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## Current notes

### Cervical screening to include HPV test

**51/3201** Cervical cancer is the most common cancer in women under the age of 35 and incidence has increased 22% over the last decade. Incidence is expected to decline among women who have been vaccinated against human papillomavirus. However, each year in the UK, more than 3,200 women are diagnosed and over 890 lose their lives.

Following recommendations from the UK National Screening Committee (UKNSC – available at [https://legacyscreening.phe.org.uk/policydb\\_download.php?doc=594](https://legacyscreening.phe.org.uk/policydb_download.php?doc=594)), women between the ages of 25 and 64 who are offered a smear test that can identify changes that could develop into cervical cancer will also be checked for human papillomavirus (HPV) infection which is a precondition for the disease.

The new test is expected to be available within the Scottish Cervical Screening Programme by 2019-20. [Source: Scottish Government News Release, 11 August 2017. <https://news.gov.scot/news/improving-cervical-screening>]

### FSS update on Fipronil in eggs

**51/3202** Food Standards Scotland (FSS) has been liaising with the Food Standards Agency (FSA) regarding the investigation into the distribution of eggs contaminated with Fipronil in the UK.

It has now been established that more eggs from affected farms than originally reported have been imported into the UK. It is very unlikely these eggs pose any risk to public health, but as Fipronil is unauthorised for use in food-producing animals the agency has been acting with urgency to ensure that people in Scotland are protected.

Although some of the products such as sandwich fillings or other chilled products made from these eggs had a short shelf life and would have already been eaten, FSS has identified some that were still within the expiry date. These are now being withdrawn by the businesses involved and the FSS update includes a list of products identified to date.

It is likely that the number of eggs that have come to the UK is closer to 700,000 than the 21,000 previously reported. Initial information was that products containing affected eggs had not been distributed to Scotland, but as the number of affected eggs imported to the UK is greater than originally thought, it is possible that some products containing them may have been distributed here. However, as this represents 0.007% of the eggs consumed in the UK every year, it remains the case that it is very unlikely that there is any risk to public health from consuming these foods.

FSS reminded food businesses in Scotland of their legal responsibilities which include informing the relevant local authorities immediately if they have any reason to believe that a food which they have imported, produced, processed, or distributed does not comply with food safety requirements. This allows the relevant competent authority and FSS to advise them on appropriate actions to take.

The bulk of the eggs consumed in the UK (85%) are produced here. The agency has no evidence that eggs laid in Scotland are contaminated or that Fipronil has been used inappropriately in Scotland. Testing of eggs in Scotland is underway and results will be published as soon as they are available. [Source: FSS News Release, 10 August 2017. <http://www.foodstandards.gov.scot/news-and-alerts/food-standards-scotland-update-on-fipronil-in-eggs-1>]

## **WHO estimates 500,000 cholera cases in Yemen**

**51/3203** According to WHO estimates, the total number of suspected cholera cases in Yemen this year hit the half a million mark on Sunday (13 August), and nearly 2000 people have died since the outbreak began to spread rapidly at the end of April.

The overall caseload nationwide has declined since early July, particularly in the worst affected areas but suspected cases of the waterborne disease continue to rage across the country, infecting an estimated 5000 people per day. The spread of cholera has slowed significantly in some areas compared to peak levels but the disease is still spreading fast in more recently affected districts, which are recording large numbers of cases.

Yemen's cholera epidemic, currently the largest in the world, has spread rapidly due to deteriorating hygiene and sanitation conditions and disruptions to the water supply across the country. Millions of people are cut off from clean water, and waste collection has ceased in major cities.

A collapsing health system is struggling to cope, with more than half of all health facilities closed due to damage, destruction or lack of funds. Shortages in medicines and supplies are persistent and widespread and 30,000 critical health workers have not been paid salaries in nearly a year. [Source: WHO News Release, 14 August 2017. <http://www.who.int/mediacentre/news/releases/2017/cholera-yemen-fiftythousand/en/>]

## **Chikungunya in Southern France**

**51/3204** On 11 August the Regional Health Agency of Provence-Alpes-Côte d'Azur reported a locally-transmitted case of chikungunya in the Var department of southern France (report available in French at <https://www.paca.ars.sante.fr/un-cas-autochtone-de-chikungunya-dans-le-var-le-niveau-2-est-active>). The case is resident in Var and works in the neighbouring Alpes-Maritimes department.

