



Health Protection Report

weekly report

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High-level azithromycin resistance in *Neisseria gonorrhoeae*

The HPA, through the Gonococcal Resistance to Antimicrobials Surveillance Programme (GRASP), has detected a cluster of gonococcal isolates that exhibit high-level resistance to azithromycin, an antimicrobial agent used for treatment of chlamydial infections.

The Department of Health has issued an alert to microbiologists to inform appropriate testing [1].

Nevertheless, clinicians are reminded that resistance in *Chlamydia trachomatis* is unknown and that azithromycin remains an effective treatment for chlamydial infections, although it is not appropriate for the treatment of gonorrhoea.

Background

Azithromycin (1g, single dose) is a recommended therapy for chlamydial infections. It also has activity against *Neisseria gonorrhoeae* and *Treponema pallidum* but is not a recommended therapy for gonorrhoea because the 1g dose gives inadequate cure rates (93%) and a 2g dose, which is effective, is not well tolerated.

However, dual infections with both *C. trachomatis* and *N. gonorrhoeae* are common and there is a likelihood that azithromycin will be used, at the lower dose, in cases where only the chlamydial infection is diagnosed and the presence of gonococci is not recognized, both in genitourinary medicine (GUM) clinics and in primary care settings.

The GRASP (The Gonococcal Resistance to Antimicrobials Surveillance Programme) has monitored the susceptibility of gonococci to azithromycin since 2001, aiming to detect the emergence and spread of resistance. Resistance is currently defined as a minimum inhibitory concentration (MIC) >0.5 mg/L, although good data on the relationship of MICs to therapeutic failure are limited.

GRASP has shown that:

- ▶ Low-level azithromycin resistance has increased annually between 2001 and 2006, reaching 2.2% nationally in 2005 and over 5% in some regions of England and Wales ; the highest MIC observed was 12 mg/L.
- ▶ In 2007, high-level resistance to azithromycin (MIC 4096 mg/L) was detected in six isolates of *N. gonorrhoeae*. These were all from heterosexual patients, and showed similar resistance profiles, being susceptible to first-line treatments for gonorrhoea.
- ▶ Azithromycin use was not documented in any of these patients.
- ▶ Five of the six isolates were referred from a single laboratory in the Liverpool area, while the remaining isolate was recovered in Cardiff. All six isolates were identical (ST649) by sequence-based typing (NG-MAST), suggesting an outbreak in the heterosexual community.
- ▶ Further highly-resistant isolates have been identified in Scotland, but high-level azithromycin resistance has not been documented elsewhere in the world.

- ▶ Low-level azithromycin resistance in *N. gonorrhoeae* can be mediated by various mechanisms. The mechanism of this high-level resistance is currently unknown and could be novel, or a combination of known mechanisms.
- ▶ In line with national guidelines the majority of patients in GRASP were also treated for chlamydial infection and the proportion who received azithromycin therapy for this has increased substantially, from <5% in 2000 to 40.1% in 2006.

The resistance alert issued by Department of Health [1] recommends the following:

- ▶ Azithromycin should not be used to treat gonorrhoea
- ▶ Patients treated with azithromycin or doxycycline for chlamydia cannot be assumed to have been adequately treated for gonococcal infection. Gonorrhoea should be treated specifically, according to therapeutic guidelines, at the same time as chlamydia is treated.
- ▶ All clinical laboratories should test *N. gonorrhoeae* isolates for resistance to a panel of antimicrobials comprising:
 - both recommended first line therapies for gonorrhoea (ceftriaxone or cefixime),
 - azithromycin (and tetracycline if used locally to treat chlamydia co-infections).
 - any other agents used locally to treat gonorrhoea (e.g. ciprofloxacin or penicillin).
- ▶ Where azithromycin resistance is detected a report should be sent to the clinician stating "Resistance has been detected to azithromycin. Specific anti-gonococcal therapy should always be used to treat cases of gonorrhoea"
- ▶ All possible examples of resistance to azithromycin (zone of inhibition \leq 27mm, using a 15 μ g disc) or to cefixime or ceftriaxone should be referred to the Sexually Transmitted Bacteria Reference Laboratory for confirmation, as interpretation can sometimes be difficult.

