Can dust and water harm you?

Carol Robinson CNM3
Infection Prevention and Control
SIVUH

A TRADITION OF INDEPENDENT THINKING

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

What are we going to discuss here today?

- *Legionella*
- *Aspergillus*

Some bacteria not covered are *Pseudomonas spp, Cryptosporidiosis*, *Acinetobacter spp, Enterobacteriaceae*

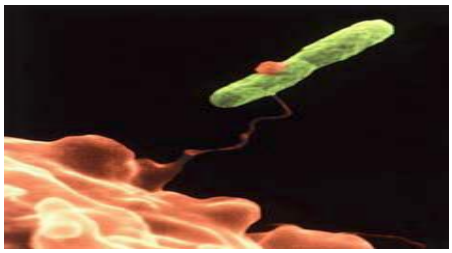
For further information on these;

Guidelines for the Prevention and Control of Infection from Water Systems in Healthcare facilities

Published by the HPSC on 12th August 2015

UCC

Legionella



An amoeba entrapping a L. pneumophila bacterium. Courtesy of Fields BS. Legionella and protozoa: interaction of a pathogen and its natural host. Legionella, current status and emerging perspectives. Washington DC: ASM Press, 1993

Where did in come from?

- Identified in 1977 after 34 attendees of a American Legion Convention in a hotel in Philadelphia died of an unknown illness
- The Central Disease Council (CDC) interviewed 4,400 legionnaires and their families.
- They also collected hundreds of environmental samples.
- They isolated a new bacterium that was responsible for the outbreak.
- Further investigation showed that the bacterium thrived in the air conditioning system cooling tower and had been pumped throughout the hotel.

Legionella pneumophila

It was called legionella because of the group of people they isolated the bacterium from.

and

Pneumophila because it likes the lungs (Greek Lung-loving)

To date at least 50 legionella species and 70 Serotypes have been described.

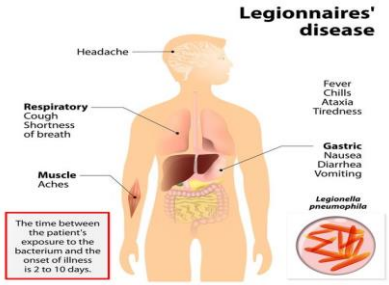
Legionella pneumophila serogroup 1 being responsible for 70-90% of the all cases of legionnaires disease.

Clinical aspect of *Legionella*

Legionella bacteria can cause two distinct clinical syndromes

- First is pontiac fever, a flu-like illness. The incubation period is usually 1-2 days. Patients recover spontaneously in 2-5 days
- Second legionnaires' disease which is a severe and potentially fatal form of pneumonia. Incubation period 2-10 days

Signs and symptoms



Diagnosis

- Laboratory criteria for case confirmation:
- At least one of the following three
- Detection of *Legionella pneumophila* antigen in urine.
- Isolation of any *Legionella* spp. from respiratory secretions
- *Legionella pneumophila* serogroup 1-specific antibody response

Number of cases notified in Ireland

Year	Number of cases
2006	13
2007	16
2008	11
2009	7
2010	11
2011	7
2012	15
2013	14

Risk of Infection

- People over 40 years of age
- Males
- Smokers
- Excess intake of alcohol
- Immunocompromised organ transplant patients, patients with HIV/AID, and those receiving systemic steroids.
- Patients with chronic underlying disease such as diabetes mellitus, congestive heart failure, COPD and chronic liver failure.

- It reproduces in high numbers.
- Water temperatures in the range 20°C to 45°C favors the growth of legionella.
- They do not multiply below 20°C and do not survive above 60°C .
- It also reproduces in stagnant water such as water systems not in use on regular basis
- Organic matter such as scale and biofilm which harbour the bacteria allowing it to reproduce further.

Sources

Methods of transmission

- Inhaled via legionella contaminated aerosols.
- Aspiration of water contaminated with legionella.
- No evidence of person-to-person transmission.

What control measures can be used for Legionella

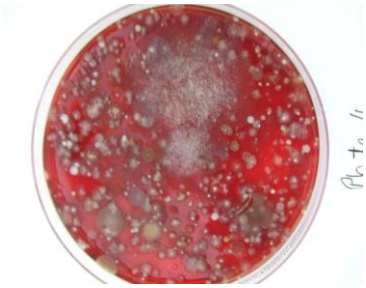
- Risk assessment.
- Flushing of unused water outlets
- Record Keeping.
- Temperature control.
- Change and disinfection of Shower heads and flexible hoses if used.
- Regular water sampling
- Audit

Aspergillus

What is Aspergillus?

