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2017-18 shingles (herpes zoster) vaccination programme

51/3401 On 8 August, the Scottish Chief Medical Nursing and Pharmaceutical Officers issued a letter presenting details of the 2017-18 shingles programme which will run from 1 September 2017 until 31 August 2018. The programme is aimed primarily at:

- people aged 70* years (routine);
- people aged 76* years (catch up).

* this is defined by the patient's age on 1 September 2017.

In line with previous years, those who were previously eligible for the programme from the start (and who have not yet taken up the offer of vaccination) can still be vaccinated. This includes those aged 71-74 (inclusive) and 77 to 79 (inclusive). Vaccine should not be offered to anyone aged over 80, even if they have previously been eligible, as efficacy of the vaccine declines with age.

Zostavax® is the only shingles vaccine with market authorisation available in the UK. It contains live, attenuated virus derived from the Oka/Merck strain of varicella zoster virus. This vaccine is contraindicated in some patients (e.g. the immunosuppressed).

An easy-to-use tool has been created to help with eligibility and screening for contraindications for use by healthcare practitioners. This tool can be accessed at http://www.hps.scot.nhs.uk/pubs/detail.aspx?id=1650.

The Green Book chapter can be found at https://www.gov.uk/government/publications/shingles-herpes-zoster-the-green-book-chapter-28a. The full text of the letter can be accessed at http://www.sehd.scot.nhs.uk/cmo/CMO(2017)13.pdf.

Chikungunya cases in France - risk assessment

51/3402 Further to Current note 51/3204 (at http://www.hps.scot.nhs.uk/ewr/redirect.aspx?id=75295), the European Centre for Disease Prevention and Control has issued a 'rapid risk assessment' on 24 August.

Health Protection Scotland

The assessment concludes that the report of a cluster of autochthonous chikungunya cases in areas of Europe where *Aedes albopictus* is established is not unexpected during the summer months, when environmental conditions are favourable for mosquitoes. The risk of new clusters of local transmission emerging in the EU is currently considered moderate for chikungunya and dengue, as these diseases are endemic in large areas of the intertropical zone, repeated introductions occur through viraemic travellers returning from these areas, and weather conditions are currently suitable for *Aedes albopictus* activity in areas where it is established.

Early detection of imported cases is vital for preventing onward transmission through the introduction of the chikungunya virus by a viraemic traveller in an area where *Aedes albopictus* is established. Awareness among clinicians and information for travellers returning from areas with chikungunya transmission, combined with appropriate laboratory detection capacity, are essential during high mosquito activity season in areas where *Aedes albopictus* is established.

The detection of an autochthonous case should trigger epidemiological and entomological investigations to assess the potential of onward transmission and guide vector control measures aimed at lowering mosquito population density. In addition, personal protective measures against mosquito bites are recommended in affected areas to further reduce mosquito-borne transmission of chikungunya. Indoor and outdoor personal protective measures to reduce mosquito bites include the use of mosquito repellent in accordance with the instructions indicated on the product label; wearing long-sleeved shirts and long trousers, especially during the daytime when *Aedes albopictus* mosquitoes are most active; sleeping and resting in screened or air-conditioned rooms and using mosquito bed nets at night and during the day.

Travellers returning from areas where chikungunya transmission occurs should be advised to seek medical care if they develop symptoms consistent with chikungunya, in particular if they return to areas where the *Aedes albopictus* mosquito is established, in order to reduce the risk of the virus being introduced into the local mosquito population and to prevent further local transmission. [Source: ECDC Risk Assessment, 24 August 2017. https://ecdc.europa.eu/en/publications-data/rapid-risk-assessment-cluster-autochthonous-chikungunya-cases-france]

Further information on chikungunya is available for clinicians on TRAVAX at http://www.travax.nhs.uk/diseases/non-vaccine-preventable/chikungunya.aspx and for the general public at http://www.fitfortravel.nhs.uk/advice/disease-prevention-advice/chikungunya-fever.aspx.

MHRA warning on unreliable HIV home-testing kits

51/3403 On 22 August, the Medicines and Healthcare products Regulatory Agency (MHRA) issued a warning against using or buying Hightop HIV/AIDS Home Test Kits after seizing 114 potentially unreliable products from two UK-based suppliers.

All UK-based stock of Hightop HIV/AIDS Home Test Kit has been seized by MHRA and all sales of the product into the UK market have been stopped by the manufacturer.

The HIV kits, manufactured by Qingdao Hightop Biotech Co Ltd, do not have a valid CE mark which means the product has not met a number of regulatory requirements concerning test performance, labelling and instructions for use. MHRA is investigating the issue with experts at Public Health England.