Chikungunya is transmitted by the Asian tiger mosquito (*Aedes albopictus*) and a small number of cases have been identified in France since 2010.

No vaccine is available against chikungunya. Mosquito bite avoidance is the only method of reducing the risk of infection. All travellers to endemic regions should be aware of the risk of infection and be advised to practise strict bite avoidance measures.

*Aedes* mosquitoes are particularly persistent and aggressive and bite between dusk and dawn. Methods of bite avoidance include:

- wearing long, loose, lightly coloured clothing to cover up the skin during the day;
- the use of insect repellent containing DEET applied to any exposed skin;
- when sunscreen and DEET are used together, DEET should be applied after sunscreen. The effectiveness of repellent reduces more rapidly than sunscreen, so a further reapplication on top of sunscreen may be necessary;
- the use of permethrin-impregnated mosquito nets protects against early morning bites and should also be used when sleeping during the day;
- the use of air conditioning if available and/or mesh screening of windows and doors;
- eradication of mosquito breeding sites around accommodation/home (e.g. open containers, old tyres or flower pots that may collect water).

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>. [Source: TRAVAX Outbreak News, 14 August 2017. <http://www.travax.nhs.uk/outbreaks/outbreak-record-page.aspx?id=22298>]

## Mosquito treatment in Ashford, Kent

**51/3205** Specialists from Public Health England (PHE) and Ashford Borough Council have assessed and treated an area for non-native mosquitoes. Action was taken to eradicate eggs and larvae of an invasive species of mosquito, *Aedes albopictus* (Asian tiger), which has become more common in Europe during recent years. Though the mosquito posed no immediate risk to public health, the decision was to treat the area and prevent it becoming established in the UK.

PHE and Ashford Borough Council have ensured residents and businesses in the area have been fully informed of all treatment taking place and both agencies are working closely with Kent County Council.

The eggs and larvae were discovered through PHE's ongoing mosquito surveillance programme which monitors 30 UK ports and airports. Since invasive mosquitoes became more widespread in France, surveillance has been conducted by PHE at motorway service stations in south east England on the main routes from the south coast ferry ports and Eurotunnel.

This is the second time this species has been found in the UK, and is likely to have resulted from the importation of one adult female across the Channel via vehicular traffic. A similar discovery was made by PHE in Folkestone last September. Adult mosquitoes can only fly a very short distance and so control measures are implemented up to a 300 metre radius.

The presence of a mosquito does not mean that it is carrying any diseases as they first need to bite an infected person and then move on to a second individual to transmit it. There are currently very few cases of diseases known to be carried by this mosquito (e.g. chikungunya, dengue) circulating in neighbouring countries and therefore no known risk to health locally. *Aedes albopictus* has never been reported in Scotland.

PHE and Ashford Borough Council will continue to monitor the site for any further signs of invasive mosquitoes and ensure there are no suitable habitats. [Source: PHE News Release, 3 August 2017. <https://www.gov.uk/government/news/mosquito-treatment-in-ashford-kent>]

## **Bovine tuberculosis**

**51/3206** Scotland achieved Officially Tuberculosis Free Status (OTF) in September 2009. OTF is recognition of the relatively low and stable incidence of TB found in Scottish herds. This status also provided the Scottish Government with the flexibility to design a dedicated and original TB surveillance programme for the Scottish national herd and as a result, 1 January 2012 saw the introduction of a new risk-based TB testing policy in Scotland whereby 'low risk' herds became exempt from four-yearly routine herd testing.

The first four year testing cycle was completed on 31 December 2015 and a subsequent review of the scheme criteria has shown that there is scope to safely increase the number of herds eligible for exemption without adversely affecting the ability to detect infected herds. The 'low risk' selection criteria will therefore change with effect from 1 January 2017.

The Animal and Plant Health Agency (APHA) reassesses all herds annually and is responsible for notifying cattle keepers in Scotland whether or not their herds are exempt from routine TB testing. The letters to inform Scottish cattle keepers of their testing requirements for 2017 were issued by APHA on 22 August 2016.

