
LEGIONELLOSE PREVENTION IN THE NETHERLANDS

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SUMMARY

New legislation has been introduced for the prevention of legionella pneumonia in drinking water systems. A temporary Emergency Act was withdrawn after two years. New rules appeared in the Water Supply Decree. The norm is 100 "colony-forming-units per liter" for water that is nebulized, e.g., water from a shower. The owner of the installation has to document a self-inspection program and has to analyze the water twice a year for the presence of legionella bacteria. The rules are restricted to high-risk locations, such as hospitals, hotels and swimming pools.

1 INTRODUCTION

Legionella bacteria have been identified as an important cause of community and hospital acquired pneumonia. The disease is caused by inhalation of a contaminated aerosol containing legionella bacteria. The lower respiratory system is infected. The disease develops as a severe pneumonia with a mortality of about 15%. Morbidity is also high because of toxic and chronic effects on the body. The disease is not transmitted from person to person. An outbreak is therefore always pinpointed to a certain location and there is no danger of an uncontrolled spreading of the disease.

The pathogenesis for humans is controlled by the hosts' susceptibility. Children and young people are seldom affected but elderly people and immuno-suppressed patients run a high risk of infection.

It is difficult to distinguish infections caused by legionella bacteria from other bacterial or viral infections of the human lung. Of all causes of pneumonia the legionella bacteria is believed to be responsible in approx. 5 % of all cases. The official

number reported to the health authorities is several times less than the real occurrence as shown by different studies. Therefore many legionella infections are probably not documented.

2 LEGIONELLOSE PREVENTION BEFORE 1999

In 1986, a report from the Health Council of the Netherlands urged effective measures to be taken in all hospitals to prevent hot tap water from being contaminated with the legionella bacteria. In all other large establishments preventive measures were not as urgent but a raise in temperature of hot water to 60°C at the tap should be seriously considered. The water in whirlpools should contain at least 0.5 mg chlorine. Also the adequate measures should be taken at air conditioning installations and cooling towers. Further measures should only be considered if epidemical evidence occurs. The importance of temperature management for hot tap water and regular cleaning and disinfection of air conditioning installations was recognized. The

Dutch Association of Water Supply Companies (VEWIN) arranged for an update of the installer standard for drinking water systems (NEN 1006). The hospitals reported every year about 45 patients with legionellose disease. The awareness about the danger of legionella infections remained low but that attitude changed dramatically in 1999.

3 THE OUTBREAK OF INFECTION

A large outbreak in the Netherlands in 1999 was caused by one non-disinfected whirlpool on a flower show at the city of Bovenkarspel. About 200 people were hospitalized and 28 persons died. The suspected whirlpool had been filled with tap water and the bath was demonstrated at high temperature for two weeks without refreshing the water or using a disinfectant. These circumstances allowed for growth of *Legionella pneumoniae*. After 4 days the first persons were infected. The tap water used for filling the tub was seen as the origin of the real hazard. In a very short time people neither did trust their domestic shower. There was a strong urge in society for action and the final elimination of this kind of danger.

The legionella hazard got high political interest. The Parliament asked for appropriate, sufficient and timely actions. Attention was not restricted to demonstration whirlpools but was focused on all water systems of domestic or industrial origin.

4 RISK OF INFECTION

The risk of infection is dependent on a number of factors. No dose-response model is known for the infection of humans by the legionella bacterium. Only when a group of people is exposed during an outbreak it is possible to derive the attack-rate. The attack-rate in Bovenkarspel was approx 0,2 percent. Other outbreaks elsewhere show about the same percentage. The risk of death is therefore 0,02 %. That kind of risk is not an acceptable value of protection for an exposed population to a contaminated drinking water system. To

determine a tolerable risk other factors must be taken into account such as the economic costs, the social preferences, the technical feasibility and the benefits.

5 PREVENTION IN COLLECTIVE DRINKING WATER SYSTEMS

The aim of drinking water guidelines is to provide values of protection for an exposed population. A negative health impact should be negligible. No guideline against protection of the legionella bacterium was available in the Water Supply Act. For the protection of the exposed consumer the Ministry of VROM issued in 2000 an Temporary Emergency Act on Legionella Prevention in Drinking water for a period of two years. The aim of the legislation was directed to the sanitation of the so called collective drinking water installations at; hospitals, hotels, swimming pools, office buildings, industrial buildings, shops and flats. (No prevention rules were made for the domestic households).

The Ministry of VROM chose for measures for all collective drinking water installations. The measures were aimed at creating an environment that is not conducive to survival or multiplication of *Legionella*. Those include adjusting of the correct temperature for cold and hot water and maintain the installation according to the technical standard NEN 1006.

6 RISK ASSESSMENT OF THE INSTALLATION

A mandatory risk assessment for the prevention of growth of the organism inside the installation was introduced by the Temporary Emergency Act for the collective drinking water installation. This self-inspection program consists of a risk-inventory and analysis based on a time/temperature scheme and a technical inspection of the installation. When a risk for the propagation of legionella is detected, technical measures must be taken to remove the risk or the risk must be controlled by hot-water flushing procedures as described in a control-plan.

7 THE OWNER OF THE COLLECTIVE INSTALLATION

The different owners of all collective installations were required to carry out an assessment of the safety of their drinking water. The Emergency Act contained a detailed scheme of the inventory- and risk analysis requirements. This leads to a self-inspection program that can be audited by a second party.

8 EVALUATION OF THE TEMPORARY EMERGENCY ACT

At the end of 2001 the Ministry of VROM started an evaluation on the compliance of the emergency regulation for the prevention of legionella in drinking water installations.

Public exposure to nebulization of possible contaminated water at small installations was low. A risk-assessment for this specific category showed a low hazard value, slightly above the household level. Also the epidemic survey for the source of infections by the health care authorities showed no record of incidents at these locations. Subsequently this low priority - but in size very substantial -category was removed from the Emergency Act.

The Inspectorate visited during the term of the Temporary Emergency Act approx. 500 installations. Water samples were taken from the cold and the hot drinking water system and analyzed for the presence of the bacterium. Most of the inspected locations were classified as

priority sites, such as hotels, hospitals and swimming pools. Inspection of the larger and more complex installations showed good compliance with respect to the presence of the mandatory risk-assessment.

9 EXIT TEMPORARY EMERGENCY ACT

The Temporary Emergency Act had to be withdrawn after a period of two years. The reduced prevention scheme is now introduced in the Water Supply Decree (28/12/2004) The number of locations with a mandatory self-inspection program is restricted to the larger public places, such as hospitals, hotels and swimming pools. The number of locations is reduced till approx. 12.000. This approach has been approved by the Parliament. The norm is increased to 100 "colony-forming-units per liter" and the mandatory microbial analysis is introduced. Because of these microbial analyses a better feedback for the effectiveness of the self-inspection program is assured.

The water supply companies have been assigned in the Water Supply Decree as auditor of the collective drinking water systems. They have to control the performance of the legionella prevention system. Furthermore they will control the technical quality of all collective installations (600.000) as demanded by the rules of NEN 1006. The water supply companies report their findings to the Inspectorate. The Inspectorate will enforce the law when needed.