References

1. Inspector of Microbiology and Infection Control. High-level azithromycin resistance in *Neisseria gonorrhoeae*. DH Gateway ref 9698, 4 April 2008. Available at http://www.dh.gov.uk/en/Publichealth/Patientsafety/Microbiologyandinfectioncontrol/DH_075723
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Hepatitis E in passengers on a cruise ship

Four cases of hepatitis E infection were reported among elderly male passengers on a round-the-world cruise between January 7 and March 28, 2008. The dates of onset were between 12 and 23 March and it is thought highly likely that exposure occurred at some point during the cruise. There were a number of ports of call including: Madeira, Barbados, Acapulco, San Francisco, Pago Pago (American Samoa), Nuku'Alofa (Tonga), Auckland, Sydney and Hong Kong.

The passenger capacity of the cruise ship is 1800 with 900 staff but, as people joined and left the cruise at different points during the journey, the cumulative number of passengers on board at some point during the cruise was 3000. Passengers were mainly from the UK but also included nationals from the USA, Australia, South Africa, Denmark, and Ireland .

The Health Protection Agency (HPA) has been working closely with the cruise ship operator and port health authority to assist with investigations and ensure all passengers receive appropriate information. The cruise company has sent letters and a factsheet on hepatitis E to all passengers to inform them and to advise that they seek medical advice should they develop symptoms compatible with hepatitis E. They are also being asked to contact the HPA directly so that linked cases might be identified.

Hepatitis E is a viral infection that usually produces mild disease with symptoms of jaundice, dark urine and pale stools with or without nausea, loss of appetite and/or abdominal pain [1]. In rare cases it can prove fatal, particularly in pregnant women. Hepatitis E is endemic in many countries in Asia, Africa and Central America. It is a relatively uncommon cause of hepatitis in the United Kingdom; there were 292 cases reported in 2006 and the majority of these were travel associated.

Direct person-to-person spread of hepatitis E is uncommon. Exposure usually arises from contaminated food or water and can be prevented through good hygiene, for example:

- ▶ Drinking bottled water only if it is from a known safe supply and the bottle is unopened.
- ▶ Not using ice or eating anything with ice, unless the ice is made from safe bottled water.
- ▶ Not eating uncooked fruits or vegetables unless peeled and washed in safe water
- ▶ Not eating foods or beverages from street vendors.

The HPA asks health professionals to ensure that any patients with symptoms compatible with hepatitis E are tested. Samples (10ml EDTA whole blood) should be sent to the Virus Reference Department (VRD), HPA Centre for Infections, 61 Colindale Avenue, London, NW9, 5HT [2].

Enquiries should be directed to email: zoonoses@hpa.org.uk

References

1. <http://www.hpa.org.uk/webw/HPAweb&Page&HPAwebAutoListName/Page/1191942127585?p=1191942127585>.

2. Further advice on testing can be sought from VRD's Blood Borne Viruses Unit. Tel: 020 8327 6204, <http://www.hpa.org.uk/webw/HPAweb&Page&HPAwebAutoListName/Page/1200660013228?p=1200660013228>

Guidance on the application of dose coefficients for the embryo, fetus and the breastfed infant in dose assessments for members of the public

International Commission on Radiological Protection (ICRP) recommendations on assessment of risk to the public from radionuclides in the environment [1, 2] assume that in most situations an explicit assessment of the dose to either the embryo/foetus or the breastfed infant is not required. However, for some radionuclides – principally isotopes of phosphorus and the alkaline-earth elements (calcium, strontium, etc) – it is necessary for special consideration to be given to the foetus/breast-fed infant where these materials form a significant part of any release of radioactivity to the environment. (In these cases the dose due to *in utero* exposure and breastfeeding can be effectively significantly higher than that received by the mother.)

A new HPA publication [3] provides guidance on the application – where such radionuclides are involved – of ICRP dose coefficients which, for other materials, would be sufficient for risk assessing, without special consideration of *in utero* exposures or transfer of radionuclides in breast milk. The application of these coefficients in relation to situations of routine exposure, accidents and emergencies are considered.