In response to the identification of bovine TB in a herd on the Isle of Skye, and a further outbreak in a herd south of the border in Cumbria, the Scottish Government issued an updating summary of the situation on 11 August which can be accessed at <http://www.gov.scot/Topics/farmingrural/Agriculture/animal-welfare/Diseases/disease/tuberculosis/bovinetbupdate11aug2017>. [Source: Scottish Government webpage. <http://www.gov.scot/Topics/farmingrural/Agriculture/animal-welfare/Diseases/disease/tuberculosis>]

## **State of the Climate Report**

**51/3207** A new 'State of the Climate' report has confirmed that 2016 surpassed 2015 as the warmest year in 137 years of recordkeeping.

Last year's record heat is thought to have resulted from the combined influence of long-term global warming and a strong El Niño early in the year. The report found that the major indicators of climate change continued to reflect trends consistent with a warming planet. Several markers such as land and ocean temperatures, sea level, and greenhouse gas concentrations in the atmosphere broke records set just one year prior.

These key findings and others are available from the State of the Climate in 2016 report released online on 10 August by the American Meteorological Society (AMS).

The 27th annual edition of the report (available at <https://www.ncdc.noaa.gov/bams/2016>), led by National Centers for Environmental Information (NCEI), is based on contributions from nearly 500 scientists from more than 60 countries around the world and reflects tens of thousands of measurements from multiple independent datasets. It provides a detailed update on global climate indicators, notable weather events, and other data collected by environmental monitoring stations and instruments located on land, water, ice, and in space. [Source: NCEI News Release, 10 August 2017. <https://www.ncei.noaa.gov/news/reporting-state-climate-2016>]

## STEC in Scotland 2016: enhanced surveillance and reference laboratory data

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### Introduction

Shiga toxin-producing *E. coli* (STEC), also known as Verotoxigenic *Escherichia coli* (VTEC), are a group of bacteria which can cause gastrointestinal illness in humans. Previously, the organisms have been referred to as VTEC, however recently there has been a widespread move to standardise the nomenclature across Europe to STEC. While the two terms are interchangeable, for the purposes of this report, the term STEC will be used.

STEC are widespread in the environment and can colonise the gastrointestinal tract of farmed, wild, and domesticated animals and birds and can be shed in their faeces. Ruminants (cattle, sheep and goats) are considered to be the main reservoir of infection although STEC causes no clinical signs of infection in the animal. Transmission to humans can occur as a result of direct contact with STEC-contaminated faecal material, as a result of handling or petting animals or by exposure to faecally contaminated mud or vegetation often during recreational activities. Exposure can also occur from consumption of water or food which is contaminated.

Outcomes of STEC infection range from asymptomatic infection, to mild non-bloody diarrhoea, through to bloody diarrhoea, abdominal pain and occasionally fever. Further serious outcomes of infection can include haemolytic uraemic syndrome (HUS) which is a major cause of acute renal failure in children in Scotland.<sup>1</sup>

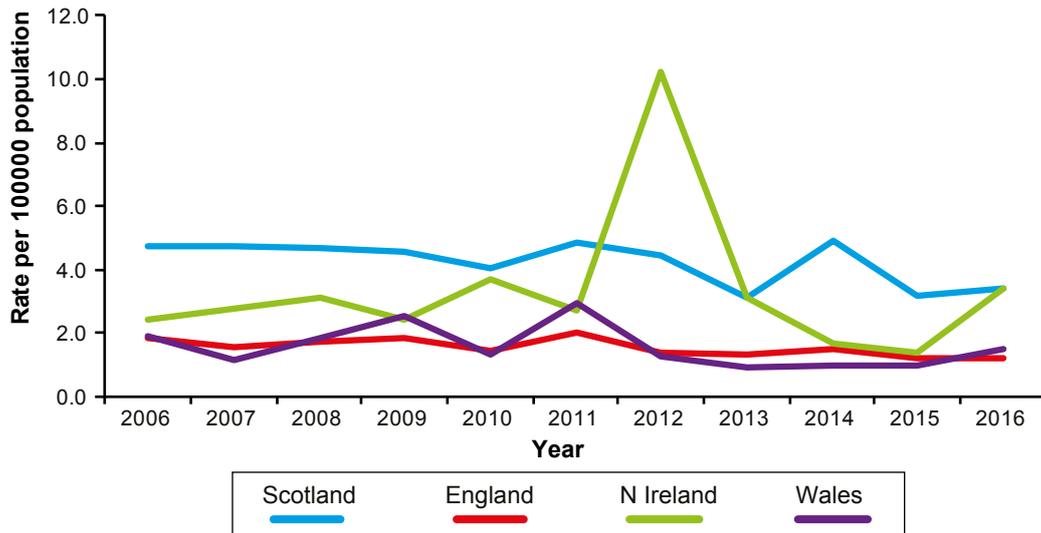
Although large foodborne outbreaks have occurred in Scotland,<sup>2,3</sup> sporadic infection predominates. The potential for *E. coli* O157 to cause both secondary spread<sup>4</sup> and large outbreaks is exacerbated by its low infectious dose<sup>2,3</sup> and asymptomatic infection can also occur.<sup>5</sup>

