

Treating COVID-19 could lead to increased antimicrobial resistance

August 25 2020, by Mr Alan Williams



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The use of antibiotics in people with COVID-19 could result in increased resistance to the drugs' benefits among the wider population, a new study suggests.

Patients hospitalised as a result of the virus are being given a combination of medications to prevent possible secondary bacterial infections.

However, research by the University of Plymouth and Royal Cornwall Hospital Trust suggests their increased use during the pandemic could be placing an additional burden on [waste water treatment](#) works.

Writing in the *Journal of Antimicrobial Chemotherapy*, scientists say this could lead to raised levels of [antibiotics](#) within the UK's rivers or [coastal waters](#) which may in turn result in an increase in antimicrobial resistance (AMR), where bacteria become resistant to the action of antibiotics.

This would be particularly acute in receiving waters from waste water treatment works serving large hospitals, or emergency 'Nightingale' hospitals, where there is a concentration of COVID-19 patients.

The findings are based on reports that up to 95% of COVID-19 inpatients are being prescribed antibiotics as part of their treatment, and concerns that such a large-scale drug administration could have wider [environmental implications](#).

Sean Comber, Professor of Environmental Chemistry in Plymouth and the article's lead author, said: "COVID-19 has had an impact on almost every aspect of our lives. But this study shows its legacy could be felt

long after the current pandemic has been brought under control. From our previous research, we know that significant quantities of commonly prescribed drugs do pass through treatment works and into our water courses. By developing a greater understanding of their effects, we can potentially inform future decisions on prescribing during pandemics, but also on the location of emergency hospitals and wider drug and waste management."

The COVID-19 guidance issued by the National Institute for Health and Care Excellence (NICE) suggests patients with COVID-19 should be treated with doxycycline and either amoxicillin or a combination of other medications if a [bacterial infection](#) is suspected, but to withhold or stop antibiotics if a bacterial infection is unlikely.

Neil Powell, Consultant Pharmacist at the Royal Cornwall Hospital said: "Common with other hospitalised patients in the UK, and other countries, the majority of our patients with COVID symptoms were prescribed antibiotics because it is very difficult to know whether a patient presenting with symptoms of COVID has an overlying bacterial infection or not. We did a lot of work to try and identify those patients who were unlikely to have a bacterial [infection](#) complicating their viral COVID infections in an attempt to reduce the amount of antibiotic exposure to our patients and consequently the environment."

This research combined patient numbers for UK emergency hospitals set up temporarily around the country with waste water treatment work capacity and available river water dilution serving the emergency [hospital](#) and associated town.

Using available environmental impact data and modelling tools developed by the UK [water](#) industry, it focussed on one UK emergency hospital—Harrogate, geared up to treat around 500 people—and showed the risks posed by doxycycline was low, assuming the hospital was at full

capacity.

Tom Hutchinson, Professor of Environment and Health at the University and a co-author on the research, added: "This is a comprehensive environmental safety assessment which addresses potential risks to fish populations and the food webs they depend on. The data for amoxicillin indicated that while there was little threat of direct impacts on fish populations and other wildlife, there is a potential environmental concern for selection of AMR if at 100% capacity."

Amoxicillin is used to treat everything from pneumonia and throat infections to skin and ear infections.

Mathew Upton, Professor of Medical Microbiology at the University and a co-author on the research, added: "Antibiotics underpin all of modern medicine, but AMR is an issue that could impact millions of lives in the decades to come. Currently, the COVID-19 pandemic is causing immense suffering and loss of life across the globe, but AMR has been—and will remain—one of the most significant threats to global human health. We conducted this study so that we can begin to understand the wider impact of global pandemics on human health. It is clear that mass prescribing of antibiotics will lead to increased levels in the environment and we know this can select for resistant bacteria. Studies like this are essential so that we can plan how to guide antibiotic prescription in future pandemics."

More information: Sean D W Comber et al, COVID-19, antibiotics and One Health: a UK environmental risk assessment, *Journal of Antimicrobial Chemotherapy* (2020). [DOI: 10.1093/jac/dkaa338](https://doi.org/10.1093/jac/dkaa338)

Provided by University of Plymouth

Citation: Treating COVID-19 could lead to increased antimicrobial resistance (2020, August 25)
retrieved 26 April 2024 from

<https://medicalxpress.com/news/2020-08-covid-antimicrobial-resistance.html>

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