Epidemiological Investigations of Healthcare Associated LD: Local Experience

Dr. Tonny NG
SMO(Epidemiology Section)
Surveillance and Epidemiology Branch, Centre for Health Protection
Dec 2011

© TemplatesWise.com

Epidemiological Investigation of LD cases

Case investigation

Environmental investigation

Management of exposed persons

Control Measures and Follow-up

Risk Communication

Aims of Ix

- Source identification (risk-based approach)
- Apply control measure to prevent further spread

Field Investigation

- Potential sources are poorly maintained water system with generation of water droplet / aerosol as well as re-circulated / stagnant water
- Common items: cooling towers, humidifiers, cool fans, shower facilities, respiratory therapy equipments, spa pool
- Storage vs Instantaneous type water heater
- Filter unit

Possible Control Measures

- Suspension of contaminated facilities
- Source elimination (e.g. replacement of shower head and host, remove high risk device)
- Disinfection+ Follow-up sampling
- Maintenance plan

Notification

- On 2 April, 2011, CHP was notified by PHLSB of a case of legionnaires' disease affecting an 81-year-old Chinese lady confirmed by demonstration of *Legionella pneumophila* serogroup 1 antigen in urine

Case History

- Past health: non-smoker, with hypertension and congestive heart failure on medication
- Admitted to a public Hospital on 3 March, 2011 for abdominal pain and diarrhoea for 2 days and developed shortness of breath
- Perforation of duodenal diverticulum diagnosed by CT abdomen
- Operation was done on 9 March

Case History

- CXR showed bilateral upper lobe infiltrates since 23 March
- No cough all along, only kick of fever after operation
- CSU (1 April) for *Legionella pneumophila* serogroup 1 antigen positive on 2 April by PHLSB
- Sputum (1 April) culture: no *Legionella* species

Social history

- Housewife, lived with her husband, usually stayed at home

- No Travel history for the past one month

Case investigation

- No definite date of symptom onset
- Problem to define incubation period
  - Range: 2-10, common 7 days
- Acute infection or recent infection?

Case investigation

- Serum taken on 22/3/2011, 1/4/2011 and 7/4/2011 for *Legionella pneumophila* Ab done by PHLSB were all <1:32
- Serial CXR reviewed
- Responsive to antibiotic
- Other possible source considered

Exposure history

- No exposure history to fountain, spa, jacuzzi or swimming pool before admission
- Not using any mist generating device at home
- No history of using steam inhalation device or other mist generating device in ward