Diagnostic laboratories investigate all diarrhoeal faeces for the presence of *E. coli* O157 and refer isolates to the Scottish *E. coli* O157/VTEC Reference Laboratory (SERL) for confirmation and further typing. STEC of serogroup O157 are the only STEC for which routine standard tests are performed in diagnostic laboratories. Under national guidelines, faeces from high-risk patients testing negative at the local laboratory are sent to SERL where more sensitive methods are used for detection and isolation of STEC.<sup>6</sup>

Health Protection Scotland undertakes enhanced surveillance of STEC in close collaboration with the SERL and NHS board health protection teams. Data are also integrated with other surveillance systems, in particular ObSurv, the system for the surveillance of all general outbreaks of infectious intestinal disease.<sup>7</sup>

Reported rates of *Escherichia coli* O157 (*E. coli* O157) infection in Scotland rose substantially in the mid-1990s and remain consistently high compared to other countries within the UK and Europe.

FIGURE 1: *E. coli* O157: rates per 100,000 population – culture positive cases, UK 2006 - 2016\*.



\* Data outwith Scotland courtesy of Public Health Wales, Public Health Agency (NI) and Public Health England. Data for Wales, N Ireland and England include Shiga toxin positive cases only. All data for 2016 are provisional.

The number of non-O157 STEC detected at the SERL has risen over recent years and these are now identified in over one quarter of all laboratory-confirmed infections. Non-O157 STEC can be associated with significant morbidity including HUS.

## Methods

HPS defines a case as a single person-infection episode with local laboratory or SERL laboratory confirmation of infection by one or more of the following:

- culture positive (isolates of *E. coli* O157 or other serogroups cultured from faeces);

or

- faecal PCR positive for Shiga toxin genes, and/or an *E. coli* O157 specific gene, but not confirmed by culture;

or

- serum positive (antibodies to O157 or other serotypes detected in blood serum).

Both symptomatic and asymptomatic cases are included.

HPS surveillance systems collect information about general outbreaks i.e. those affecting members of more than one household, or residents of institutions.<sup>7</sup> Other cases are therefore either apparently sporadic or occur amongst members of a single household. For ease of comprehension, cases in general outbreaks are referred to as outbreak cases, while cases or clusters restricted to single households, whether or not they are secondary or primary cases, are referred to as sporadic cases.

Imported infections are defined as those cases from whose onset date, incubation period, and travel and other exposure histories, local investigators judge infection more likely to have been acquired outside the UK than from any other identifiable source.

This report presents analyses of the main variables for STEC infections reported to HPS in 2016.

To allow comparison with previous years, only faecal culture positive cases were included in the following analyses. Cases identified by serodiagnosis or PCR without culture confirmation were excluded. Data for *E. coli* O157 and non-O157 STEC are presented separately.

All data for 2016 will be provisional until 31 December 2017.

