CASE STUDIES

PREVENTING LEGIONELLAE IN AN AUSTRIAN HOSPITAL THROUGH A NEW WATER INSTALLATION THAT COMPLIES WITH AUSTRIAN STANDARD ÖNORM B5019

Organisations involved

Krankenhaus der Barmherzigen Schwestern in Ried im Innkreis (hospital), Austria

Description of the case

3.1. Introduction

Hospitals, nursing homes, hotels and other recreational facilities are buildings with large and complex water supply systems, including large hot water storage tanks. Stagnation of water and temperatures favourable for legionellae growth lead to a heavy proliferation of legionellae. For this reason such buildings are at higher risk of legionellosis.

People are more susceptible to legionella infection if they are weakened by other illnesses or if they are elderly. Therefore it is very important that residential homes, nursing homes and hospitals take strong steps to combat legionella contamination. Patient exposure to legionella occurs while they are taking a shower, bathing, or drinking tapwater, but it can also occur through contact with contaminated medical equipment that has been rinsed with tapwater [1, 2]. But hospital staff and maintenance workers are also at higher risk of infection [2]. Hospital water supply systems require a high level of maintenance to ensure a good water quality.

In Austria, in 2007, 108 cases of legionella infections (Legionnaires' disease) including 11 deaths (case-fatality: 10.19%) were reported to the country's National Reference Centre for Legionella Infections (NRLI). In 66 cases it was possible to identify the most likely source of infection. In 15 cases the hospital water system was identified as a very likely source [3].

Dr. Milo Halabi is the head of the National Standards Committee for Legionella at the Austrian Standards Institute. This committee is responsible for the elaboration of ÖNORM B5019 [4].

The ÖNORM B5019 is has been in force since January 2007. Objective, and its objective of the Norm is to support help designers and construction responsible companies to plan and install warm drinking water supply systems and to help users to operate and use it them hygienically. It covers the planning, the operation, regularly and checking of water supply systems as well as the refurbishment of problematic water repair of defective supply systems. The aim idea is that compliance with the ÖNORM could nearly totally prevent almost totally eliminate the risk of legionellae growth in water supply systems.

Dr Halabi was interested in applying the new ÖNORM to the hospital in which he works, Krankenhaus der Barmherzigen Schwestern in Ried im Innkreis (Picture 1). This became possible when a new hospital building has been constructed. He took the chance to apply the ÖNORM.

Picture 1: Barmherzige Schwestern Ried Hspital, new building (Bauteil 6)

Source BHS Ried

3.2. Aims

The aim was to prevent legionellae contamination of the hot water supply system in Barmherzige Schwestern Ried Hospital, by implementing the ÖNORM B5019, 'Hygienic aspects of the planning, construction, operation, maintenance, surveillance and rehabilitation of central heating installations for drinking water'.

3.3. What was done, and how?

The hospital was about to begin construction of a new building (the so-called Bauteil 6), with five storeys. This provided the chance to plan from scratch a water supply system that complies with the Austrian regulation ÖNORM B5019. The ÖNORM stipulates the general requirements for warm drinking water supply systems.

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The first part of ÖNORM B5019 focuses on the planning/design of warm water supply systems. Key factors of the ÖNORM regarding the design are:

1. Choice of material for the piping system: the ÖNORM stipulates the use of suitable material in accordance with ÖNORM EN 806-2 and ÖNORM EN 12502,

- The material used must be appropriate according to the physical and chemical water condition and must not corrode
- The pipes must have a smooth internal surface, to prevent biofilms from forming.

The hospital decided to use stainless steel for its hot water supply system.

2. For the drinking water heating system (Trinkwasser Erwärmer TWE) an installation of three different types is possible:

- instantaneous water heater
- water reservoir systems
- water reservoir with attached heating source.

For all systems the water temperature in the supply system must be at least 60 °C when leaving the central heating system and must not fall below 55 °C at any point of the supply system at any time (except for the cold water pipes).

The hospital installed an instantaneous water heating system with circulation line.

3. With regard to the hot water supply:

- Pipes with dead ends must be avoided
- All parts of the system must be stored and transported in such a way that internal fouling is prevented
- Testing or adaptor fittings must be installed
- Pressure testing must be carried out only with potable water or oil-free air
- The pipes must be thermal-insulated, so that the loss of temperature does not exceed 5 K, and cold and hot water pipes must be separated in different ducts
- Oversizing of the supply system must be avoided
- The user must be protected from scalding by very hot water.

4. Special requirements for the hot water heating system with circulation, installed in the hospital, are as follows:

- Each circulation line must have a control valve,
- When water is re-circulated to the TWE, temperature must be at least 55 °C,
- Continuous circulation of water must be guaranteed,
- The valves must stand a temperature up to 70°C,
- The circulating pump has to operate non-stop,
- Control points must be planned and installed to monitor the operating parameters especially the temperature.

The second part of the ÖNPRM deals with the commissioning and operation of the hot water supply system.

The ÖNORM stipulates specific requirements for the first commissioning of the water supply system depending on different risk groups. Hospitals with patients who are immunocompromised belong to the highest risk group 4. This applies for the new building (Bauteil 6). The regulation covers the requirements regarding pressure testing, flushing and adjustment of the operating parameters, the handing over of the supply system, routine operation and regular checks.

