered tap water.

Eckmanns and his collaborators are concerned that guidelines regarding sterile water in intensive care units are being flouted. Such guidelines state, for example, that transplant patients should use sterile water for drinking and oral hygiene. In practice, however, patients often drink bottled still water, which is also used to prepare medications given via nasogastric tubes.

Once they were aware of their results, the investigators removed all commercially available bottled still water from all six intensive care units. The numbers of infections and colonisations then began to decline, and had done so significantly by 2 weeks after they were first noted. The types of infections and colonisations in the lungs that constituted the outbreak were probably caused by transmission of *P aeruginosa* through aspiration and/or microaspiration from the oropharynx, though the organism can also be transmitted from stomach to lungs when drugs are prepared and given with the contaminated bottled still water via nasogastric tubes.

These are disquieting findings, are they not?