## Results

### *E. coli* O157

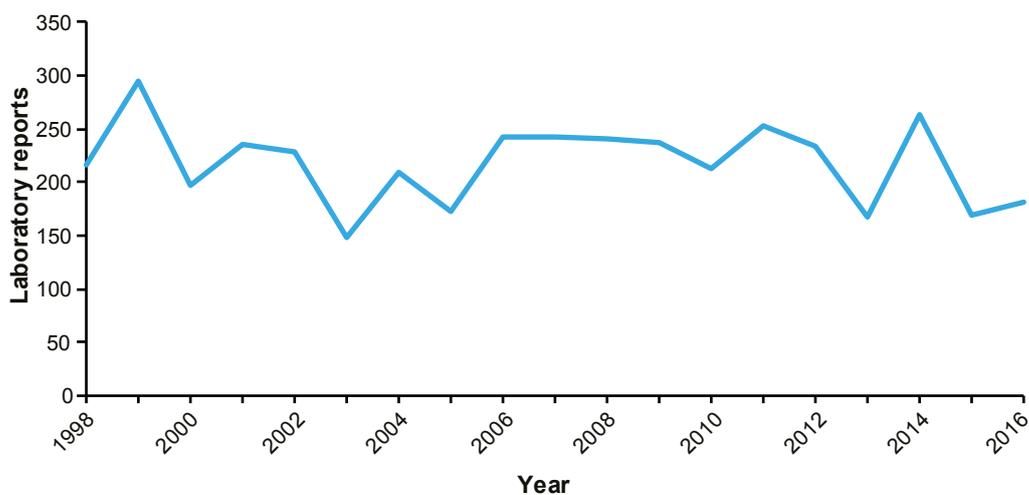
In 2016, a total of 185 reports of *E. coli* O157 were made to HPS. The methods of identification of these are described in Table 1.

TABLE 1: Laboratory confirmed reports of *E. coli* O157.

Method of laboratory confirmation	Total
Culture positive (faeces)	181
PCR positive, culture negative	2
Serum positive only	2

There were 181 faecal culture positive cases of *E. coli* O157 notified to HPS in 2016. This represented a slight increase on the 170 cases reported in 2015, but still less than the five-year (2011-2015) average of 218 cases.

FIGURE 2: *E. coli* O157: Faecal culture positive laboratory reports in Scotland, 1988 - 2016.



## Geographical distribution and incidence rates

Table 2: *E. coli* O157: NHS board, rates per 100,000 – faecal culture positive cases.

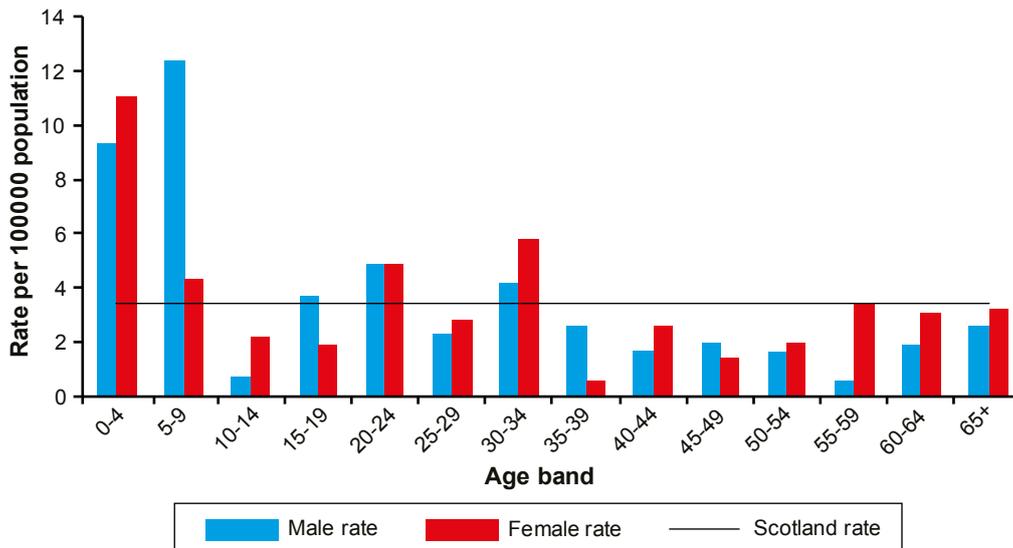
	Rate per 100,000		
	2016	2015	2014
Ayrshire & Arran	2.7	5.9	7.0
Borders	2.6	3.5	7.0
Dumfries & Galloway	10.7	10.0	10.0
Fife	2.2	2.5	8.4
Forth Valley	2.0	2.7	4.7
Greater Glasgow & Clyde	2.5	2.2	1.8
Grampian	5.6	5.5	9.0
Highland	3.4	2.5	5.6
Lanarkshire	3.1	2.4	3.4
Lothian	2.0	2.0	2.9
Orkney	4.6	23.2	18.5
Shetland	0	4.3	12.9
Tayside	5.8	1.9	6.1
Western Isles	11.0	0.0	0.0
Scotland	3.4	3.2	4.9