References

1. ICRP. Doses to the embryo and fetus from intakes of radionuclides by the mother. ICRP publication 88. *Ann ICRP* 2001, **31** (1-3).
2. ICRP (2004). Doses to infants from ingestion of radionuclides in mothers' milk.
3. *Guidance on the application of dose coefficients for the embryo, foetus and the breastfed infant in dose assessments for members of the public*. Documents of the Health Protection Agency. Radiation, Chemical and Environmental Hazards, RCE-5, March 2008. ISBN 978-0-85951-614-3. Printed copy, £21 + 10% postage and packing, available from CRCE Information Office, tel: 01235 822742/822603; email: chiltoninformationoffice@hpa.org.uk. Available to download free from the HPA website: http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1207121671073?p=1199451989432

World Health Day

'Protecting health from climate change' is the theme of World Health Day, 7 April 2008, which also marks the 60th anniversary of the founding of World Health Organization. A dedicated website provides details of co-ordinated activities and related documentation [1].

The climate change theme builds on the WHO's 2003 report on the subject, *Climate change and human health - risks and responses* [2]. More recently an HPA report considered the public health implications of climate change for the UK [3].

References

1. <http://www.who.int/world-health-day/en/index.html>
2. <http://www.who.int/globalchange/climate/summary/en/index.html>
3. *Health effects of climate change in the UK*. London: Department of Health and the Health Protection Agency. February 2008. See, *HPA report on climate change and health*, HPR Vol. 2 No. 7, 15 February 2008.

Infection reports

Volume 2 Number 14 Published on: 4 April 2008

Respiratory

Laboratory reports of respiratory infections made to Cfl from HPA and NHS laboratories in England and Wales

Laboratory reports of respiratory infections made to Cfl from HPA and NHS laboratories in England and Wales

Data are recorded by week of report, but include only specimens taken in the last eight weeks (i.e. recent specimens)

Table 1 Reports of influenza infection made to Cfl, by week of report: weeks 10-13/2008

Week	Week 10	Week 11	Week 12	Week 13	Total
Week ending	09/03/08	16/03/08	23/03/08	30/03/08	
Influenza A	11	14	28	9	62
Isolation	1	-	2	1	4
DIF	1	5	3	3	12
Four-fold rise in paired sera	-	-	-	-	-
PCR	4	2	9	1	16
Other	5	7	14	4	30
Influenza B	20	29	28	34	111
Isolation	3	4	1	4	12
DIF	4	7	6	10	27
Four-fold rise in paired sera	-	-	-	-	-
PCR	10	13	5	10	38
Other	3	5	16	10	34
Influenza (untyped)	-	-	-	-	-
Isolation	-	-	-	-	-
DIF	-	-	-	-	-
Four-fold rise in paired sera	-	-	-	-	-
PCR	-	-	-	-	-
Other	-	-	-	-	-

DIF = Direct immunofluorescence.

"Other" = 'Antibody detection - Single high titre' or 'method not specified'.

Table 2 Respiratory viral detections by any method (culture, direct immunofluorescence, PCR, four-fold rise in paired sera, single high serology titre) by week of report: weeks 05-09/2008.

Week	Week 10	Week 11	Week 12	Week 13	Total
Week ending	09/03/08	16/03/08	23/03/08	30/03/08	
Adenovirus*	25	26	40	25	116
Coronavirus	2	–	–	1	3
Parainfluenza **	7	7	9	7	30
Rhinovirus	31	32	39	20	122
Respiratory syncytial virus (RSV)	38	38	46	27	149

* Respiratory samples only. Excludes diagnoses made by electron microscopy (EM)

** Includes parainfluenza types 1, 2, 3, 4 and untyped.

Table 3 Respiratory viral detections by age group: weeks 10-13/2008

Age group (years)	<1 year	1-4 years	5-14 years	15-44 years	45-64 years	≥65 years	Unknown	Total
Adenovirus*	24	23	14	35	14	6	–	116
Coronavirus	1	–	1	1	–	–	–	3
Influenza A	6	10	8	16	17	5	–	62
Influenza B	6	13	15	28	31	17	1	111
Parainfluenza†	14	8	1	1	3	3	–	30
Rhinovirus	66	15	7	17	9	7	1	122
Respiratory syncytial virus (RSV)	100	10	7	9	13	9	1	149

* Respiratory samples only.

