How Safe Is Your Recreational Water From COVID-19 Transmission?

New UK Study Findings Show Importance of Proper Chlorination

Although outbreaks of certain respiratory pathogens such as *Legionella* have been linked to recreational water (often due to improper maintenance of chlorine levels), the US Centers for Disease Control and Prevention (CDC) states that it is not aware of any scientific reports showing that the SARS-CoV-2, the causative agent of the COVID-19 virus, spreads through water in pools, hot tubs, water playgrounds or other treated aquatic venues.[1]

Findings from a research study in the UK now provide us with better understanding of how proper chlorination and pH control safeguards recreational waters from the spread of SARS-CoV-2.2 These new findings were published in the most recent issue of *Water Research*, a leading journal in the field of water science and technology. Sigura™ contributed technical expertise to the project.[2]

Analyzing Waterborne Transmission Potential

Although airborne transmission is accepted as the primary route of spread of SARS-CoV-2, many have also proposed waterborne transmission as a secondary route. This has been primarily based on SARS-CoV-2 RNA having been detected in wastewater around the world.[3]

Prior to this recent study, headed by researchers with the Department of Infectious Disease at Imperial College, London, the effect of chlorinated swimming pool water on inactivation of SARS-CoV-2 had never been directly demonstrated. Its findings clearly illustrate the level of chlorine's efficacy in the inactivation of SARS-CoV-2.[2]

Successive Experiments Performed

Water samples for the study taken from swimming pools were modified in the laboratory to a range of pH and free chlorine values. A known amount of infectious SARS-CoV-2 was added to duplicate water

samples. After 30 seconds of treatment any remaining infectious virus was then titrated by $TCID_{50}$ on Vero cells. Successive experiments were performed with varying free chlorine levels, varying pH, a range of both pH and free chlorine levels, and an independent preparation of virus at a range of pH and chlorine levels. In addition, a phosphate-buffered saline (PBS) control was included in each experiment to validate the infectivity of the virus input.

Achieving Inactivation

The findings of the study show the importance of both chlorine levels and pH to achieve inactivation. The study found that lower pH and higher free chlorine levels result in greater inactivation of SARS-CoV-2. A pH of no more than 7.4 and free chlorine above 1.5 parts per million (ppm) resulted in at least a 3-log reduction (by at least 3 orders of magnitude) in infectious titre. The availability of active free chlorine decreases with increasing pH, and this was observed in the study, with some residual virus being detected after treatment in samples with water above pH 7.4, even when at least 1.5 ppm free chlorine was present.

The study concluded that its findings on the susceptibility of SARS-CoV-2 to inactivation by swimming pool water "underscore the importance for those who maintain swimming pools to adhere to UK guidelines for chlorination, and this should give confidence in the safety of bathers when in the water." [2]

References

» [1]CDC: Guidance for Public Pools, Hot Tubs, and Water Playgrounds During COVID-19 Updated Feb. 1, 2021

» [2]Brown JC, Moshe M, Blackwell A, Barclay WS. Inactivation of SARS-CoV-2 in chlorinated swimming pool water. Water Res. 2021 Sep 30;205:117718. doi: 10.1016/j.watres.2021.117718.

» [3]La Rosa G, Bonadonna L, Lucentini L, Kenmoe S, Suffredini E. Coronavirus in water environments: Occurrence, persistence and concentration methods - A scoping review. Water Res. 2020 Jul 15;179:115899. doi: 10.1016/j.watres.2020.115899.

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