The rate of faecal culture positive cases per 100,000 population for the whole of Scotland in 2016 was 3.4 compared to 3.2 in 2015 and 4.9 in 2014. Incidence rates varied across Scotland, as they have done historically. The overall rates decreased in six of the 14 NHS boards compared with the previous year. The rates for NHS boards with small populations should be interpreted with caution as the numbers disproportionately affect the incidence rates.

### Age and sex

The age distribution of the 181 faecal culture positive cases ranged from under one to over 80 years of age, while 49% of cases were male and 51% were female. The mean age was 32 years. Children under 16 years of age accounted for 33% of cases and 15% of cases were aged over 65 years. As seen in previous years, children under five years of age had the highest rate of infection, with an overall rate of 10.2 per 100,000 people, while the next highest overall rate was 8.2 per 100,000 observed in the five-to-nine years age group. The age stratified rates per 100,000 population for males and females are shown in Figure 3.

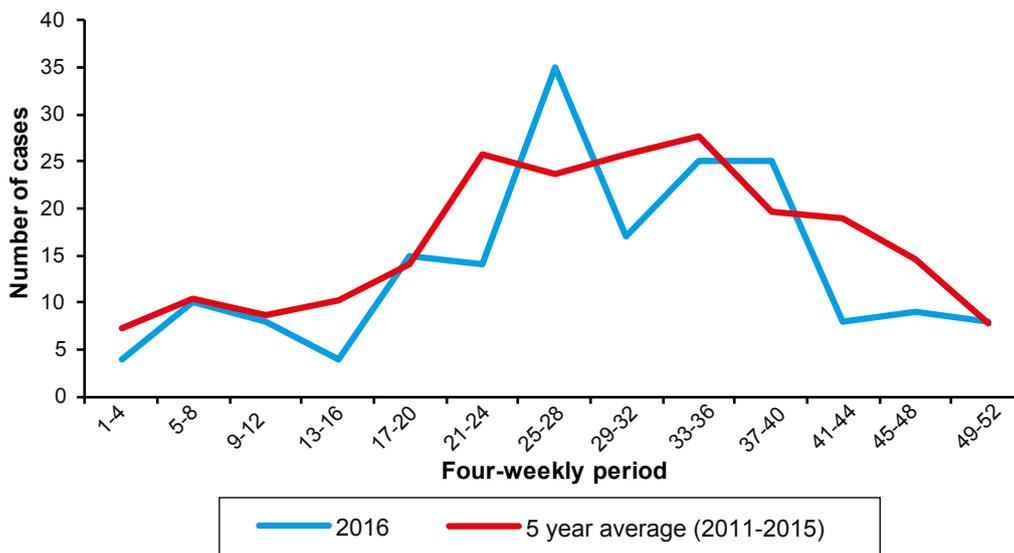
FIGURE 3: Age stratified rates per 100,000 population, faecal culture positive *E. coli* O157, Scotland 2016.



### Seasonality

The number of cases per four-week period is shown in Figure 4. As in most years, cases tend to peak in the summer months. Most infections occurred in the second and third quarters of the year, with 73% of cases occurring in this time period.

FIGURE 4: *E. coli* O157: faecal culture positive cases in Scotland, 2016, by four-week reporting period with comparison to previous five-year average.



### Reference Laboratory data

Isolates of *E. coli* O157 identified by local diagnostic laboratories are routinely sent to SERL for further typing. This includes phenotypic characterisation – phage typing, antimicrobial sensitivity testing as well as genotypic typing – PCR and MLVA. This additional typing facilitates the identification of outbreaks as well as monitoring the trends and emergence of new strain types.

Phage type (PT) results for culture positive *E. coli* O157 isolates are reported to HPS by SERL. As seen in previous years, PT 21/28 and PT8 accounted for the majority of cases. In 2016, as seen in 2015, these phage types accounted for over 60% of cases (Table 3).

TABLE 3: Phage types of *E. coli* O157 reported in 2016 and 2015.