† Includes parainfluenza types 1, 2, 3, 4, and untyped.

Table 4 Laboratory reports of infections associated with atypical pneumonia, by week of report: weeks 10-13/2008

Week	Week 10	Week 11	Week 12	Week 13	Total
Week ending	09/03/08	16/03/08	23/03/08	30/03/08	
<i>Coxiella burnetii</i>	–	–	1	1	2
Respiratory <i>Chlamydia</i> sp.	2	2	2	3	9
<i>Mycoplasma pneumoniae</i>	8	15	3	11	37
<i>Legionella</i> sp.	5	11	6	0	22

* Includes *Chlamydia psittaci*, *Chlamydia pneumoniae*, and *Chlamydia* sp detected from blood, serum, and respiratory specimens.

Table 5a Reports of legionnaires' disease cases in England and Wales, by week of report: weeks 05-09/2008

Week	Week 10	Week 11	Week 12	Week 13	Total
Week ending	09/03/08	16/03/08	23/03/08	30/03/08	
Nosocomial	–	–	–	–	0
Community	3	6(2*)	1	0	10
Travel Abroad	2	4	5	0	11
Travel UK	–	1(1*)	0	0	1
Total	5	11	6	0	22
Male	5	9	3	0	17
Female	0	2	3	0	5

* 2007 case(s)

Twenty-two cases with pneumonia were reported: 17 males aged from 33 to 78 years and five females aged from 47 to 88 years. Ten cases had community acquired infection. Three deaths were reported in two males aged 35 and 67y and F 82y.

Twelve cases were travel-associated: France (1), India (2), India/United Kingdom (1), Mexico (1), Poland (1), South Africa (1), Spain (1), Thailand (1), United Kingdom (1) and United States of America (2).

Table 5b Reports of legionnaires' disease cases by region of report in England and Wales: weeks 10-13/2008

Region	Nosocomial	Community	Travel Abroad	Travel UK	Total
North East	–	1(1*)	–	1(1')	2
Yorkshire & Humber	–	–	4	–	4
East Midlands	–	1	1	–	2
East of England	–	–	–	–	0
London	–	1	2	–	3
South East	–	2	1	–	3
South West	–	–	1	–	1
West Midlands	–	2	–	–	2
North West	–	2	–	–	2
Wales	–	1(1*)	2	–	3
Total	–	10	11	1	22

* 2007 case(s)

Travel health

Imported infections, England and Wales: October to December 2007

Imported infections, England and Wales: October to December 2007

The data presented in this report should be interpreted in conjunction with the report *Illness in England, Wales, and Northern Ireland associated with foreign travel – a baseline report to 2002* [1], especially the content under the section 'Sources of data on travel-associated illness and their limitations for analysis'. Please note that all data presented are provisional and subject to change; the confirmed final data will be presented on a biennial basis. All data presented in table 1 are for laboratory reports with specimen dates within the third quarter unless specified otherwise. Travel-associated infections are generally under-reported as information on travel history is incomplete through routine reporting mechanisms.