Movement within hospital

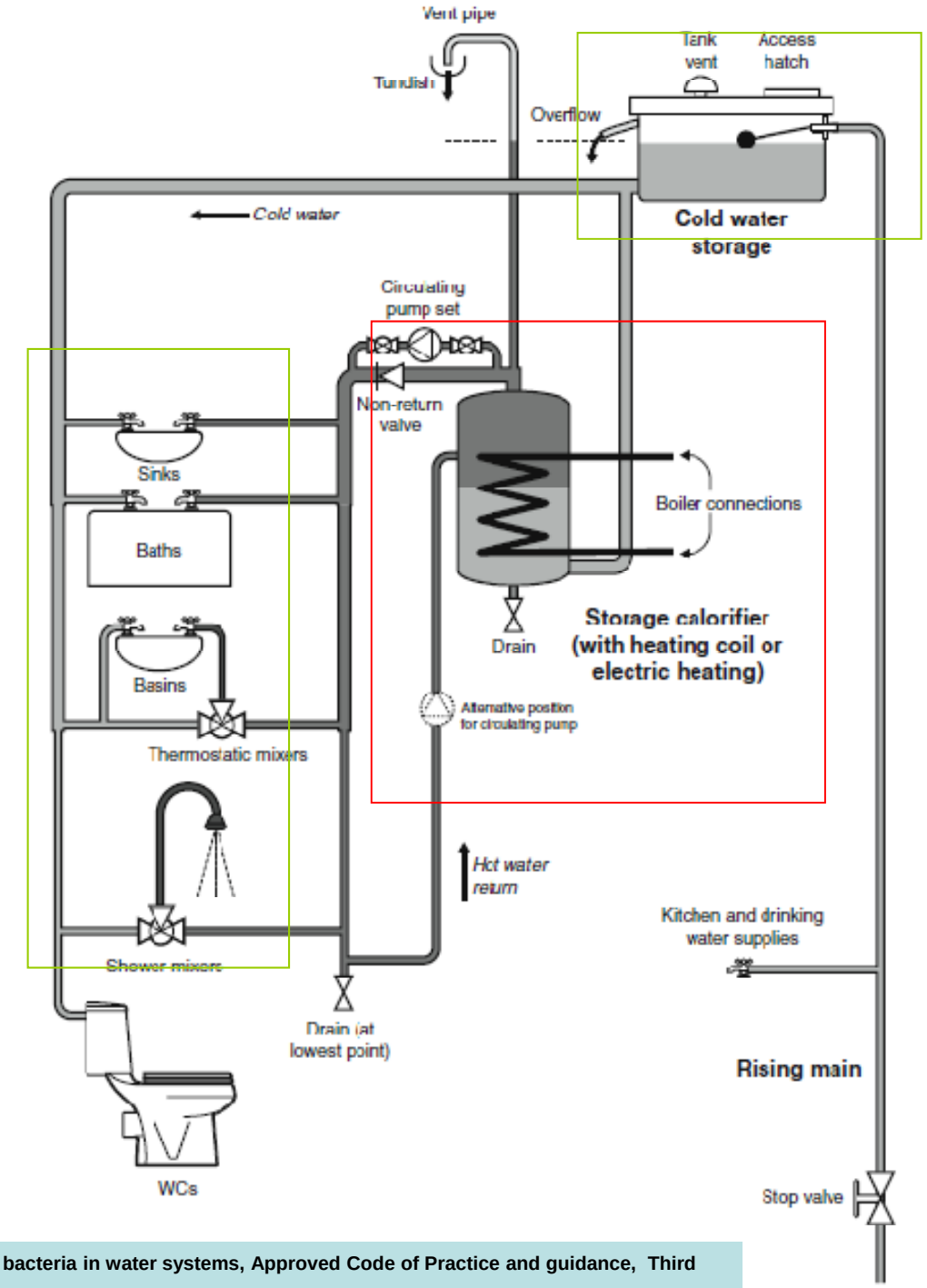
- Admitted to the public hospital since 3 March, 2011, no home leave since then

- B1 (4/3/2011) -> B5 (5/3/2011)-> C4 (HDU)(5/3/2011) -> F3 OT theatre (9/3/2011) -> C2 (ICU)(10/3/2011) -> C4 (13/3/2011)

Environmental Investigation

- Joint field visit with engineers from EMSD to the hospital conducted on 4 April
- Water supply system layout plan reviewed
- Ward C4 and C2 was inspected to identify high risk device and nursing practice
- Samples collected at strategic location of the water supply system