Phage type	2016 (% of total)	2015 (% of total)
PT21/28	80 (44.2%)	58 (34.1%)
PT 8	34 (18.8%)	48 (28.2%)
PT 32	11 (6.1%)	23 (13.5%)
PT 34	11 (6.1%)	5 (2.9%)
PT 54	9 (5.0%)	5 (2.9%)
PT RDNC	8 (4.4%)	7 (4.1%)
PT Untypable	8 (4.4%)	4 (2.4%)
PT 2	7 (3.9%)	3 (1.8%)
PT 4	4 (2.2%)	7 (4.1%)
PT 14	4 (2.2%)	6 (3.5%)
PT 31	4 (2.2%)	2 (1.2%)
PT 1	1 (0.6%)	0
Others		2 (1.2%)

The increase in PT21/28 reports in 2016 was due mainly to an outbreak of this phage type associated with the consumption of unpasteurised cheese where 26 cases were reported, 21 of whom were resident in Scotland.<sup>8</sup>

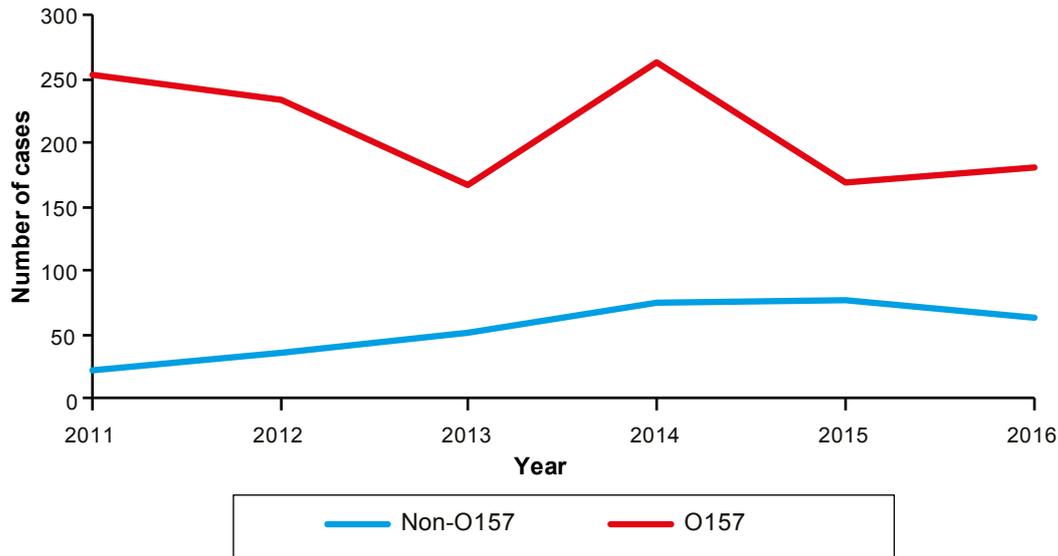
Of the 181 *E. coli* O157 culture positive isolates identified in 2016, 22 (12.2%) had no identifiable Shiga toxin-producing genes. This was an increase on the 11 (6.5%) Shiga toxin gene negative cases reported in 2015.

## Non-O157 STEC

*E. coli* O157 is the only serogroup of Shiga toxin-producing *E. coli* (STEC) routinely detected by diagnostic laboratories in Scotland. Identification of non-O157 STEC therefore requires submission of faecal samples to SERL for further investigation. In 2016, 63 isolates of non-O157 STEC were cultured and reported by SERL to HPS. This compares to 78 non-O157 isolates reported in 2015 (Figure 5). In addition, as seen in 2015, there were 19 reports of non-O157 STEC which were not confirmed by culture but were Shiga toxin gene positive. One serum positive non-O157 STEC case was reported in 2016.

The SERL also isolated a strain of *Escherichia albertii* carrying the *stx2f* gene variant. This was the first isolation of *E. albertii* in the UK. While the clinical significance of *E. albertii* is uncertain, it is known to cause gastrointestinal disease.<sup>9</sup>

FIGURE 5: Faecal culture positive O157 and non-O157 isolates, 2012 - 2016.