Table 1. Imported infections, England and Wales: October to December 2007

Organism	Total reports for Q4 (Oct - Dec)				Cumulative totals for Jan - Dec			
	2007*		2006		2007*		2006	
	Travel-related	All reports	Travel-related	All reports	Travel-related	All reports	Travel-related	All reports
Gastrointestinal Infections								
Bacterial								
<i>Salmonella</i> spp	633	3068	590	3889	2429	11873	2430	12407
<i>Campylobacter</i> spp	218	11962	258	10819	1199	50415	1026	46589
<i>Shigella flexneri</i>	9	103	10	82	26	343	41	333
<i>Shigella dysenteriae</i> †	11	19	5	8	31	53	30	43
<i>Shigella sonnei</i>	15	160	19	172	117	949	93	651
<i>Shigella boydii</i> †	17	34	12	21	69	127	56	105
Other (species unknown)	1	47	2	24	4	145	9	118
<i>Salmonella</i> Typhi	26	54	23	49	133	263	116	234
<i>Salmonella</i> Paratyphi (A,B,C)	22	46	24	45	121	219	152	269
<i>Vibrio cholerae</i> O1†	1	3	3	3	16	18	12	12
<i>Vibrio parahaemolyticus</i>	-	7	-	6	3	36	5	17
Protozoal								
<i>Entamoeba histolytica</i>	6	35	3	31	7	84	7	103
<i>Giardia lamblia</i>	37	794	51	789	235	2921	266	2937
<i>Cryptosporidium</i>	8	875	22	1185	97	3025	106	3668
<i>Cyclospora</i> spp	1	6	2	6	10	39	4	23

Intestinal helminths								
<i>Strongyloides stercoralis</i>	–	9	–	4	1	19	7	24
<i>Strongyloides</i> spp	–	4	–	1	1	11	–	4
<i>Ancylostoma duodenale</i>	–	–	–	–	–	–	–	1
<i>Necator americanus</i>	–	–	–	–	–	–	–	–
Hookworm unspec	1	13	1	4	4	28	5	21
<i>Ascaris lumbricoides</i> (round worm)	–	8	4	12	7	52	12	54
<i>Trichuris trichiura</i> (whip worm)	–	5	–	3	2	18	6	28
<i>Hymenolepis diminuta</i>	–	–	–	–	–	–	v	–
<i>Hymenolepis nana</i>	–	–	–	2	1	3	–	12
<i>Hymenolepis</i> spp	–	–	–	–	–	–	–	–
<i>Taenia saginata</i>	–	10	2	11	7	47	9	57
<i>Taenia</i> spp	–	13	–	7	4	42	5	38
<i>Gnathostoma</i> spp	–	2	–	–	–	2	–	1
<i>Diphyllobothrium latum</i> (fish tape worm)	–	–	1	2	1	1	1	7
Arthropod borne infections								
Malaria - total ‡	425	425	391	391	1548	1548	1747	1747
<i>Plasmodium falciparum</i>	330	330	309	309	1139	1139	1377	1377
<i>Pl. vivax</i>	330	55	33	33	256	256	218	218
<i>Pl. malariae</i>	8	8	9	9	30	30	26	26
<i>Pl. ovale</i>	28	28	33	33	108	108	106	106
Pl. unspecified	–	–	–	–	–	–	1	1
Mixed	4	4	7	7	15	15	17	17
Other (<i>P. knowlesi</i>)	–	–	–	–	–	–	1	1
Arboviruses								
Dengue virus ††	45	56	NA	NA	110	134	NA	NA
Chikungunya virus ††	–	–	20	21	12	15	69	75
Ross river virus ††	–	–	NA	NA	–	–	NA	NA
Sandfly fever virus ††	–	–	NA	NA	–	–	NA	NA
Eastern Equine Encephalitis ††	–	–	NA	NA	1	1	NA	NA
West Nile virus ††	–	–	NA	NA	1	1	NA	NA
Leishmaniases								
Cutaneous	2	2	6	8	10	13	26	42
Visceral	1	2	–	–	9	11	4	7
Unspecified	–	4	1	2	2	19	3	9

Filariases								
<i>Loa loa</i>	-	-	-	-	-	1	1	3
<i>Wuchereria bancrofti</i>	-	-	-	-	-	-	1	1
<i>Mansonella perstans</i>	-	-	-	-	1	1	-	-
<i>Onchocerca volvulus</i>	-	-	-	-	-	-	-	-
Unspecified	-	-	-	-	-	-	-	-
Lyme borreliosis §								
	NA	NA	NA	NA	NA	NA	NA	NA
Trypanosomiasis								
	-	-	-	-	1	2	-	-
Miscellaneous								
Schistosome infections								
<i>Schistosoma mansoni</i>	-	2	-	5	1	15	-	13
<i>Schistosoma haematobium</i>	-	7	-	4	4	33	5	27
<i>Schistosoma intercalatum</i>	-	-	-	-	-	-	-	-
<i>Schistosoma</i> spp	1	2	3	7	6	21	5	20
Other infections								
Leptospirosis §	NA	NA	NA	NA	NA	NA	NA	NA
Legionnaires' disease**	29	73	29	163	108	304	157	544
<i>Coxiella burnetii</i> (Q fever)	-	11	-	6	2	54	-	24
<i>Rickettsia</i> spp ††	9	11	NA	NA	41	77	NA	NA

All data extracted from Labbase 7 March 2008 unless otherwise specified.

