Control of Legionella bacteria in Health Care Premises

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Legionella pneumophila survival

°C

Bacteria will be killed in time:
- 70°C: Instant kill
- 60°C: 90% kill in 2 minutes
- 40°C: 90% kill in 2 hours

Bacteria will multiply:

Bacteria will survive dormant:

Optimum temperature:

Temperature Range:
- 0°C to 10°C: Bacteria will survive dormant
- 10°C to 20°C: Bacteria will multiply
- 20°C to 40°C: Bacteria will remain viable
- 40°C to 60°C: Bacteria will be killed in time
- 60°C to 70°C: Instant kill
Recirculating Hot Water System

- Cold water feed
- Cold water storage tank
- Pump
- Calorifier
- Basins
- Baths
- Showers
- Hot water return
- Drain
Legionnaires’ disease
Route of infection

- Inhalation of aerosols most likely
- No evidence of person to person spread
- Legionella survive 2-3hrs in aerosols at relative humidity of 65%
- Aerosols created by water impacting surfaces
- Aerosols <5µ can enter alveoli
Legionnaires’ disease

- Rare infection – 4 cases per million capita per annum in UK (varies across Europe)
- 2% of all CAP’s in prospective studies
- 14 - 37% of severe CAPs (mortality >25%)
- Approx 300 cases reported per annum in UK
## Legionnaires’ disease in the UK

<table>
<thead>
<tr>
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<th>Incidence</th>
<th>Mortality</th>
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<tbody>
<tr>
<td><strong>Travel</strong></td>
<td>48%</td>
<td>11%</td>
</tr>
<tr>
<td>(43% abroad, 5% UK)</td>
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<tr>
<td><strong>Community</strong></td>
<td>46%</td>
<td>12%</td>
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<tr>
<td><strong>Nosocomial</strong></td>
<td>6%</td>
<td>32%</td>
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<td>(US 23%)</td>
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Nursing homes?
Reminder issued on legionella risk

Simon Duddy

The Health and Safety Executive has reminded nursing homes in Wales of their responsibilities on legionella after a campaign of inspections.

The inspections were carried out to look at the management of some specific health and safety risks at nursing homes across Wales during March and April.

The management of legionella risk and the correct use of bedrails were the main recurring areas of concern.

Of 28 homes inspected, three quarters were issued with at least one enforcement notice, and a total of 31 enforcement notices were issued.

As a result of the findings, HSE will be contacting nursing homes in Wales to remind them of their duties to manage health and safety, and will be providing training resources to help homes improve standards.

HSE Inspector Steve Scott, who led the initiative, said: “The sample is a small percentage of the total number of nursing homes in Wales, and we must stress that not every nursing home we visited was issued with an enforcement notice.

“Those who did receive an enforcement notice were extremely keen to address shortcomings when they were raised. Those homes were given a specified period of time to put matters highlighted right, and we are carrying out follow up visits to all of these premises to ensure that remedial action has been carried out.”

Pneumonia is a major cause of death in nursing homes
Be kind to your kids

......they chose your nursing home!
Legionnaires’ disease in the community in the UK

<table>
<thead>
<tr>
<th>Year</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
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<tbody>
<tr>
<td>%</td>
<td>41%</td>
<td>47%</td>
<td>57%</td>
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Big rise in Legionnaires' cases

Health experts are investigating a surge in the number of reported cases of potentially deadly Legionnaires' disease in England and Wales.

The Health Protection Agency has been notified of 127 cases since the start of August - and the number is expected to rise further.

This compares to 63 reported cases in August 2005.

One cluster of four cases in North East Lincolnshire include that of a teacher who died from the disease.

Another cluster includes six men aged between mid-30s and 70 who have been treated at the Norfolk and Norwich University Hospital.

And three people are being treated in a Shrewbury...
Climate change could lead to a surge in Legionnaires’ disease

By Rebecca Smith, Medical Editor
Last Updated: 12:08pm BST 17/06/2009

Climate change could lead to a surge in cases of Legionnaires’ disease, Government scientists have warned.

- Arctic sea ice melting slower, for now

A study carried by the Health Protection Agency has found that higher temperatures and increases in humidity are linked with an increase in cases.

The study, one of the first of its kind in Europe, found that heatwaves corresponded to higher cases of the disease than periods of more stable weather.

The findings presented at the Health Protection Agency’s annual conference at Warwick University found in 2006 - when temperatures reached 35.5 degrees (97.7F) - there were 551 reported cases and 52 deaths from legionnaires compared with 389 reported cases the previous year, which was cooler.

Kate Ricketts, a scientist specialising in Legionnaires’ disease at the Agency’s Centre for Infections, said: “In this study there appears to be an increase in cases following warm, humid periods; this was especially
cold water recirculation and flushing

- Recirculating CWS and improved insulation reducing stagnation and heat gain
- Water storage kept to minimum
- Water flushed to waste if design temperatures are exceeded
- No pumps - uses Venturi principle

Quality is our standard · since 1864
Second baby dies at Cyprus hospital

By STAFF REPORTER 03 JAN 09

A second baby has died due to an outbreak of the rare Legionnaires' disease at a hospital in Nicosia.

