



## Superbugs and Sewage at the Beach

By Ralph Morris, MD, MPH, and Joan B. Rose, PhD

We seem to be reading and [writing a lot about superbugs](#)—antibiotic resistant bacteria that are responsible for at least 2 million infections (including [healthcare-associated infections](#) acquired while receiving medical treatment in a hospital) and 23,000 deaths each year in the US.<sup>1</sup> But the recent discovery of the “superbug enzyme” NDM<sup>2</sup> in [bathing seawaters in Ireland](#) impacted by untreated sewage/wastewater<sup>3</sup> brings this global public health issue even closer to home. After all, unless you work in the healthcare field, most of us avoid hospitals but go out of our way to spend a day at the beach!



Methicillin-resistant *Staphylococcus aureus* (MRSA)

Photo credit: CDC/James Archer

### *A Growing Problem*



Photo credit: EPA

Superbugs and related cell products like the NDM enzyme have also been linked to untreated or inadequately treated wastewater in other countries such as [India](#), where “unprecedented antimicrobial drug contamination” in waters near a major drug production hub are thought to be fueling the creation of new superbugs. Ireland and other developed nations still regularly discharge untreated wastewater to coastal and inland waterbodies.

The [Clean Water Act](#) (CWA) establishes the regulatory structure for regulating *point* sources of pollutants, including treated wastewater/sewage, into US waters. Under the CWA, the US Environmental Protection Agency (EPA) has established [recreational water quality criteria](#) and supports local and state monitoring for [indicators of waterborne pathogens](#) and other efforts to keep swimmers safe. Pollution in the water or in the sand can also come from *nonpoint*

<sup>1</sup> Antibiotic / Antimicrobial Resistance. <https://www.cdc.gov/drugresistance/>.

<sup>2</sup> New Delhi metallo-beta-lactamase, which makes bacteria highly resistant to some of the last-line of antibiotics available to hospitals.

<sup>3</sup> Domestic households, industrial, and agricultural practices produce *wastewater*, which can pollute lakes, streams, oceans, and groundwater; *sewage* is the term used for wastewater that typically contains feces, urine, and other household wastes.

sources like other bathers, stormwater and other surface runoff, or trash and animal wastes at the beach.<sup>4</sup> Many of the [cleanest beaches in the world](#) are right here in the US.

Not surprisingly, researchers have found particularly high levels of antibiotic resistant bacteria in hospital sewage.<sup>5</sup> On average, as much as [one-third](#) of hospital patients take antibiotics during their stay. A [recent WQ&HC article](#) reported that superbugs, once washed down the drains of hospital sinks and into hospital wastewater, can colonize up the drainpipe and sink strainer area, potentially spreading infection to vulnerable patients!

For perspective, according to the [Global Water Pathogen Project](#) (GWPP) established in 2016, almost 85% of the world's wastewater is discharged with inadequate or no treatment, and which presents an ongoing major risk to public health and the environment. Effective water and wastewater management must address public health risk associated with waterborne pathogens—including well documented tragedies like diarrheal illness and death in developing nations and the growing, uncertain risks posed by superbugs.

### *The Importance of Wastewater Treatment*

[Effective wastewater treatment](#) can help curb the threat of superbugs and rising antibiotic resistance. But while antibiotic resistant bacteria are greatly reduced by treatment, some can survive and are discharged to receiving waters, and some of those are at or near public beaches. The detection of superbugs at the beach should also help place attention on the global need for wastewater treatment infrastructure—including [the US](#). This should be a priority moving forward with new national initiatives.

But each of us can also act locally to help diminish the potential impact of superbugs at the beach by:

- Supporting community efforts in point and nonpoint pollution awareness and treatment;
- Checking for beach advisories and closings before heading to the shore, such using EPA's [BEACON 2.0](#) online tool;
- Avoiding beaches with health warnings (and other recreational waters) if you are [immunocompromised](#); and as always
- Using antibiotics properly and exactly as prescribed.

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<sup>4</sup> Beaches. <https://www.epa.gov/beaches>.

<sup>5</sup> Ireland Environmental Protection Agency. 2015. Hospital Effluent: Impact on the Microbial Environment and Risk to Human Health. Report No. 162.

<http://www.epa.ie/pubs/reports/research/health/EPA%20162%20final%20web.pdf>.