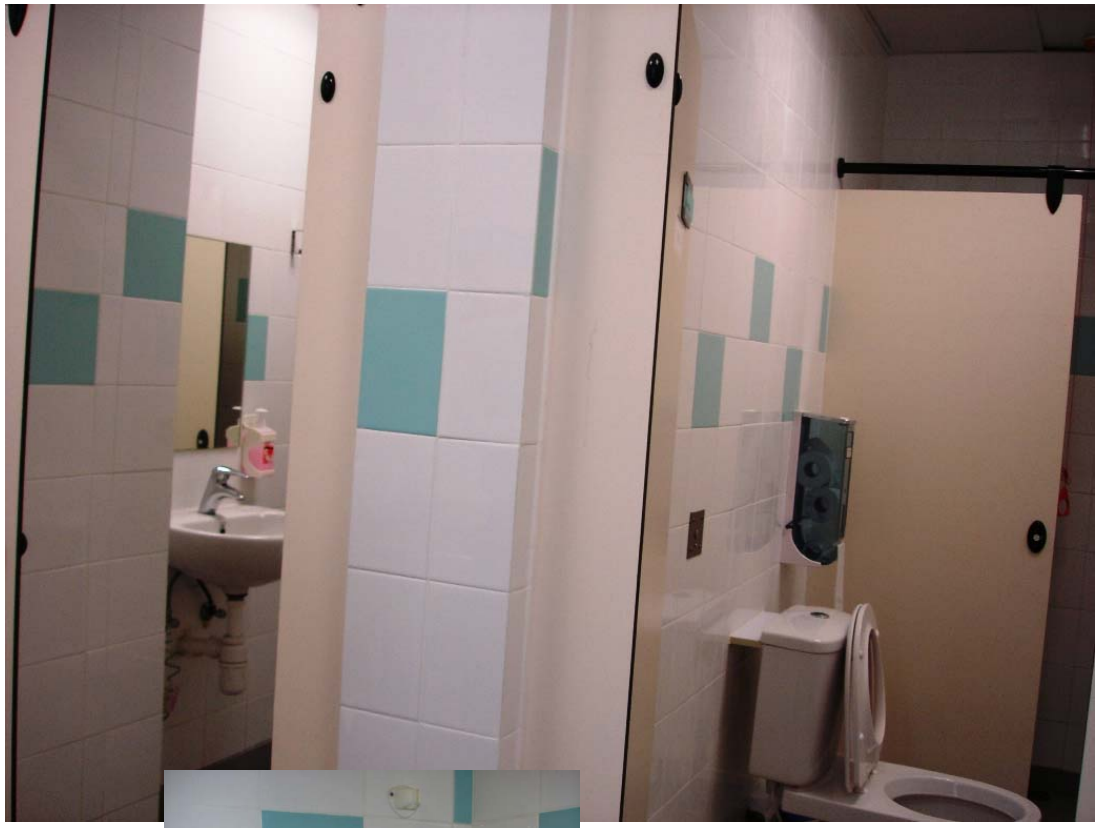
Sampling strategy

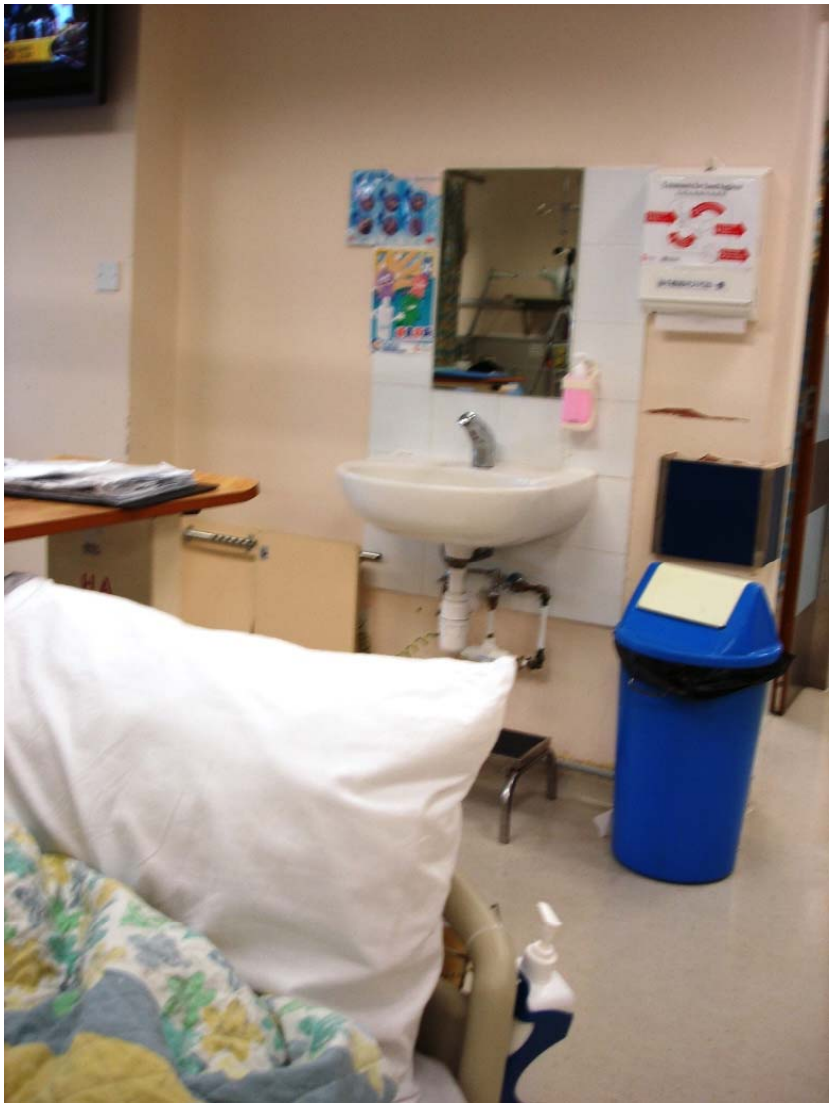


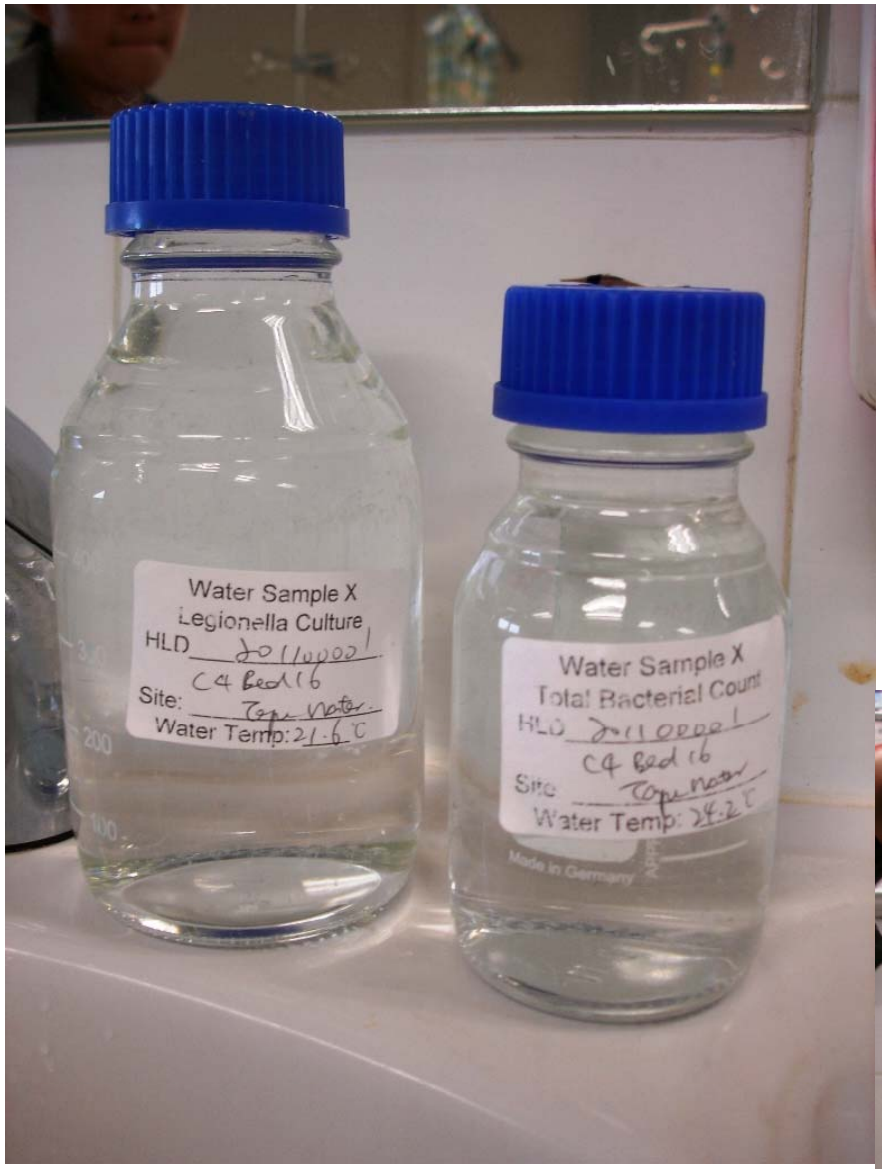
Legionnaires' disease, The control of legionella bacteria in water systems, Approved Code of Practice and guidance, Third edition, Health and Safety Executive