*All data for 2007 is provisional and may be subject to change.

†Data on cholera, *S.boydii* and *S.dysenteriae* supplied by the Cfl Laboratory of Enteric Pathogens.

‡Data for malaria supplied by the HPA Malaria Reference Laboratory and are provisional. Trends are best interpreted on an annual basis.

§Data for Lyme borreliosis and leptospirosis supplied by the Zoonoses Surveillance Reference Unit, CDSC Wales, on behalf of the Leptospira Reference Unit, Hereford and the Lyme Disease Reference Unit, Southampton.

**Data on legionnaires' disease supplied by the Legionella Section of the Respiratory Diseases Department of Cfl.

†† Data from the Special Pathogens Reference Unit, Centre for Emergency Preparedness and Response.

NA – Not available

Gastrointestinal infections

Salmonella spp (non-typhoidal)

There were 3,068 laboratory reports of *Salmonella* spp, of which 633 (21%) were associated with recent travel abroad. *Salmonella* serovar Enteritidis was the most common serotype associated with travel abroad (257/633, 41%), of which phage types (PT) 1, 4, 21, and 6 were most commonly reported [table 2]. Other PTs reported included PT14B, of which 9/15 were associated with travel to Spain and PT15, of which 10/13 were associated with travel to Egypt.

Table 2. Laboratory reports of *Salmonella* Enteritidis associated with foreign travel, England and Wales: October to December 2007

Country of travel	<i>Salmonella</i> Enteritidis phage types (PTs)						Total
	PT 1	PT 4	PT 21	PT 6	Other	PT not stated	
Spain	9	11	–	–	14	6	40
Turkey	–	2	14	7	3	3	29
Egypt	2	8	–	–	12	2	24
Tunisia	1	2	–	12	2	–	17
Greece	6	–	6	–	4	–	16
Portugal	6	–	–	–	8	–	14
Cuba	–	–	–	5	–	2	7
Dominican Republic	3	3	–	–	–	–	6
India	2	–	1	–	2	1	6
Kenya	3	–	1	–	2	–	6
Morocco	5	–	–	–	1	–	6
Maldives	–	–	–	–	4	1	5
Sri Lanka	5	–	–	–	–	–	5
Bulgaria	–	1	–	–	3	–	4
France	2	–	–	–	1	1	4
Other (N=25)	4	5	5	1	14	7	36
Country not stated	5	9	4	1	6	7	32
Total	53	41	31	26	76	29	257

Other serovars reported were *S. Typhimurium* (67/633, 11%), *S. Virchow* (48/633, 8%), *S. Kentucky* (19/633, 3%), and *S. Newport* (17/633, 3%) [table 3].

Table 3. Laboratory reports of other *Salmonella* spp associated with foreign travel, England and Wales: October to December 2007

Country of travel	S Typhimurium	S Virchow	S Kentucky	S Newport	Other	Total
Egypt	3	17	6	5	21	52
India	2	4	–	1	26	33
Spain	12	1	–	2	10	25
Thailand	5	1	–	–	15	21
Kenya	1	6	2	1	7	17
Pakistan	3	1	–	–	13	17
Tunisia	2	–	3	1	9	15
Cuba	2	–	–	–	9	11
Morocco	4	–	3	1	3	11
Turkey	2	1	–	–	8	11
The Gambia	1	4	–	–	5	10
Africa (unspecified)	–	1	2	–	6	9
Italy	3	–	–	1	4	8
Malta	1	–	–	–	6	7
Greece	2	–	–	–	4	6
Other countries (N=47)	15	8	2	3	57	85
Country not stated	9	4	1	2	22	38
Total	67	48	19	17	225	376

***Campylobacter* spp**

There were 11,962 laboratory reports of *Campylobacter* spp, of which 218 (2%) were associated with recent travel abroad. *Campylobacter* infections are mostly associated with travel to Spain and the Middle East in the summer months reflecting UK travel patterns, but during the winter months, India is also more often reported [table 4].