The MHRA further advised potential customers:

- Always make sure the HIV test kit has a CE mark and is clearly intended for self-testing. Only approved HIV self-testing kits that have met the appropriate regulatory requirements concerning test performance, labelling and directions for use carry a CE mark.
- Whether buying from the high street or online, only buy a self-test kit from a reputable source, such as an online pharmacy registered with MHRA. In the UK, online pharmacies must be registered with MHRA and display the European Common Logo on every page of their website. Further information on buying medicines and medical devices, including HIV home-testing kits, safely online is available in the MHRA's #FakeMeds top tips (at https://www.gov.uk/government/news/know-what-youre-buying).
- More guidance about where to buy HIV test kits can be accessed at HIV Aware (http://www.hivaware.org.uk/public/index.php/do-i-have-hiv/testing).

The MHRA urged anyone who believed they might have used a Hightop HIV/AIDS Home Test Kit to seek a further HIV test at their local sexual health clinic or through their GP, because the self-test kits may be unreliable and provide false results.

Suspected faulty test kits can be reported via the Yellow Card Scheme. [Source: MHRA Press Release, 22 August 2017. https://www.gov.uk/government/news/mhra-seizes-more-than-100-unreliable-hiv-home-testing-kits]

FSS update on Fipronil in eggs

51/3404 Food Standards Scotland (FSS) is continuing to work closely with the Food Standards Agency and industry to trace products containing eggs from farms in the Netherlands implicated in the Fipronil investigation.

On 24 August, FSS noted that it was advising food businesses that products should be withdrawn from the market if the amount of egg from implicated farms composed more than 15% of the product. Food businesses are expected to follow this guidance or provide evidence demonstrating that the egg product complies with the EU maximum residue level.

The advice is considered to be proportionate in relation to this unauthorised substance in the food chain. However, people in Scotland do not need to change the way they buy or eat their eggs or egg products, as it is very unlikely that there is any risk to public health.

The ongoing investigation has identified six additional products distributed to catering outlets, but none so far have been traced to Scotland. FSS has issued an updated withdrawal list and will provide further updates if necessary. [Source: FSS News Release, 24 August 2017. http://www.foodstandards.gov.scot/news-and-alerts/update-on-fipronil-in-eggs-1]

Environmental incidents - SEISS reports (chemical incident – Tarbert, Loch Fyne)

51/3405 The Scottish Environmental Incident Surveillance System (SEISS) recorded the following incident in the past week:

- A major emergency response was triggered in the Loch Fyne-side village of Tarbert after Royal Mail staff were affected by suspected chemical inhalation. Six staff members are understood to have suffered breathing problems as mail arrived in Tarbert from Lochgilphead

at around 8.30am on Tuesday 22 August. The cause of the contamination in the building was under investigation as police set up roadblocks around Tarbert Royal Mail sorting office. Fire crews and Scottish Ambulance Service paramedics attended, while fire and rescue decontamination and scientific assessment units were also despatched from the central belt to the Argyll fishing village. It is understood three of the six people affected continued to receive medical attention for breathing difficulties some hours after the initial incident (https://www.obantimes.co.uk/2017/08/22/mystery-tarbert-chemical-scare-triggers-major-response/).

For more detailed information on SEISS, go to http://www.hps.scot.nhs.uk/enviro/ssdetail.aspx?id=107 or contact either Ian Henton or Colin Ramsay at HPS on 0141 300 1100.

Legionellosis in Scotland 2015-2016

Prepared by: Ross Cameron[1], Kevin Pollock[1], Cameron Watt[1], Barbara Denham[2], Diane Lindsay[2], Roisin Ure[2], Kevin Scott[2], Jim McMenamin[1] and Andrew Smith[2].

1. Health Protection Scotland.

2. The Scottish Haemophilus Legionella Meningococcus Pneumococcus Reference Laboratory.

Introduction

Description of disease

Legionella infection or legionellosis can manifest clinically in two ways:

- Legionnaires' disease: a severe, potentially fatal form of pneumonia usually resulting in hospitalisation which is characterised by myalgia, fever and cough.
- Pontiac fever: a milder form of disease characterised by flu-like symptoms but pneumonia is not present.

Both diseases are caused by bacteria from the *Legionella* species which are ubiquitous in both natural and artificial aquatic environments. *Legionella* species are natural pathogens of protozoa and can colonise any artificial aquatic environment including cooling towers, air conditioning units, spa pools and bagged soil. *Legionella* sp. become a public health risk when the bacteria become aerosolised and subsequently inhaled. There is potential for *Legionella* to become dispersed widely, especially after colonisation of cooling towers, leading to outbreaks.

Legionella are fastidious Gram negative rods which thrive in warmer waters (15°C-46°C) but have been isolated from waters with temperatures ranging from 6°C to 60°. They are commonly found in stagnant waters associated with biofilms or within various protozoa.

Legionella pneumophila is the most common cause of Legionnaires' disease with 96.1% of reported culture-confirmed cases in Europe in 2015 being attributed to this species. Of the 16 serogroups of *L. pneumophila*, serogroup 1 (Sg1) is responsible for most cases of Legionnaires' disease; 85.6% of culture positive cases in Europe in 2015 were caused by this serogroup.[1] In addition, there are a further 61 species of *Legionella*, of which more than 20 have been implicated in human disease.