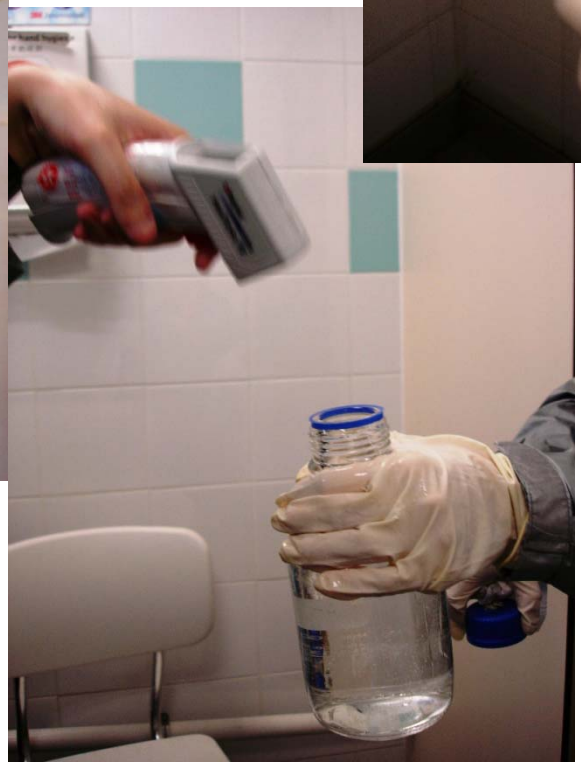
C2 ward

C4 Ward



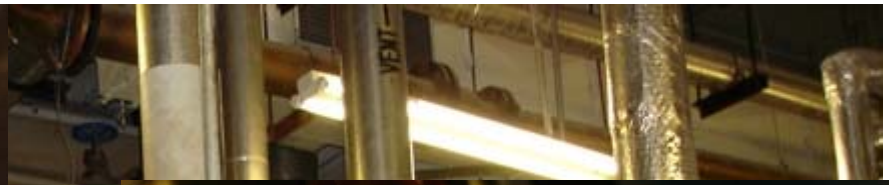



Water Sample X
Legionella Culture
HLD 20110002
C4 Bed 16
Site: Tap Water
Water Temp: 21.6°C
Water Sample X
Total Bacterial Count
HLD 20110002
C4 Bed 16
Site Tap Water
Water Temp: 24.2°C
Made in Germany



Water sampling
at the source


20
40
60
80
100
2 B H 3



Environmental Investigation (2)

- Patient's residence:
  - water samples collected from bathroom tap, shower and kitchen tap for *Legionella* species and total bacterial count (TBC)
  - environmental swabs collected from bathroom shower for *Legionella* species

Kitchen and Bathroom at Patient’s Residence

Action Levels for *Legionella* in Hot & Cold Water Systems

	Sources	**Legionella Bacteria (cfu/ml)**				
		>0.1 to <1	**>1**	**≥1 to <100**	**>10**	**>100**
UK	(HSE, 2000)	(UK1) Action depends on whether just one or two or the majority of samples are positive; review of control measures and risk assessment required; possible disinfection.	(UK2) Immediate review of the control measures and risk assessment required; possible disinfection.			
SA (warm water systems only)	(South Australian Health Minister, 2008)				(a) **Required immediate decontamination**	
EU	(EWGLI, 2005)		(a) Same as (UK1)		(a)Same as (UK2)	
The Netherlands	(WHO, 2007)		**Immediate action** is needed to prevent closure of (part of) system involved.			
US					**Prompt cleaning** and/or biocide treatment of the system	Immediate cleaning and/or biocide treatment; **take prompt steps to prevent employee exposure**

Locations	*Possible Sources*	*Swab Sample*	*Water Samples (cfu/ml)*
ICU C2 – Bed No.7	Tap water	/	TBC: 1/ml Total legionellae per ml: 0.4 Legionella pneumophila serogroup 1 per ml: <0.1 Legionella pneumophila serogroup 2-14 per ml: 0.3 Legionella species per ml: 0.1
C4 – Patient toilet	Left bathroom shower	Showerhead: -ve Hose of shower: +ve for Legionella species	TBC:180/ml Total legionellae per ml: 12 Legionella pneumophila serogroup 1 per ml: <0.1 Legionella pneumophila serogroup 2-14 per ml: <0.1 Legionella species per ml: 12
C4 – Patient toilet	Left bathroom shower w/o showerhead & hose	/	TBC: 110/ml Total legionellae per ml: 3 Legionella pneumophila serogroup 1 per ml: <0.1 Legionella pneumophila serogroup 2-14 per ml: <0.1 Legionella species per ml: 3
C4 – Patient toilet	Right bathroom shower	Showerhead: -ve Hose of shower: +ve for Legionella species	TBC: 1900/ml Total legionellae per ml: 0.1 Legionella pneumophila serogroup 1 per ml: <0.1 Legionella pneumophila serogroup 2-14 per ml: <0.1 Legionella species per ml: 0.1
C4 – Patient toilet	Right bathroom shower w/o showerhead & hose	/	TBC: 130/ml Total legionellae per ml: 2 Legionella pneumophila serogroup 1 per ml: <0.1 Legionella pneumophila serogroup 2-14 per ml: <0.1 Legionella species per ml: 2
C4 – Bed No. 16	Tap water	/	TBC: 38/ml Total legionellae per ml: 0.2 Legionella pneumophila serogroup 1 per ml: <0.1 Legionella pneumophila serogroup 2-14 per ml: <0.1 Legionella species per ml: 0.2
Main Block	Water tank	/	TBC: Nil Total legionellae per ml: <0.1