The fortnight-old infant, who was born in a private clinic, died earlier today in the intensive care unit at Makarios Hospital, where it had been admitted along with other infants after falling ill.

The director of the Makarios Hospital Pediatric Clinic and Head of the Intensive Care Unit, Andreas Hadjidemetrou, told CNA that the child had passed away in the early hours of this morning.

Two more infants are on respirators while last Tuesday another infant died at the same hospital.

A total of infants are being treated in the unit, receiving treatment for pneumonia. Seven of them are now said to be in a better condition.

Laboratory analyses showed that all of the children are suffering from Legionnaires’ disease, also known as Legionellosis, an acute respiratory infection caused by bacteria. However, according to Hadjidemetrou, the final laboratory examinations will be announced next week.

The infants being treated in the intensive care unit were born between December 17 and 22 at the private clinic. However, the neonatal unit of which will remain closed until the examinations are concluded.

Legionnaires is a potentially fatal form of pneumonia, caused by an airborne bacteria normally generated in moist environments.
Staphylococcus aureus (MRSA)
Royal Liverpool University Hospitals

Patients with MRSA

- Chart showing the increase in patients with MRSA from 1983 to 2005.
Have you gelled your hands?
Health Technical Memorandum 04-01
The control of Legionella, hygiene, “safe” hot water, cold water and drinking water systems
Part A: Design, installation and testing

Part B: Operational management
HTM 2040/27 ➔ HTM 04-01

Major differences

- Flush outlets at least twice weekly
- Legionella sampling advised (ICT to manage)
- Biocide treatment useful, but lowering temperature not advised
- POU filters – temporary use
- New builds - treat the water with an effective biocide from day 1
NHS Estates

HFN 30

“...avoid swan necks where possible”
Swan neck and downward displacement taps
RADA Unatherm-3LL & 3HL
Downward displacement

\[ v \]

Swan neck taps
8 month study

Test rig under construction
Factors encouraging colonization by legionellae

- Temperature between 20°C and 45°C
- Water stasis
- Sludge/rust (hot water heaters & cooling towers)
- Plastics, hemp, rubber
- Paraffin wax based flux
- Pipe jointing compounds (linseed oil based)
Dead-legs
Water stasis
Non-touch fittings in hospitals: a possible source of Pseudomonas aeruginosa and Legionella spp.

M. Halabi†, M. Wiesholzer-Pittl†, J. Schöberl† and H. Mittermayer†

*Department of Pathology and Microbiology, †Infection Control Team, Krankenhaus der Barmherzigen Schwestern Ried im Innkreis, A-4910 Ried im Innkreis, ‡Department of Hygiene, Microbiology and Tropical Medicine, Krankenhaus der Elisabethinen Linz, Fadingerstrasse 1, A-4020 Linz, Austria

Summary: Non-touch fittings are gradually becoming very common in the bathrooms and toilets of public facilities and restaurants. Hospitals and other healthcare facilities have recently started to install these types of water taps to lower water consumption, thus saving costs, and to prevent healthcare workers from touching the tap, thus promoting hygiene. This study analysed the bacteriological water quality of 38 non-touch water taps in different settings in a 450-bed secondary-care hospital in Upper Austria. Two different tap types were installed: 23 taps were without temperature selection and 15 were with temperature selection (cold and warm). A membrane filtration method was used, and the authors screened for both indicator organisms and Pseudomonas aeruginosa in 100 ml water samples. In 10 non-touch taps without temperature selection, the authors also screened for Legionella spp. in 500 ml water samples. Seventy four percent of the taps without temperature selection and 7% of the taps with temperature selection showed contamination with P. aeruginosa (*P < 0.001). None of the taps showed contamination with indicator organisms. Detailed analysis of the source of contamination revealed that the magnetic valve and the outlet itself were heavily contaminated, whereas the junction from the central pipe system was free of contamination.

All 10 analysed taps showed contamination with Legionella spp. It was concluded that the local contamination of non-touch fittings is a result of the low amount of water that flows through the outlet, the low water pressure and the column of water, which is ‘still-standing’ and has a temperature of about 35°C, thus providing nearly ideal growth conditions for P. aeruginosa. Additionally, the presence of materials such as rubber, PVC, etc. in the fittings enhances the adhesion of P. aeruginosa and thus the production of biofilms. In conclusion, the authors wish to encourage infection control teams to evaluate the use of non-touch fittings in hospitals, especially when they are installed in risk areas.

Keywords: Non-touch fittings; hospital; nosocomial infection; Pseudomonas aeruginosa; Legionella spp.
Intelligent hands-free systems

Rada Sense
FLEXIBLE CONNECTOR ON SUPPLY TO TAP ROOM 1 - 8.
WRe - Growth of Microorganisms test (BS 6920)
Bacteria find delays hospital move
Sep 19 2005
By Liz Hazelton

Walsgrave Hospital bosses have delayed moving into new buildings after potentially-killer bacteria was found in the water.