In Scotland, about 20-40 cases of Legionnaires' disease are reported every year, which are mostly travel associated. Older males are at increased risk of disease and smoking and underlying respiratory disease are risk factors.

Legionellosis surveillance in Scotland

Enhanced surveillance of *Legionella* infections has been undertaken by Health Protection Scotland (HPS) in conjunction with the Scottish Haemophilus Legionella Meningococcus Pneumococcus Reference Laboratory (SHLMPRL) since 1994. The purpose of this enhanced surveillance is to characterise the *Legionella* species causing illness, identify the likely source of infection and inform measures to reduce the public health risk. This involves characterising, identifying and

monitoring trends. Surveillance in Scotland is integrated with that of the rest of the UK and with Europe.

Most Legionnaires' disease cases are hospitalised and the disease is detected by diagnostic tests usually conducted in the hospital (Table 5). The detection of Pontiac fever cases is rare and mostly occurs during outbreaks when awareness of legionellosis is high among healthcare staff. Patient samples are tested locally but are usually confirmed by the reference laboratory.[2] When the case is confirmed, the health protection team from the resident NHS board will carry out an investigation which aims to define any risks for exposure and to instigate any control measures to prevent others from being exposed. The NHS board is then requested to complete and send an enhanced surveillance form to HPS. This form collects demographic data, information on the clinical presentation and risk factors for each patient, and detailed information on travel away from home during the incubation period of the illness (2-14 days prior to onset of symptoms in Scotland). All cases that are travel-related with date of travel 2-10 days before date of onset are immediately reported to the European Legionnaires' Disease Surveillance Network (ELDSnet), which aims to quickly identify clusters of cases across Europe and prompt source identification.

HPS publishes summaries every two years of legionellosis in Scotland. Readers are referred to previous reports for more detailed information about past years.[3] This report provides an update on cases of legionellosis in Scotland between January 2015 and December 2016.

Under Scottish Government / Scottish Health Protection Network guidance,[4] NHS boards should notify HPS of the occurrence of actual or potential Legionnaires' disease cases. Management of outbreaks which affect more than one NHS board is co-ordinated by HPS. This report provides a summary of sporadic cases and those outbreaks reported to HPS in the period 2015-2016.

Legionnaires' disease surveillance in Europe

Only the severe form of legionellosis, Legionnaires' disease, is monitored at a European level. This monitoring is administered by the European Centre for Disease Control (ECDC), through the European Legionnaires' Disease Surveillance Network (ELDSNet).[5, 6]

Legionnaires' disease is monitored in two ways:

1. annual submission of datasets of all Legionnaires' disease cases in member states;[1]
2. immediate reporting of travel-related cases of Legionnaires' disease as they are diagnosed by member states.[7] This aims to improve knowledge and information on the epidemiological and microbiological (both clinical and environmental) aspects of Legionnaires' disease, to locate sources of infection and to prevent further cases of infection.

In addition, ECDC member states are required to notify ECDC of outbreaks or other significant events which may present a risk to European citizens travelling to that country.

ECDC provides case definitions for Legionnaires' disease, which all member states use for the purposes of reporting to ECDC. In local outbreaks these definitions may be modified to be more inclusive, to allow more rapid identification of the infection source.

The following case definitions were used during 2015 and 2016 and are taken from ECDC.[7]

A confirmed case of Legionnaires' disease must have clinically defined pneumonia and at least one of the following three laboratory criteria:

- isolation of *Legionella* species from respiratory secretions or any normally sterile site;
- detection of *Legionella pneumophila* antigen in urine;
- significant (at least four-fold) rise in specific antibody level to *Legionella pneumophila* serogroup 1 in paired serum samples.

Probable cases of Legionnaires' disease must have clinically defined pneumonia and at least one of the following laboratory criteria:

- detection of *Legionella pneumophila* antigen in respiratory secretions or lung tissue e.g. by DFA staining using monoclonal-antibody derived reagents;
- detection of *Legionella* species nucleic acid in respiratory secretions, lung tissue or any normally sterile site;
- Significant (at least four-fold) rise in specific antibody level to *Legionella pneumophila* other than serogroup 1 or other *Legionella* species in paired serum samples;
- Single high level of specific antibody to *Legionella pneumophila* serogroup 1 in serum.

Cases are linked epidemiologically if at least one of the following criteria is met:

- environmental exposure;
- exposure to the same common source.

