

Reduced risk for waterborne virus infections for society despite climate change – VISK

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Good and healthy drinking water

A safe and healthy drinking water is essential for all humans. In structured analyses carried out within the municipality of Gothenburg, microbiological risk was identified as one of the most important aspects to achieve the goal of good and healthy drinking water. Predicted climate change will lead to more intense, and more frequent, rainfall events e.g. in the region of Kattegatt-Skagerack-Öresund and thereby increase the risk of microbiological influence on raw water sources.

What goes around comes around

Waterborne viruses are dispersed in the water cycle. The raw water may be influenced by untreated waste water especially during periods of heavy rain. Further, wastewater treatment plants may receive too much incoming sewage water with lowered treatment efficiency of the wastewater and sewage plant overflows. When this occurs citizens in the connected area may be exposed to potential sickness through microbiological virus infections, as viruses are released to the receiving water for the wastewater treatment plant. This recipient can be raw water for any municipality downstream e.g. if surface water from a river is used. The conventional drinking water process used today does not effectively remove viruses and parasites, being originally designed for reducing bacteria. Viruses and parasites might therefore pass through the drinking water treatment plant and may be distributed to the consumer.

Holistic approach

Within the VISK project different experts are gathered from Nordic countries from different disciplines to work together to learn more and to be able to perform a structured work on waterborne viruses. VISK includes 18 partners, with stakeholders from municipalities, industrial organizations, academia and authorities, to provide a complete and holistic approach. This is the first inter-regional approach for pathogens in Scandinavia, which provides another link for the area. Within the VISK project the whole virus cycle is of concern and investigated with risk evaluation in focus. The work is divided into different work areas including epidemiology, mapping, treatment, risk communication, communication strategy and communication and results.

Epidemiology

In the epidemiology part of the work an investigation of an early warning system is performed as well as a study of drinking water habits related to stomach sickness. The early warning system includes a systematisation of the sickness information data and the potential use in the drinking water industry.

Mapping

The mapping part includes a large scale sampling program in water of viruses in raw water, sewer outlets, inflow to sewage treatment plants and side flow in 15 sampling sites in the Göta River and a more limited number in the river Glomma. There is also mapping of selected human virus types and levels as well as faecal indicators in mussels outside the recipients of the rivers to achieve a baseline for a two-year monitoring program. Hydrodynamic modelling in the rivers Göta River and Glomma are performed using the mapping data for validation to investigate the spread of the viruses in the rivers. It is also possible to use potential scenarios in the modelling part of the work.

Treatment

In the treatment part of the project the main focus lies on viral removal during ultra filtration and virus inactivation in disinfection processes (UV light and chlorination) under Scandinavian conditions. The results will enhance the understanding of the mechanisms of viral removal and inactivation providing the opportunity for process optimization and reducing risk.

Trust and confidence

It is known that confidence in drinking water is high, but that this is quickly eroded during an outbreak. At this point social trust in those who manage and operate the system becomes important. In the Ale H2O study we are for the first time investigating social trust between outbreaks and will provide advice to practitioners based on the results of the study.

Risk model

The risk communication focuses on systemising the results of the epidemiology, mapping and the treatment in a risk model to be used by water treatment plants in their water safety planning. Relevant figures on the viral load in the source water, taking into account spatial and temporal variability, enables water treatment plants to target their treatment. Improved understanding of viral removal and inactivation mechanisms will help in monitoring and surveillance in order to guarantee that these targets are met. Tools to better predict when the source water is at its most vulnerable, thereby enabling corrective actions to be taken, minimizing the risk of outbreaks to occur, is another important outcome of the risk communication work package. Altogether this will enable correct decision making, giving possibilities for healthy and safe drinking water.

Results

VISK results will be collated in a communication and action plan, which will be disseminated to politicians, water industry stakeholders and society. The aim is to enable correct decision-making. An open home page already exists (www.VISK.nu) to promote the communication of VISK results through handbooks, newsletters and reports.

One example of the results from VISK is an early warning system, which has been identified as important. Further, a survey has proven that trust and confidence in the drinking water and its providers before a potential incident occurs is important. The modelling of the spread of viruses in a raw water source will provide support for risk assessment analyses. An indication of whether a pathogenic virus is viable, or not, has proven a significant challenge for analysis. Another challenge is to achieve concentration of the samples before analysis.



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