

The Human Health & Environmental effects of increased chlorine-based disinfectant use during pandemics (such as COVID-19)

November 2020

Several articles proposed that increased chlorine-based disinfectant use during the COVID-19 pandemic could be damaging [aquatic environments](#), [harming wildlife](#) or even adversely impacting [human health](#).

Chlorine-based disinfectants are well known, efficacious and cost effective, particularly when strictly used as per manufacturer directions. All disinfectants must be used responsibly to ensure that they continue to be a vital part of the toolbox in the fight against potentially deadly pathogens.

ISSUE SUMMARY

Chlorine-based disinfectants are regularly employed to destroy pathogens using specific, appropriate concentrations and contact times. Use of chlorine-based disinfectants is assessed and controlled worldwide by various authorities, such as the U.S. Environmental Protection Agency (EPA), the E.U. European Chemicals Agency (ECHA) etc. Those disinfectants that are effective against COVID-19 when used as directed are openly presented on sites such as the [EPA's list N](#) and its [European equivalent](#) list. Products on these lists include those based on familiar chemicals such as 'bleach' (hypochlorite) and chlorinated isocyanurates which 'release' active chlorine and help keep our communities healthy.

As part of their product registrations (for example with the EPA in the US or ECHA in the EU), these products are assessed for their potential harm to the environment and human health. Manufacturers must provide an extensive data set that shows under which conditions these products do not present a risk to human health or the environment. Manufacturers must also prove that these conditions still allow these products to be effective against the target pathogens.

As part of the assessment process, manufacturers must then detail and clearly present the conditions under which the disinfectant is produced, used and disposed of. Such details are often available on the product packaging and on the internet. When these instructions are strictly followed, there is little to no risk of the disinfectant harming human health or the environment.

Government authorities also provide advice on correct use. For example, the U.S. Centers for Disease Control and Prevention (CDC) has provided [directions](#) for consumers to develop a disinfectant solution by diluting regular, household chlorine bleach to destroy the COVID-19 virus on surfaces. These directions have been illustrated clearly in [this poster](#). The European CDC has similar advice [for health care environments](#).

When used correctly, these products can continue to protect homes, communities and workplaces from otherwise harmful microorganisms.

INDUSTRY VIEWS

WCC recognises that, when misused, damaging effects can occur but strongly maintains that the products of chlorine chemistry are an essential part in protecting homes, communities and workplaces from the effects of potentially fatal pathogens.

A key use of chlorine-based disinfectants is to destroy pathogens (such as the SARS-CoV-2 virus) on surfaces. Researchers believe the coronavirus is transmitted primarily through the air by virus-laden respiratory droplets and aerosols when infected people cough, sneeze, laugh, sing, speak, or even breathe. Some respiratory droplets may settle on surfaces that people contact with their hands. Depending on the surface and local environmental conditions, [viruses can remain viable](#) for hours to even days. Surface disinfection should reduce the risk of humans transferring the virus from hands to the mouth, nose, or possibly eyes, after contact with a contaminated surface. Chlorine-based disinfectants have been shown [by researchers](#) to destroy 'SARS-CoV-2,' on surfaces, helping to intercept this route of exposure. That said, all approved SARS-CoV-2 disinfectants must be used strictly according to manufacturers' directions.

When used indoors and flushed through a building's wastewater collection system to a wastewater treatment facility, there is very little, if any, risk to the environment (indeed, chlorine-based disinfectants are sometimes used to treat wastewater to help prevent harmful pathogens from entering the environment). If bleach, for example, enters sewers where it is not exposed to sunlight, it can persist longer, but it rapidly reacts with organic matter in the environment and in the sewage. It will likely react first and quickly with ammonia compounds, producing mono- and dichloramine. Many modern cities have appropriate wastewater and drinking water treatment facilities to deal with any increase in these and other byproduct compounds.

When used outdoors, manufacturers recommend that an appropriate product labeled for that purpose be used with the manufacturers' use directions carefully followed. Indiscriminate spraying of disinfectant over a broad outdoor area may be harmful to the

environment as it can bypass the wastewater treatment step. As such, this use, with possible specific exceptions, is strongly advised against by manufacturers. Further, disinfection byproducts, including chloramines, trihalomethanes, and haloacetic acids, are minimised when chlorine-based disinfectants are used according to manufacturers' directions. This includes cleaning surfaces of dirt and debris *before* applying disinfectant and avoiding broad application to public spaces and natural areas unless specifically approved for that purpose.

Outdoor disinfectant use carries a second problem, as there is a risk to aquatic environments from direct run-off. However, bleach, for example, does not stay in the outdoor environment for very long. Sunlight rapidly degrades hypochlorous acid ('active chlorine'), the active disinfecting agent in bleach. If the bleach applied were at a free chlorine level of 100 parts per million (ppm) or less, then most, if not all, of the bleach will be degraded by the sun within an hour or two. This effect is also accelerated by warm temperatures.

WCC recognises that vigilance and education are key in preventing the misuse of chlorine-based disinfectants

During the COVID-19 pandemic, a [survey from the U.S. CDC](#) showed that nearly 40% of people surveyed were using cleaners and disinfectants in an unsafe manner in an effort to help prevent infection from the SARS-CoV-2 virus. This may explain a [report](#) at the same time which recorded an increase in calls to poison centres in the first quarter of 2020.

Genuine concerns about the pandemic have resulted in harmful, unintended consequences from consumers' misuse of cleaners and disinfectants. These include spraying high concentrations of disinfectant on the skin, soaking produce in disinfectant solution, and direct ingestion/ injection/ gargling with disinfectant. Such uses may have also been compounded by irresponsible parties advocating such unsafe uses. Any unauthorised uses of disinfectants are strongly discouraged and the message remains to follow the approved manufacturer usage directions.

During the COVID-19 pandemic, a variety of disinfectants are being used, including non-chlorinated products. Consumers need to be informed on the particular products they are using, including information on safe use available from the manufacturers. As offices, schools, and childcare facilities reopen during pandemics, surface disinfection should also be carried out carefully, with users strictly following manufacturers' safe use and storage directions. In addition to ventilating indoor spaces during cleaning and disinfecting, this includes storing products out of the reach of children and never mixing incompatible products (e.g. never mixing bleach with ammonium cleaning products or with acidic drain cleaners). Whilst local directions should always be followed, guidelines are available in the

[COVID-19 bleach disinfection poster](#) and the U.S. CDC's "[Reopening Guidance for Cleaning and Disinfecting Public Spaces, Workplaces, Businesses, Schools, and Homes.](#)"

Misuse can also carry along with it a risk of 'overusing' disinfectants. Some microorganisms can become tolerant to such high levels, these then multiply and so more disinfectant is needed to kill them (and so on). This is a basic description of antimicrobial resistance (AMR). AMR is a real public health risk for the future and is often associated with an excess, unnecessary, or improper use of antibiotic medicines. By following manufacturer directions, the risks of this happening in our communities can be reduced.

To help inform people on correct usage, WCC works closely with its global membership to prepare guidance, educate on safe and responsible use and has an extensive resources section, available via its website www.worldchlorine.org.