The case definition detailed above is the latest version available on the ELDSNet web pages, taken from the Commission Decision of 8 August 2012, when ECDC case definitions were reviewed and revised.[8]

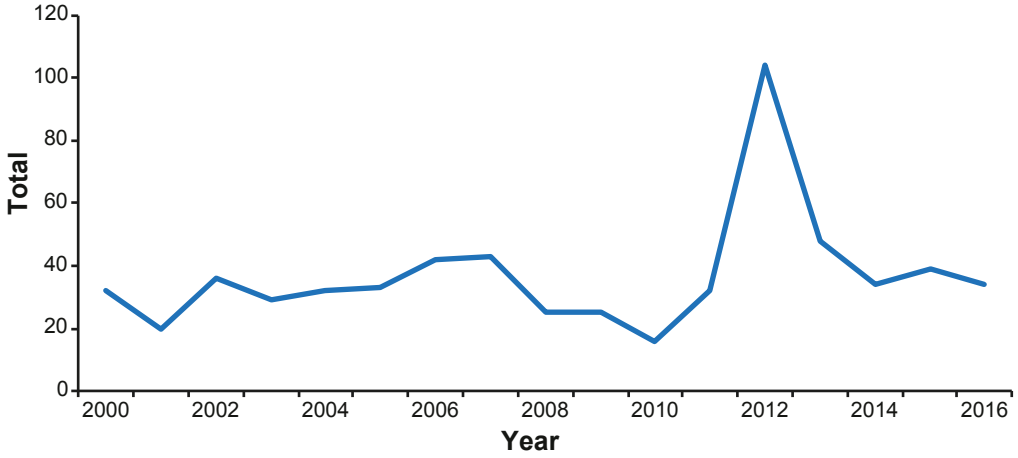
All Legionnaires' disease cases presented in this report were defined according to the current ECDC definitions.

Descriptive epidemiology

Characteristics of cases

The trend of the annual number of reference laboratory diagnosed Legionnaires' disease cases is shown in Figure 1. In 2015 there were 39 cases of which 33 were confirmed and six were probable cases according to ECDC case definitions. In 2016 there were 34 cases of which 31 were confirmed and three were probable cases. In 2015, one case was a resident of Latvia; in 2016, one case was a resident of Spain and another resident of the United States of America.

FIGURE 1: Enhanced surveillance of Legionellosis in Scotland: Annual total of cases reported to HPS 1995-2016.

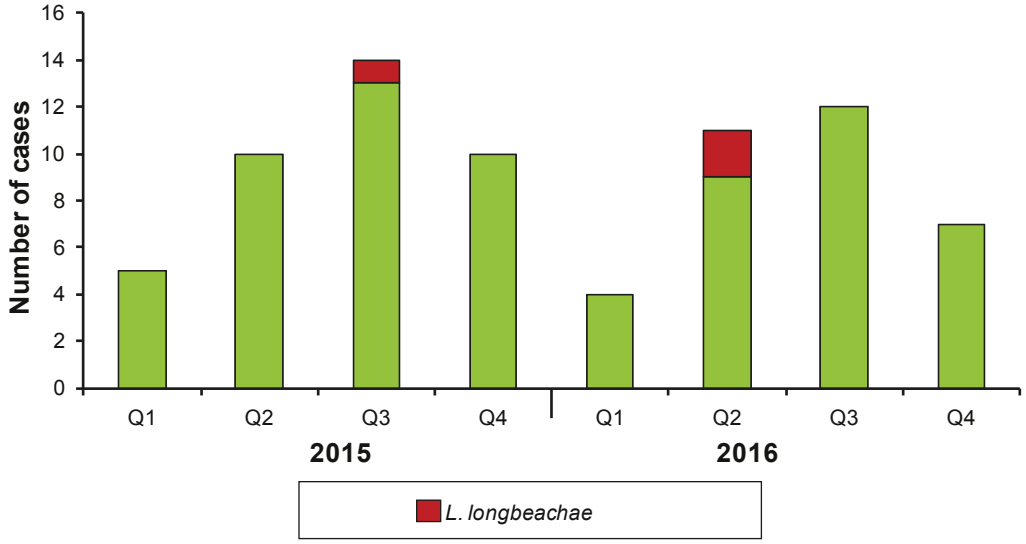


Incidence

Incidence of Legionnaires' disease in 2015 and 2016 was 7.3 cases per million population and 6.3 cases per million, respectively. These rates are consistent with the incidence of 6.4 per million population in 2014 and a decline from the 9.0 cases per million in 2013 and 19.6 in 2012 in which there was a large Legionnaires' disease outbreak in Edinburgh. The incidence rates for Scotland in 2015 and 2016 are also lower than the 2015 European incidence rate of 13.6 cases per million.[1]

Cases of Legionnaires' disease were diagnosed in every quarter of 2015 and 2016. The highest number of cases was seen in quarter three (July to September) for both years (Figure 2). This is similar to what is observed in Europe with the number of travel cases reported increasing in the summer months.[1]

FIGURE 2: Number of cases of Legionnaires' disease in Scotland by quarters, in 2015 and 2016.