Although the number decreased slightly in 2016, the general trend in recent years has been an increase in non-O157 isolates. This is thought to be largely due to a change in the referral pattern from laboratories sending samples to SERL resulting in an increase in identification of non-O157 cases. In total, 25 different non-O157 serogroups were identified in 2016, of which 15 were reported on one occasion only. STEC O26 was the most common serogroup reported as was the case in previous years and accounted for 12 (19%) of the non-O157 faecal culture positive cases. While five isolates were O-Unidentifiable, the next most common serogroups were O128 and O63, both with five cases reported.

TABLE 4: Non-O157 STEC serotypes reported in Scotland 2016.

Serotype	Total
O26	12
Unidentifiable	5
O63	5
O128	5
O103	4
O125	4
O91	4
O46	3
O113	2
O4	2
O174	2
Others (15 types)	15

### Enhanced surveillance

At the start of January 2016, a new standard enhanced surveillance questionnaire was adopted by health protection teams across Scotland. This collects more detailed information than previously on both environmental and food exposures and enables comparison across NHS board areas. In 2016, information on 163 cases (90%) of faecal culture positive *E. coli* O157 and 54 cases (86%) of faecal culture positive non-O157 STEC was provided to HPS following case interviews by the local health protection team.

Information on hospitalisation was available for 217 cases of STEC. Of these, 35% of all cases of STEC were admitted to hospital for at least one night during their illness. In particular, for O157 this figure was 40% and for non-O157 this figure was 20%.

Information on clinical presentation was available for 217 cases, with 71% of cases of *E. coli* O157 having bloody diarrhoea, a further 22% reporting diarrhoea with no blood while 6% of confirmed cases reported experiencing no symptoms. Two cases, whilst not reporting diarrhoea of any kind, did report abdominal pain (one of who also additionally reported vomiting and fever). The clinical presentations of STEC cases are summarised in Table 5.

TABLE 5: Clinical presentation of culture positive STEC cases in Scotland 2016, enhanced surveillance data.

	All STEC (N=217)	O157 (N=163)	Non-O157 (N=54)
Hospitalised	35%	40%	20%
Bloody diarrhoea	73%	71%	80%
Diarrhoea (no blood)	17%	22%	20%
Asymptomatic	5%	6%	0%

### Sporadic or outbreak cases

During 2016, five general outbreaks of STEC were reported to ObSurv. This is similar to the number of STEC outbreaks reported in previous years, with five in 2015 and seven in 2014. All five outbreaks in 2016 were identified as serogroup O157 – two being phage type 21/28, two phage type 8 and one phage type 54. For three of the outbreaks the suspected mode of transmission was considered to be mainly foodborne, one was due to drinking untreated water and for one outbreak the mode of transmission was not confirmed.

As has historically been the case in Scotland,<sup>2,3</sup> the majority of cases in 2016 were apparently sporadic cases.

### Imported infections

Of the 217 cases for which information was available, 15% of all STEC cases were considered to have acquired their infection outwith the UK. This figure was the same for both *E. coli* O157 and non-O157 cases.

### Discussion and conclusions

The number of *E. coli* O157 cases reported in Scotland increased slightly in 2016 and the number of non-O157 cases reported decreased slightly. This was in keeping with the expected year-to-year variation.

Despite the variation in the number of cases seen annually, the consistently high rates of STEC infection reported in Scotland as compared to other UK countries reinforces the need for the continued and comprehensive application of the wide range of existing control measures embedded in food safety and other guidance in Scotland. In addition, it highlights the importance of a comprehensive multi-agency approach to tackling STEC in Scotland as set out in the VTEC Action Plan for Scotland.<sup>2</sup> A multi-agency implementation group has been set up to deliver the recommendations within the Action Plan and is due to report in 2018.

In addition, a new web-page - <https://www.nhsinform.scot/bugs-and-germs> - has recently been launched, on the NHS Inform website, to provide the public with advice on how to avoid infections, including STEC, in Scotland's outdoors.

## Acknowledgements

HPS and SERL particularly wish to thank those patients and their families who have provided information; and also the following groups across Scotland: HP Teams in NHS boards; environmental health officers; consultant microbiologists and diagnostic laboratory staff; public analyst laboratory staff; and Scottish Agricultural College (now part of SRUC). We also thank Susan Brownlie and Genna Drennan at HPS and laboratory staff at SERL.

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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		

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Printed in the UK. HPS is a division of the NHS National Services Scotland.

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