Challenge for owners/operators: An article from Switzerland on the topic of drinking, shower, and bathing water hygiene in healthcare facilities.

The operation of healthcare facilities requires a high level of hygiene and safety. This applies, among other things, to the areas of drinking, shower and bath water supply and is highly relevant to facility management. Maintaining the water quality in the building is a complex subject area that already begins with planning and construction and continues into the implementation of adequate self-monitoring during ongoing operation.

Water-associated infections in healthcare facilities

According to current statistics, the average drinking water consumption in Switzerland is 296 litres per inhabitant and day (SVGW, BFS 2022). For healthcare facilities, this value per patient or resident is many times higher. This is relevant because there are pathogens that can be transmitted through water, and people from a wide range of risk groups are present in healthcare facilities. The risk groups for water-associated infections include elderly people and people with severe underlying diseases, a weakened immune system, as well as metabolic, cardiovascular, or chronic lung diseases.

Drinking water naturally contains numerous microorganisms. In principle, these do not pose a threat to human health. However, it becomes problematic when pathogens (pathogenic organisms) come into focus. As soon as technical and/or operational inconsistencies occur in the drinking water installation, such microorganisms grow more and more and can pose a health risk. The hazard is stronger present, the more uncontrolled multiplication up to health-critical concentrations occurs. For example, water contaminated by legionella can cause pneumonia if it enters the lungs through inhalation or ingestion. Direct contact with contaminated water can cause wound infections, e.g., by Pseudomonas.

Prevention through systematics: hazard analysis and risk assessment

Hazard analyses of drinking, shower and bathing water systems in buildings provide a documented basis for comprehensive risk assessments in the field of maintenance. They are therefore a systematic element of the globally established Water Safety Plan (WSP) of the World Health Organisation (WHO). It is of crucial importance that they are carried out by persons who are familiar with the systems to be assessed. The assessed risk considers the potential harm to the health of users who may be exposed, in addition to the potential harm to drinking water quality from identified deficiencies. Risk assessments must be carried out independently, i.e., there must be no conflict of interest between those carrying out the risk assessment and those making decisions on any measures to reduce hazards (e.g. dismantling, remediation, capital expenditures).

Responsibility of the owner/operator to ensure perfect drinking water quality

Legislation stipulates that a responsible person must be appointed for drinking water installations in buildings (Art. 73 LGV). According to current laws and standards, the owner/operator of a public building is responsible for ensuring perfect drinking water quality.

The SVGW guideline W3/E4 (2021) summarises this as follows:

> *Owners/operators [...], are considered water suppliers (Art. 2 Para. c TBDV). They are obliged to self-monitoring and are responsible for the quality of the drinking water provided and supplied (Art. 26 LMG). The owner/operator must inform the cantonal authorities if [...] there is or is suspected to be a health risk coming from the drinking water (Art. 84 LGV).*

The basic component of the mandatory self-monitoring is the maintenance of the intended operation. The SVGW guidelines W3/E3 (2020) and W3/E4 (2021) provide detailed information on which components a self-monitoring concept should contain and at which basic intervals these should be implemented, depending on the building category. These include:

- Keeping checklists for risk management of the technical/operational actual situation
- Routine operational checks
- Maintenance and servicing of installations and connected equipment
- Implementation of flush management for infrequently used tapping points

- Routine temperature checks
- Legionella sampling

Inconsistencies in technology and operation lead to problems with drinking water quality

Impairments of the microbiological drinking water quality usually arise from technical and/or operational inconsistencies in the building drinking water installation. Prominent sources of error are:

- Stagnant drinking water due to unused tapping points or disused pipes that are still filled
- Hot water temperatures too low
- heated cold water by heat transmission

Let us look at the simple example of the "tap aerator" as a system component. Often insufficient maintenance is observed in the context of self-monitoring. This includes, among other things, regular descaling, and cleaning. Limescale deposits provide additional surfaces on which microorganisms can colonise and grow. Operational problems can also arise, e.g. reduced water flow due to blockage. As a result, sufficient pipe exchange can no longer be ensured, stagnation occurs. Regular cleaning and descaling of aerators and shower heads are therefore little but effective measures for system maintenance and possibilities for system control.

Representative water samples and temperature controls for quality assurance

In order to maintain the drinking water supply system of a building in a permanently hygienically impeccable condition, and thus to ensure that it operates as intended, regular checks by the operator are necessary. Representative water samples, ideally taken by samplers from an independent, accredited laboratory, provide information about the microbiological situation in the system. Temperature checks of the system and at defined sampling points by those responsible for operations (e.g. facility management, infrastructure, maintenance site engineers, sanitation) provide information on the operating status of the system. In the case of anomalies, possible hazards and risks for the users can be identified. This, in turn, can be used to initiate measures to eliminate the causes.

In addition to the determination of sampling points and unproblematic access to sampling points, the choice of suitable sample vessels is also important: sterile vessels for bacteriological parameters, inert vessels for chemical parameters and glass vessels for the determination of bacterial endotoxins, if the latter would have to be measured. This should be known especially for applications with dialysis water (permeate), usually provided by reverse osmosis systems. In addition to a clearly defined sampling objective, enough samples and a sufficient sample quantity are indispensable for all sampling.

Controls for air conditioning systems

For air-conditioning systems, whose air humidification system may be fed with drinking water, hybrid humidification is recommended instead of recirculating spray humidification. For new systems, an initial hygiene inspection is carried out by qualified personnel, qualified at least in accordance with VDI 6022 Sheet 4, Category A. In older air-conditioning systems, humidifiers with circulation operation are still frequently found and must be continuously inspected in accordance with the regulations for operation and maintenance work - e.g. determining and documenting the growth of microorganisms (total cfu count) in the circulating water at half-monthly intervals (SWKI VA 104-01, Table 8).

Controls for therapy and warm water pools

As with self-monitoring for drinking water hygiene, a concept for self-monitoring should be developed for areas such as therapy and hot-spa pools and applied in accordance with relevant standards and guidelines. The focus here is on the one hand on the treatment and distribution of the bathing water, and on the other hand on the quality of the water in the pool during use.

The water quality in the bathing pool depends on the following factors:

- Quality and quantity of the filling water
- Contamination by the bather
- Function of the water treatment system
- Pool hydraulics

It is important to keep in mind that a single bather transfers up to 35 million microorganisms to the water, e.g. through the body's own fluids, skin flakes, or cosmetics.

System maintenance is prevention and calls for all

Ensuring the quality of drinking, showering, and bathing water requires the cooperation of a wide range of stakeholders and service providers. It requires expertise and commitment throughout the entire life cycle and management cycle, starting with the planning, construction and commissioning of the installations and ending with the implementation of regular operation in accordance with the regulations.

Prospects

The aim of legislation, standardisation and service providers should be to empower the owner/operator to establish a systematic self-monitoring system for drinking water hygiene, which enables the drinking water installation to be operated as intended on a permanent basis and thus protects the precious resource and the foodstuff water. So, be honest to you and your organisation, and ask yourself:

- As the person responsible for FM, do I know the relevant laws and standards on drinking water, and do I know all relevant mechanisms for ensuring its hygienic quality?
- Do I know which obligations I face in my country about drinking water hygiene?
- Does my organisation provide an environment with sufficient resources to operate a water system over time with the necessary quality?
- Do I know reliable and technically experienced partners who can support me?

Well then, cheers!

Further Reading

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