Gender

Table 1 shows the percentage of male cases in Scotland from 2000 to 2016. In 2015, 64.1% of cases were male while 70.6% were male in 2016. This pattern has previously been observed in Scotland and elsewhere with on average there are twice as many male cases as female cases. In 2015 in Europe, the percentage of male cases was 71.3%.[1]

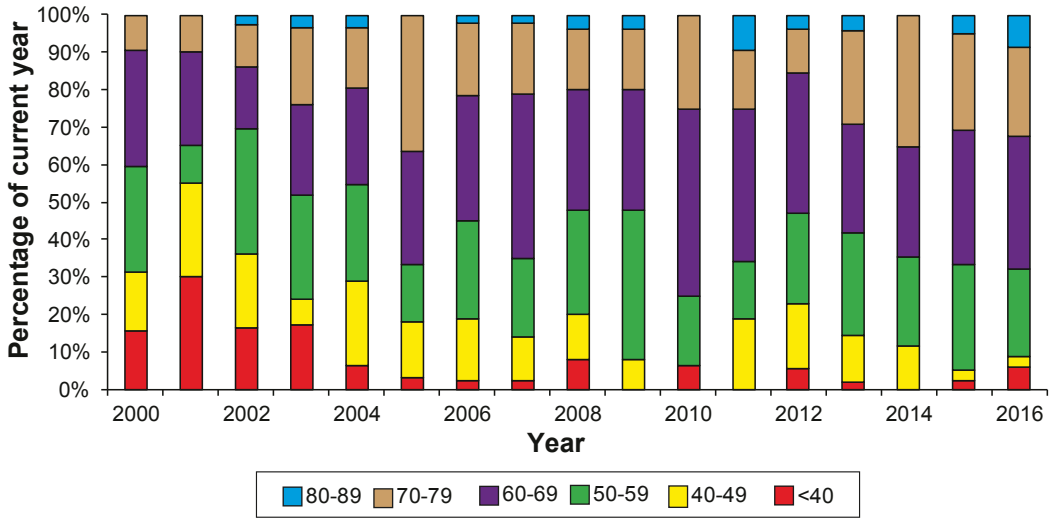
TABLE 1: Cases of Legionnaires' disease reported by SHLMPRL to HPS 2000-2016.

Year	Cases	Percentage male
2000	32	68.8%
2001	20	70.0%
2002	36	66.7%
2003	29	58.6%
2004	32	71.9%
2005	33	54.5%
2006	42	76.2%
2007	43	65.1%
2008	25	64.0%
2009	25	68.0%
2010	16	50.0%
2011	32	71.9%
2012	104	67.3%
2013	48	60.4%
2014	34	61.8%
2015	39	64.1%
2016	34	70.6%

Age

The majority of Legionnaires' disease cases between 2000 and 2016 are aged 40 years or older (Figure 3). 97% and 94% of cases were 40 or older in 2015 and 2016, respectively. The majority of cases in 2015 were between 50 and 69 years old (25 cases, 64%) while, in 2016, the 60-69 age group had the highest number of cases (12 cases, 35%) with eight cases each in the 50-59 and 70-79 age groups. Overall, for 2015 and 2016 the most common age range of cases was 60-69 years with 26 cases accounting for 36% of cases reported in these years.

FIGURE 3: Cases of *Legionella* reported to HPS by age group, 2000-2016.



Risk factors

Both tobacco smoking and respiratory disease are known risk factors for Legionnaires' disease. In 2015 and 2016, 51% of cases were smokers, 31% did not smoke and smoking status was

unknown for 18% of cases. The proportion of smokers is higher than in 2013-2014 when 45% of cases were smokers (50% non-smokers and 5% unknown) and lower than in 2011-2012 when 61% were smokers (31% non-smokers and 8% unknown).

Being immunocompromised is a risk factor for Legionnaires' disease as with many other pathogens. In 2015 and 2016, 18% of cases were immunocompromised either through immunosuppression with steroids or through an underlying condition, while 82% were not immunocompromised and immune status was unknown or not recorded for 2% of cases. This is compared with 11% (78% not immunocompromised and 11% unknown or not recorded) and 29% (64% not immunocompromised and 7% unknown or not recorded) of individuals being immunocompromised in 2013-2014 and 2011-2012, respectively.

Having underlying co-morbidities is also a risk factor for Legionnaires' disease. Of the 73 cases reported to HPS in 2015 and 2016, 51 (70%) cases had an underlying co-morbidity. These co-morbidities were varied and the most common include cardiovascular disease, chronic lung disease, diabetes and cancer.

Clinical presentation

Data presented in this report describe cases of Legionnaires' disease in 2015 and 2016. Two Pontiac fever cases were reported to HPS during this period and are not included in this report.

Clinical symptoms include (in no particular order) fever, shortness of breath, dry cough, headache, muscle pain, lethargy, confusion, nausea, vomiting, diarrhoea, dizziness, shivers, thoracic pain, pleuritic pain, chest pain and collapse.

Mortality

In 2015 there were two recorded deaths from Legionnaires' disease and four in 2016 (Table 2). Such mortality data do not necessarily reflect the cause of death recorded on patient death certificates.