- *Aspergillus* is a fungus (or mold) that is very common in the environment. It is found in soil, on plants and in decaying plant matter. It is also found in household dust, building materials, and even in spices and some food items CDC 2008

- Healthcare associated outbreaks of aspergillosis have become a well-recognised complication of construction, demolition or renovation work in or near hospital wards in which immunosuppressed patients are housed.
- *Aspergillus* spores are superbly adapted to airborne dissemination.
- Hospital outbreaks of aspergillosis have been reported, in transplantation units, haematology and oncology units, intensive care units, renal units and medical wards where immunosuppressed patients were nursed.
- The respiratory tract is the most common portal of entry and the small diameter of the spores (2.5–3.5 μm) permits them to reach the pulmonary alveolar spaces, where they may germinate to form hyphae



- Building work should be regarded as any renovation, redecoration and maintenance work that involves disturbance to any fabric of the building, including ceiling tiles.
- The key to eliminating *Aspergillus* infection is first to minimise the dust generated during construction activity and second, to prevent dust infiltration into adjacent patient care areas.

Control measures to be considered /put in place

- IPCN should Educate staff on preventative measures.
- Complete risk assessments of area.
- Dry wall/plastic barriers
- Dust containment measures.
- Ventilation ducts must be sealed
- Seal windows.
- Divert patient traffic where possible.
- Air should be exhausted to the outside of the building if this is not possible air should be filtered through Hepa filters.
- Building site workers should be as far away as possible from patient care areas
- Carpet should be place inside the exit.

Control Measures continued

- A lift should be designated for the sole use of the construction workers, or where possible external hoist system
- Any waste material must be removed with minimal creation of dust.
- All areas must be terminally cleaned prior to use.
- The IPCN is to inspect areas to ensure that they have been cleaned appropriately.

Control Measures continued

- When building work is finished ventilation/ air conditioning systems to be checked.
- If it is necessary for a severely immunocompromised patient to be transported near to a construction area they should wear a fit-tested *(PFR 95) which gives a greater than 95%* filtration
- Antifungal chemoprophylaxis maybe considered in at-risk patients
- Environmental sampling of air during building work will be carried out as deemed necessary by the IPCT

Classification of at-risk patients

At-risk patients may be categorised as follows:

Group 1 ~ No evidence of risk

1. Staff members, Service Providers and Contractors
2. All patients not listed in Groups 2 – 4 below

ACTION: Environmental measures and inform Infection Control Team.

Group 2 ~ Increased risk

1. Patients on prolonged courses of high dose steroids particularly those hospitalised for prolonged periods
2. Severely immunosuppressed AIDS patients
3. Patients undergoing mechanical ventilation
4. Patients having chemotherapy who are not neutropenic
   (Neutropenia defined as absolute neutrophil count (ANC), <1x10$_9$/l)
5. Dialysis patients

ACTION: Environmental measures **may** be sufficient but a risk assessment should be provided by the Infection Control Team.

Group 3 ~ High risk

1. Neutropenia for less than 14 days following chemotherapy
2. Adult acute lymphoblastic leukaemia (ALL) on high dose steroid therapy
3. Solid organ transplantation
4. Chronic Granulomatous Disease of Childhood (CGDC)
5. Neonates in intensive care units (ICU)

ACTION: Removal from ward area if possible, or consider postponing immunosuppressive treatment, commencement of antifungal prophylaxis plus environmental measures.

Group 4 ~ Very high risk

1. Allogeneic bone marrow transplatation
   a. during the neutropenic period
   b. with graft versus host disease
2. Autologous bone marrow transplantation, i.e. during the neutropenic period
3. Peripheral stem cell transplantation, i.e. during the neutropenic period
4. Non-myeloablative transplantation
5. Children with severe combined immuno-deficiency syndrome (SCIDS)
6. Prolonged neutropenia for greater than 14 days following chemotherapy or immunosuppressive therapy
7. Aplastic anaemia patients

ACTION: Removal from ward area if possible, or consider postponing immunosuppressive treatment, commencement of antifungal prophylaxis plus environmental measures.

In each of the four risk categories the Infection Control Team must be consulted.

Main points

- Ensure risk assessments are completed.
- Ensure all documentation is completed.
- Ensure all control measures are put in place.

References

- Garrett L (1994)cited in Lane et al (2004)Legionnaires disease A Current Update Med Surg Nursing.
- HSE/HPSC Subcommittee of the Scientific Advisory Committee (2009). National Guidelines for the Control of Legionellosis in Ireland, 2009 Report of Legionnaires' Disease .
  Available at http://www.hpsc.ie/hpsc/A-Z/Respiratory/Legionellosis/Publications/File,3936,en.pdf
- NDSC (2002)National Guidelines for the Prevention of Nosocomial Invasive Aspergillosis During Construction/Renovation Activities
  Available at www.hpsc.ie

Thank you for listening

Any questions ?