Locations	***Possible Sources***	***Water Samples***
G/F., Main Bldg. POD Room C1 Wash basin	Hot tap water	TBC: 1/ml Total legionellae per ml: 1.9 Legionella pneumophila serogroup 1 per ml: <0.1 Legionella pneumophila serogroup 2-14 per ml: <0.1 Legionella species per ml: 1.9
G/F., Main Bldg. POD Room C1 Wash basin	Cold tap water	TBC: 20/ml Total legionellae per ml: 73.0 Legionella pneumophila serogroup 1 per ml: <0.1 Legionella pneumophila serogroup 2-14 per ml: <0.1 Legionella species per ml: 73.0
7/F., Main Bldg. Ward B7 Wash basin	Cold tap water	TBC: nil Total legionellae per ml: <0.1
7/F., Main Bldg. Ward B7 Wash basin	Hot tap water	TBC: 1/ml Total legionellae per ml: 0.1 Legionella pneumophila serogroup 1 per ml: <0.1 Legionella pneumophila serogroup 2-14 per ml: 0.1 Legionella species per ml: <0.1

Home Env. Sampling results

Item	*Locations*	*Possible Sources*	*Swab Sample*	*Water Samples*
1.	Kitchen	Tap water	/	TBC: 1/ml Total legionellae per ml: <0.1
2.	Toilet – wash basin	Tap water	/	TBC: 1/ml Total legionellae per ml: <0.1
3.	Toilet – (w/ hot pool electric storage water heater)	Shower	/	TBC: 180/ml Total legionellae per ml: <0.1
4.	Toilet – (w/ hot pool electric storage water heater)	shower w/o showerhead & hose	Showerhead and hose of shower : -ve	TBC: 39/ml Total legionellae per ml: <0.1

Control Measures

- Immediate suspension of the affected water outlets
- Arrange for disinfection of whole water supply system with assistance from EMSD follows by repeat sampling
- To develop a water supply system maintenance plan (a task force was set up to draw up a maintenance plan for HA hospital)
- In the meantime, the hospital had also stepped up relevant infection control measures (esp. in wards with high risk patients)

Contact tracing

- Household contact
  - Husband asymptomatic all along during the surveillance period
- Hospital contacts
  - Discharge records reviewed and symptomatic contacts were screened for LD antigen with urine test via hospital infection control team
- Enhanced surveillance (1 April to 31 Oct)
  - 542 urine samples tested for legionella antigen were all -ve

Risk Communication

2 April 2011

CHP investigates case of Legionnaires' Disease

The Centre for Health Protection (CHP) of the Department of Health is investigating a confirmed case of Legionnaires' Disease involving a 81-year-old woman living in Aberdeen.

The patient, who had underlying medical illness, was admitted to Queen Mary Hospital for abdominal pain and shortness of breath on March 3. Urine test revealed today (April 2) that the patient was infected with Legionella bacteria. The patient is now in stable condition.

She has no recent travel history. Her home contacts are asymptomatic. Investigation is on-going.

Information on Legionnaires' Disease and advice on prevention can be found at the CHP's website, www.chp.gov.hk .

Ends/Saturday, April 2, 2011

Go to top

2008 © | Important Notices | Privacy Policy

Department of Health

The Centre for Health Protection is a professional arm of the Department of Health for disease prevention and control

Printer friendly

11 April 2011

Update on CHP's investigation into Legionnaires' Disease case

The Centre for Health Protection (CHP) of the Department of Health has provided an update on its investigation into an earlier confirmed case of Legionnaires' Disease (LD) involving an 81-year-old woman admitted to Queen Mary Hospital (QMH).