TABLE 2: Number of Legionnaires' disease related deaths in Scotland reported to HPS 2000-2016.

Year	Deaths	Case fatality rate
2000	3	9%
2001	2	10%
2002	2	6%
2003	2	7%
2004	4	13%
2005	1	3%
2006	3	7%
2007	1	2%
2008	6	24%
2009	3	12%
2010	0	0%
2011	6	19%
2012	6	6%
2013	2	4%
2014	4	12%
2015	2	5%
2016	4	12%

Case fatality rates in 2015 and 2016 were 5% and 12%, respectively. This resulted in a mean case fatality rate of 8.2% in the two-year period. This is consistent with previous two-yearly mean case fatality rates in Scotland (7.3% in 2013-2014, 8.8% in 2011-2012; 7.3% in 2009-2010; 10.3% in 2007-2008). Scotland's case fatality rate is also consistent with the European rate which was 8.1% in 2015.[1] The small number of annual deaths in Scotland makes case fatality rates subject to large variation and therefore difficult to interpret.

Suspected settings for *Legionella* exposure

Of the 73 Legionnaires' disease cases reported to HPS in 2015 and 2016, 30.1% were considered to be community-acquired, 68.5% were travel-associated, and 1.4% had an exposure that was undetermined. There were no cases of nosocomially-acquired legionellosis. This distribution is shown in Table 3 and is consistent with previous years in which there has not been a community cluster or outbreak.

TABLE 3: Likely source of *Legionella* infection reported to HPS, 2015 and 2016.

Year	Travel-related	Community-acquired	Hospital-acquired	Unknown
2015	27	12	0	0
2016	23	10	0	1
Total	50	22	0	1

Travel-associated cases

Table 4 shows the travel destinations of each travel-related case according to continent and European country visited. In 2015 and 2016, stays in accommodation in Europe were associated with the majority of travel-related cases with destinations such as Spain, Italy, Greece and Turkey being implicated in most. Some cases visited more than one destination (Table 4).

TABLE 4: *Legionella* cases associated with travel (within UK or abroad), 2004-2016.

TABLE 4a: by continent.

Continent	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Europe	13	21	30	32	12	12	8	8	19	14	19	18	21
North America	0	0	0	1	0	0	2	1	0	5	3	2	1
South America	1	0	1	0	1	0	0	1	0	0	0	0	0
Africa	0	1	0	1	1	2	1	0	1	0	3	1	
Asia	2	2	4	1	1	1	1	1	0	2	6	5	5
Australasia	0	0	0	0	0	0	0	0	1	1	0	0	0
Not known	0	0	0	0	1	0	0	0	1	0	0	0	0
Cruise Ship/Off shore	0	0	1	1	1	0	0	0	0	0	1	2	1

Table 4b: by destinations within Europe.

European destinations	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
UK	3	3	4	6	2	2	2	1	2	4	4	2	1
Spain	3	10	1	8	6	4	1	3	4	1	5	2	8
Italy	4	4	3	7	1	0	0	1	2	2	2	4	3
Greece	0	1	3	2	0	0	3	1	6	0	2	3	2
France	1	1	4	1	0	1	1	0	0	2	0	1	1
Turkey	0	1	1	1	3	1	1	1	2	2	3	1	3
Portugal	0	0	0	3	0	1	0	0	1	1	0	1	1
Bulgaria	1	0	3	1	0	1	0	0	0	0	1	0	0
Austria	1	0	1	1	0	0	0	0	0	0	0	0	0
Others	0	1	0	2	0	2	0	1	2	2	2	4	2

The number of cases of travel-related Legionnaires' disease who had stayed in accommodation in Asia has increased since 2014, which may be a reflection of increased travel to this area. It should also be noted that in the latter part of 2016 an increase in cases of Legionnaires' disease in travellers returning from Dubai occurred and some Scottish cases were associated with this increase.[9,10]

In 2015, 22 cases were reported to ELDSNet of which nine were linked with eight different clusters, and in 2016, 19 cases were reported to ELDSNet of which eight were linked with seven clusters. A cluster is defined by ELDSNet as when cases from the same or different countries are suspected as having contracted Legionnaires' disease from the same accommodation site in a two-year period.

Community-acquired cases

Overall, from 2015 to 2016 there were 22 community-acquired cases of Legionnaires' disease. All cases were sporadic and no community clusters of Legionnaires' disease occurred in 2015-16.

The source of *Legionella* is rarely identified in sporadic, community cases due to its ubiquitous environmental distribution.

Cases of Legionnaires' disease in travellers to Scotland

In 2016, ELDSNet received three reports of cases of Legionnaires' disease in travellers to Scotland. All accommodation sites in which the cases stayed were risk assessed and appropriate measures were in place.

Outbreaks

There were no clusters or outbreaks of Legionnaires' disease in 2015 and 2016 in Scotland.