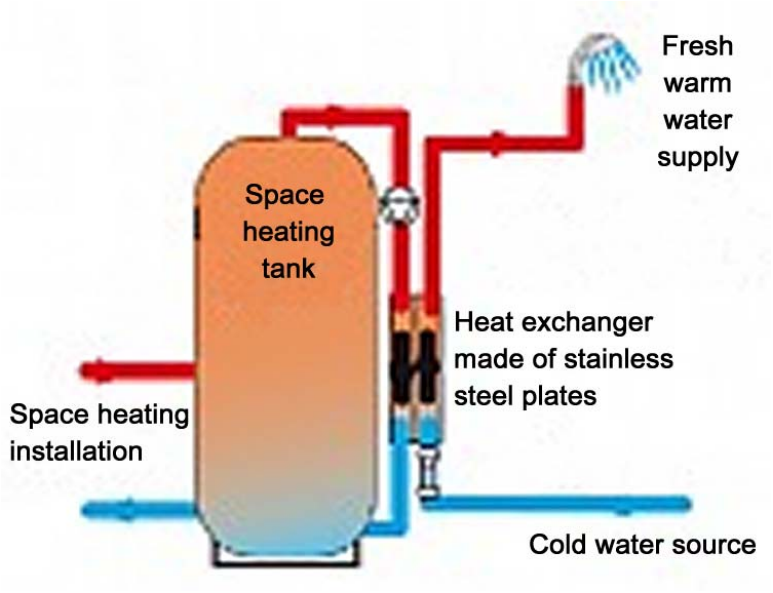
Additional parts of the ÖNORM focus on

- Microbiological checks and assessments

- Rehabilitation of supply systems
- Maintenance and measurements to prevent bacterial contamination
- Requirements for existing installations.

The hospital decided to install an instantaneous water heater (IDM Hygienik) that is based on a fresh water principle (Picture 2). The system consists of a tank with heated water, which is part of the central heating. The water from this system is used to heat up fresh water in a heat exchanger made from stainless steel plates, which then supplies the user with hot water. Thus tank water and hot water supply are strictly separated. It produces 140 litres of hot water a minute and provides about 90 basins and 35 showers with hot water [5]. The crucial part of the water heating system is the circulation line. The circulation heating exchanger guarantees a constant water temperature above 55 °C. The system does not need periodic heating up to prevent legionella growth.

Picture 2: Hot water heater by IDM Hygienik.



Source IDM Energiesysteme GmbH

3.4. What was achieved?

- Installation of a hot water supply system compliant with Austrian regulation ÖNORM B5019 in the new hospital building (Bauteil 6) that includes:
  - use of stainless steel for the whole system
  - installation of a instantaneous water heating system with circulation.
- Prevention of legionella growth in the hot water supply system

3.5. Success factors

At the beginning of the project there was a lot of scepticism about the change of water storage to the new instantaneous heater method, in which the cold water is directly heated up to 60 °C through a heat exchanger. But after two years the new water installation had proved a success. An important feature was the clear separation of the tank water and the hot water supply system, thus eliminating a large source of possible legionella contamination. In addition the system contains water at very high temperatures only in the tank circuit, which makes it economical.

3.6. Further information

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3.7. Transferability

Since the project fulfils the prescriptions of an Austrian standard it is transferable to other Austrian facilities. The standard applies mainly for new buildings and does not necessarily apply to existing hot water supply systems.

3.8. Abstract

A new water installation was implemented at the Hospital of Barmherzigen Schwestern Ried that conforms to the Austrian standard B5019 “Hygienic aspects of the planning, construction, operation, maintenance, surveillance and rehabilitation of central heating installations for drinking water”. This standard proposes technical measures to prevent Legionella infections. Dr Halabi, the responsible hygienist at the hospital, is the head of the standards committee on *Legionella* in Austria and he was very interested in implementing the standard at his hospital. After two years the success of the new water installation was evident

4. References, resources:

1. Angelbeck, J. A. , Ortolano, G.A., Canonica, F.P.,Cervia, J.S., Hospital water - a source of concern for infections, Managing Infection Control, 2006, http://www.pall.com/pdf/A_Source_of_Concern.pdf

2. Department of Human Services, *Managing the Risk of Legionnaires ' disease – Supplementary, Notes for Hospitals,* Public Health Division Victorian Government Department of Human Services Melbourne, Victoria, 2001, 34 pp. http://www.health.vic.gov.au/environment/downloads/suppnoteshospitals.pdf

3. Institut für medizinische Mikrobiologie und Hygiene Wien Nationale Referenzzentrale für Legionella-Infektionen, Jahresbericht 2007 der Nationalen Referenzzentrale für Legionella-Infektionen, AGES, 2008, http://www.bmgfj.gv.at/cms/site/attachments/3/5/9/CH0951/CMS1214392137719/legionellen_jb_2007.pdf

4. ON Österreichisches Normungsinstitut, Hygienerelevante Planung, Ausführung, Betrieb, Wartung, Überwachung und Sanierung von zentralen Trinkwasser-

5. Erwärmungsanlagen, (Hygienic aspects of the planning, construction, operation, maintenance, surveillance and rehabilitation of central heating installations for drinking water), ÖNORM B5019, 2007, to be purchased

6. IDM Hygienik, Wassererwärmung nach ÖNORM 5019: Krankenhaus Ried und IDM zeigen, wie es geht, website IDM, http://www.idm-energie.at/de/warmes-wasser-hygienisch-zuver.html

7. Personal communication with Dr. Halabi