Staff at the Coventry hospital discovered legionella, which causes the lung infection Legionnaires' disease, in the new radiotherapy unit this month.

Patients were due to move across to the building on September 12 but the transfer has now been delayed.

Walsgrave staff estimate it will take about four weeks to ensure the water supplies are clear.

A hospital spokesman said: "All buildings get regularly treated and the legionella was found as a result of routine maintenance."

"Immediate action was taken to eradicate it from the system. No patients have been affected and we have postponed moving into the new buildings."

"We're hoping to give it about four weeks to make sure everything's clear."
Hot and Cold Water Systems
Controlling the risk of legionellosis

- High and low temperatures
- Chlorine
- Chlorine dioxide
- Copper and silver ions
- Silver and hydrogen peroxide
- Regular flushing of outlets
- Self-purging showers
- UV irradiation and filters
- Point of use filtration
The 'deadly threat' to kidney dialysis patients from hospital water supply

BY DANIEL MARTIN
Last updated at 11:37 PM on 28th October 2008

Kidney dialysis patients could be at risk from a chemical added to hospital water supplies to kill bugs.

Hospitals have been alerted after one man died and six others were taken seriously ill at a dialysis unit in Leicester.

They were affected by the use of hydrogen peroxide containing microscopic particles of silver, which is used in many hospitals to kill the bacteria that cause legionnaires' disease.
Hot and Cold Water Systems
Controlling the risk of legionellosis

- High and low temperatures
- Chlorine
- Chlorine dioxide
- Copper and silver ions
- Silver and hydrogen peroxide
- Regular flushing of outlets
- Self-purging showers
- UV irradiation and filters
- Point of use filtration
Hot and Cold Water Systems
Controlling the risk of legionellosis

Point of use filtration
HSC Guidance - control of legionella

- 1987 - EH48
- 1992 - ACoP + HS(G)70
- 1995 - HS(G)70 (revised)
- 1998 - H&CWS (supplement)
- 2001 - ACoP & Guidance (L8)
Adiabatic coolers
Safety Notice

NHISESN(96)06

15 August, 1996

Product: Evaporative type cooling fan
Manufacturer/Supplier: Various
Problem: Risk of infection
Action: Withdraw from service and obtain approval of Infection Control Team before continuing use

To the Chief Executive/Board Member with special responsibility for health and safety. In accordance with local procedures for managing health and safety, this Notice should be brought to the attention of appropriate staff who should take the following action:

Either
1. Withdraw from service all cooling fans providing evaporative cooling whereby water from a reservoir saturates a membrane/screen in the air path.
Or
2. Ensure that the water reservoir is disinfected by an effective method and monitored by the Infection Control Team;
3. Ensure that the water from the fan is not taken from the dead end branch of any water system;
4. Ensure that the water is stored for the shortest practicable time;
5. Obtain approval from the Infection Control Team before putting into service.

Background
6. The Department has received a report highlighting the potential for risk of infection associated with the use of cooling fans providing evaporative cooling whereby water from a reservoir saturates a membrane/screen in the air path.
7. The use of such fans cannot be recommended in healthcare premises where patients may be susceptible to airborne infection. However, if a fan cannot be taken out of service for operational reasons, its use must be authorised and monitored by the Infection Control Team.

Enquiries
8. Enquiries to NHS Estates should be addressed to:

Mr Ian Batterby
NHS Estates Department of Health
Trevelyan Square
Boar Lane
Leeds LS2 6AE
Tel: 0113-254 7052 (Ext)
Fax: 0113-254 7299

HOW TO REPORT DEFECTS AND FAILURES
All staff working in a healthcare environment have a responsibility to report any defect or failure that occurs at work to the Department of Health. Guidance for reporting such incidents is contained in Estates Policy Letter EPL/05/16, issued in July, 1995. If you are in any doubt about the reporting procedure, please seek advice from your line manager or the Department of Health.
Biofilm and Legionella colonisation of plumbing materials

Biological growth relative to glass

[Graph showing the comparison of biological growth on different plumbing materials relative to glass. The x-axis represents materials including Copper, Glass, Polybut, Polyprop, uPVC, cPVC, Eth-Prop, and Latex. The y-axis represents the growth in logarithmic scale ranging from 0.1 to 1000. The graph compares total flora and Legionella specifically.]
WHO Legionella guidelines 2007

Elderly, smokers, alcoholics

Target level <1000cfu/l L. pneumophila
Alert level 1000 cfu/l L. pneumophila
Max level 10,000 cfu/l L. pneumophila

High risk patients
Severe immunodepression, transplantation, corticotherapy = 0.5mg/kg per day prednisilone for 30 days or more, or 5mg/kg/day for 5 days or more

Target level not detectable (?POU filters)
Alert level 250 cfu/l Legionella spp
Why are we still seeing outbreaks of Legionnaires’ disease?
- HSE findings

- Poor management
- No clear lines of responsibility
- Poor communication
- Lack of competence
- Poor quality suppliers
- Lack of investment