SHLMPRL testing for *Legionella* in 2015 and 2016

Overall, 4433 samples were received by SHLMPRL for testing in 2015 and represents a 1% increase on the number received in 2014. In 2016, 4578 samples were received, an increase of 3% on 2015 (Table 5). As there was no Legionnaires' disease clusters or outbreaks in Scotland the increase in testing may be related to an increase in returning travellers presenting with respiratory symptoms. Awareness of the increase of Legionnaires' disease cases in returning travellers from Dubai may have led to increased testing due to a number of alerts from ECDC.

Large fluctuations in testing are likely to be related to the small population size of some NHS boards.

As always, SHLMPRL would encourage all laboratories to send any positive samples for confirmation.

TABLE 5: Distribution and nature of request submitted to SHLMPRL in 2015 and 2016.

	Serology		Urinary		Respiratory		Total		% Change on Previous year	
Health Board	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
Ayrshire & Arran	83	89	1	0	3	1	87	90	-10%	3%
Borders	5	8	54	27	0	0	59	35	-20%	-41%
Dumfries & Galloway	10	8	3	2	3	0	16	10	45%	-38%
Fife	17	23	1	10	1	0	19	33	-5%	74%
Forth Valley	484	404	420	333	67	75	971	812	38%	-16%
Grampian	14	18	10	11	18	14	42	43	223%	2%
Greater Glasgow & Clyde	958	1008	1560	1735	38	87	2556	2830	-4%	11%
Highland	32	25	176	205	0	0	208	230	-28%	11%
Lanarkshire	184	195	6	4	68	35	258	234	8%	-9%
Lothian	19	23		4	18	15	37	42	9%	14%
Orkney	0	0	0	0	0	0	0	0	-100%	0%
Shetland	0	0	0	6	0	2	0	8	0%	N/A
Tayside	137	123	2	3	40	83	179	209	-19%	17%
Western Isles	1	1	0	0	0	1	1	2	-67%	100%
TOTAL	1944	1925	2233	2340	256	313	4433	4578	1%	3%

Characteristics of laboratory confirmed cases of *Legionella*

In 2015 and 2016, of 100 positive samples, 56 (56%) were diagnosed by urinary antigen test (which can only detect *L. pneumophila* serogroup 1), 21 (21%) by PCR, 16 (16%) by culture, six (6%) by single high titre and one (1%) by seroconversion (Table 6).

TABLE 6: Main diagnostic techniques employed by species and serogroup 2015 and 2016.

Organism	Isolation	Seroconversion	Single high titre	Urinary antigen	PCR	Total Number#
L. pneumophila serogroup 1	9	1	3	56	7	76
L. pneumophila serogroup 3	2				2	4
L. pneumophila serogroup 4			1		1	2
L. pneumophila serogroup 2-14	1				1	2
L. pneumophila serogroup unknown					3	3
L. longbeachae serogroup 1	1		2		1	4
L. macaechernii	1				1	2
L. bozemanii	1				1	2
L. micdadei	1				1	2
Legionella species unknown		1	1		3	
Total	16	1	6	56	21	100

More than one test may have been positive in each case.

A total of 16 samples were confirmed by culture from patients in 2015 and 2016. Of these, 12 were *L. pneumophila*, one was *L. longbeachae*, one was *L. macaechernii*, one was *L. bozemanii* and the other *L. micdadei*. The *L. pneumophila* Sg 1 isolates identified by monoclonal subtype were Philadelphia (four), Allentown/France (two), Benidorm (two) and Bellingham (one).

Sequence-based typing was performed on eight of the *L. pneumophila* isolates. This technique sequences seven genes allowing a genotype profile to be created which is invaluable in outbreaks and can facilitate tracing of environmental sources.

Environmental samples

Overall, 18 environmental samples were received for testing in 2015 and 35 in 2016. This is a decrease compared to 53, 90, 48, 83, 168 and 252 in 2014, 2013, 2012, 2011, 2010 and 2009, respectively. The decrease is likely related to no clusters or outbreaks occurring in 2015 and 2016 and therefore sampling of environmental sources was not undertaken on a large scale. The species, serotypes and subtypes are presented in table 7.

TABLE 7: Identity of cultures examined by SHLMPRL in 2013 and 2016.

Species	Serogroup	Subgroup	Human		Environmental		Total Isolates	
			2015	2016	2015	2016	2015	2016
L. pneumophila	1	Allentown/ France	0	2	0	0	0	2
		Benidorm	2	0	0	0	2	0
		Knoxville	0	0	1	0	1	0
		Olda	0	0	1	0	1	0
		Philadelphia	3	1	0	0	3	1
		Heysham	0	0	0	2		2
		Bellingham	1	0	0	0	1	0
	2		0	0	1	2	1	2
	3		2	0	0	0	2	0
	4	Portland	0	0	1	17	1	17
	5		0	0	1	0	1	0
		Chicago	0	0	0	1	0	1
	6		0	0	3	1	3	1
	7		0	0	1	3	1	3
	10		0	0	0	0	0	0
	13		0	0	1	0	1	0
	2-14		1	0	0	0	1	0
	Unknown		0	0	1	1	1	1
L. longbeachae			1	0	2	0	3	0
L. bozemanii			1	0	0	0	1	0
L. feelei			0	0	0	0	0	0
L. micdadei			0	1	0	0	0	1
L. macaechernii			1	0	0	0	1	0
L. anisa			0	0	1	4	1	4
L. erythra			0	0	0	0	0	0
L. taurinensis			0	0	3	1	3	1
L. nautarum			0	0	1	0	1	0
L. dumoffii			0	0	0	1	0	1
L. sainthelensi			0	0	0	2	0	2
TOTAL			12	4	18	35	30	39