A spokesman of the CHP said that the Centre has enhanced medical surveillance in wards where the patient stayed, including laboratory testing for symptomatic cases. So far. no additional cases were identified.

Preliminary laboratory results on the water samples taken from two wards of QMH where the patient had stayed revealed the presence of Legionella species (non-Group One Legionella pneumophila).

"Up until now, no Legionella pneumophila (Group One) was found in the collected environmental samples. LD is usually caused by Legionella pneumophila (Group One). "

"The source of infection is being investigated and further laboratory test is going on.

"CHP has advised QMH on appropriate follow up measures including the suspension of related water supply facilities for disinfection. QMH has also stepped up relevant infection control measures," he said.

The patient, who had been admitted to QMH on March 3, was discharged on April 5 in stable condition. Investigation continues.

Legionella bacteria are found in various environmental settings and grow well in warm water (25 oC to 40 oC). They can be found in aqueous environment such as water tanks, cooling towers, whirlpool and spas, water fountains and apparatus that support breathing. Design, operate and maintain man-made water systems properly could prevent LD. For more information about the good practices in handling man-made water systems, please visit the website of the Electrical and Mechanical Services Department for the Code of Practice issued by the Prevention of LD Committee < http://www.emsd.gov.hk/emsd/eng/pps/oa_ld_pub_cp.shtml >.

Ends/Monday, April 11, 2011

14 April 2011

Printer friendly

Further update on investigation into Legionnaires' Disease case

Further laboratory results available today (April 14) confirmed the preliminary test results reported on April 11 concerning water samples taken in Queen Mary Hospital (QMH) in the wake of a Legionnaires' Disease (LD) case involving an 81-year-old woman.

A spokesman for the Centre for Health Protection (CHP) of the Department of Health said that laboratory results for the first round of water samples collected from water outlets at Intensive Care Unit (C2 ward) and C4 ward confirmed the level of Legionella species to be ranged from 0.1 to 12 cfu/ml. No Legionella pneumophila (Group One) was found. LD is usually caused by Legionella pneumophila (Group One).

No Legionella bacteria is detected in water sample collected at the water tank supplying these wards, suggesting that the water source is free from contamination.

Water samples collected at case's resident were all negative for Legionella bacteria.

According to International standard, immediate control measures including disinfection should be taken when the levels for Legionella bacteria in hot and cold water systems exceed 0.1 -1 cfu/ml.

QMH has already suspended the contaminated water supply and stepped up appropriate infection control measures.

Legionella bacteria are found in various environmental settings and grow well in warm water (25 to 40 degrees Celsius). They can be found in aqueous environment such as water tanks, cooling towers, whirlpool and spas, water fountains and apparatus that support breathing. Proper design, operation and maintenance of man-made water systems could prevent LD.

For more information about proper design, operation and maintenance of man-made water systems, please visit the EMSD's website (www.emsd.gov.hk) for the Code of Practice issued by the Prevention of LD Committee.

Investigation continues.

Ends/Thurday, April 13, 2011

Limitations

- Genetic sequencing of bacteria from suspected source and patient is usually required to establish causal relationship

- This case was diagnosed by urine test. Bacteria isolate not available for genetic sequencing

- Since the opening of a new teaching hospital, the author have tested series of water samples every 3 months, with positive results after two years. *L. anisa* was identified with contamination levels of 0.5 to 4 CFU/ml

- L. pneumophila was not detected by microbiological methods in any of the samples. However, PCR detected genomic material from L. pneumophila in the water samples, with more than 3,000 genomic units/liter

- *L. pneumophila* was not detected may be due to technical limitations relating to the detection of a minority population (*L. pneumophila*) in the presence of a much more abundant population (*L. anisa*).

- *L. anisa* may mask water contamination by *L. pneumophila*, demonstrating that the risk of *L. pneumophila* infection should be taken into account if water is found to be contaminated with *Legionella* species other than *L. pneumophila* ***(J. Clin. Microbiol. January 2006, vol. 44, no. 1 56-59***)

Conclusion

- A possible hospital acquired LD infection
- No additional case was detected with enhanced surveillance after prompt control measures have been implemented


Thank you
© TemplatesWise.com