The most commonly isolated species was *L. pneumophila* Sg 4 Portland with 18 out of 53 (34%) environmental samples positive for this species. This is followed by *L. anisa* with five out of 53 (9%) samples positive, *L. pneumophila* Sg 6, *L. pneumophila* Sg 7 and *L. taurinensis* with four samples positive each (8% each) and *L. pneumophila* Sg 2 with three samples positive (6%). Of the four *L. pneumophila* Sg 1 positive samples, two were Heysham (50%), one was Olda (25%) and the other Knoxville (25%). The remaining species isolated from environmental samples were *L. longbeachae* (two, 4%), *L. sainthelensi* (two, 4%), *L. nautarum* (one, 2%) and *L. dumoffii* (one, 2%).

SHLMPRL encourages all labs to send *Legionella* species for confirmation as sequence-based typing identifies all *Legionella* species.

New and planned developments over the next two years

Update of Guideline on Management of *Legionella* Incidents, Outbreaks and Clusters in the Community

A planned update of the Guideline on Management of *Legionella* Incidents, Outbreaks and Clusters in the Community[11] is underway and should be completed by the end of 2017. The update will consist of the inclusion of the new case definitions and guidance around the testing of household water supplies during the investigation of sporadic cases and clusters of Legionnaires' disease.

From 2017, the Scottish case definition for Legionnaires' disease have been modified to be in line with the Public Health England (PHE) case definitions with the main change being the addition of PCR positive cases being considered confirmed. These modified case definitions are detailed below:

A confirmed case of Legionnaires' disease must have clinically defined pneumonia and at least one of the following four laboratory criteria:

- isolation of *Legionella* from respiratory secretions or any normally sterile site;
- detection of *Legionella* pneumophila antigen in urine;
- detection of *Legionella* spp. nucleic acid (e.g. by PCR) in a lower respiratory tract specimen (e.g. sputum or bronchoalveolar lavage (BAL));
- significant (at least four-fold) rise in specific antibody level to *Legionella pneumophila* serogroup 1 in paired serum samples.

Probable cases of Legionnaires' disease must have clinically defined pneumonia and at least one of the following laboratory criteria:

- detection of *Legionella pneumophila* antigen in respiratory secretions or lung tissue e.g. by DFA staining using monoclonal-antibody derived reagents;
- significant (at least four-fold) rise in specific antibody level to *Legionella pneumophila* other than serogroup 1 or other *Legionella* species in paired serum samples;
- single high level of specific antibody to *Legionella pneumophila* serogroup 1 in serum.

Whole genome sequencing of human and environmental *Legionella* isolates in Scotland

The Chief Scientist Office for Scotland is funding a study titled 'Genomic epidemiology of Legionnaires' disease in Scotland: towards effective outbreak investigation'. The lead investigator is Professor Ross Fitzgerald, The Roslin Institute, Edinburgh in collaboration with the Scottish Reference laboratory and others. The project makes use of whole genome sequencing technology on clinical and environmental *Legionella* isolates spanning 30 years to provide the highest level of genotypic resolution. To date the project has sequenced over 400 Scottish *Legionella* isolates (Bryan Wee, Project Postdoctoral scientist) which will be studied in the context of the wider global diversity of genomic data already available. The study will uncover the diversity of genetic subtypes of clinically relevant *Legionella* in Scotland to inform investigations into source attribution in complex outbreaks. In addition, the project will also examine the potential of using culture-independent metagenomic sequencing to probe the diversity of *Legionella* spp. in environmental and patient samples.

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NHS board abbreviations

AA	Ayrshire & Arran	BR	Borders	DG	Dumfries & Galloway	GGC	Greater Glasgow & Clyde
FF	Fife	FV	Forth Valley	GR	Grampian	HG	Highland
LO	Lothian	LN	Lanarkshire	OR	Orkney	SH	Shetland
TY	Tayside	WI	Western Isles				

Correspondence to: The Editor, HPS Weekly Report, Health Protection Scotland, Meridian Court, 5 Cadogan Street, Glasgow, G2 6QE, Scotland

T 0141-300 1100 **F** 0141-300 1172 **E** NSS.HPSWReditor@nhs.net **W** http://www.ewr.hps.scot.nhs.uk/

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