Table 4. Laboratory reports of *Campylobacter* spp associated with foreign travel, England and Wales: October to December 2007

Country of travel	<i>Campylobacter</i> spp
Spain	36
India	33
Morocco	21
Turkey	15
Portugal	12
Egypt	9
Kenya	8
Thailand	7
China	5
Cyprus	5
Nepal	5
France	4
Africa (unspecified)	3

Tunisia	3
Barbados	2
Other countries (N=30)	41
Country not stated	9
Total	218

***Shigella* spp**

In total, there 363 reports of shigella infection in the fourth quarter of 2007, of which 53 (15%) were associated with foreign travel. Travel history information was available for over 50% of both *S. boydii* and *S. dysenteriae* reports, but for only 21% for *S. sonnei* and *S. flexneri*. Countries of travel are listed for each species in table 5.

Table 5. Laboratory reports of *Shigella* spp associated with foreign travel, England and Wales: October to December 2007

Country of travel	<i>Shigella</i> species					Total
	<i>S. boydii</i>	<i>S. sonnei</i>	<i>S. dysenteriae</i>	<i>S. flexneri</i>	<i>Shigella</i> unspecified	
Egypt	2	–	2	7	1	12
Morocco	4	6	1	–	–	11
India	7	–	4	–	–	11
The Gambia	1	1	–	1	–	3
Tunisia	–	2	–	–	–	2
Bangladesh	–	1	1	–	–	2
Kenya	–	1	–	–	–	1
China	–	1	–	–	–	1
Caribbean	–	1	–	–	–	1
Sierra Leone	–	–	–	1	–	1
Pakistan	1	–	–	–	–	1
Iraq	1	–	–	–	–	1
Algeria	–	–	1	–	–	1
Zimbabwe	–	–	1	–	–	1
Country not stated	1	2	1	–	–	4
Total	17	15	11	9	1	53

Cholera

There were three reports of *Vibrio cholerae* serogroup O1; all of which were associated with travel to Nepal.

Cryptosporidium

There were 875 reports of cryptosporidium infection of which eight were associated with recent foreign travel. Countries of travel reported were Spain (three), Egypt (two), Greece (one), Pakistan (one), and Madagascar (one).

Giardia lamblia

There 794 giardia infections reported, of which 37 were associated with recent foreign travel. Countries of travel are listed in table 6.

Table 6. Laboratory reports of *Giardia lamblia* associated with foreign travel, England and Wales: October to December 2007

Country of travel	<i>Giardia</i> reports
Pakistan	5
Spain	4
India	4
Turkey	3
Egypt	2
Madagascar	2
The Gambia	2
Cape Verde	2
Congo	2
Other countries (N=14)*	11
Total	37

Other intestinal protozoa

Other intestinal protozoa reported were *Entamoeba histolytica*; six out of a total of 35 were associated with recent foreign travel; countries reported were India, Egypt, The Gambia, Peru (one report each), one had travelled to Cambodia, Laos and Thailand and one had no country of travel stated. There were six reports of *Cyclospora*, of which one was associated with travel to Israel.

Enteric fever

During the fourth quarter of 2007, there were 54 reports of *S. Typhi* and 46 reports of *S. Paratyphi* (42 *S. Paratyphi* A, and four *S. Paratyphi* B).

Forty-eight percent (26/54) of *S. Typhi* and *S. Paratyphi* (22/46) reports were associated with recent foreign travel. Countries of travel are listed in table 8. The Indian sub-continent remains the most reported region of travel for cases of enteric fever and is mainly associated with those visiting friends and relatives in their country of ethnic origin [2].

Table 7. Laboratory reports of enteric fever associated with foreign travel, England and Wales: October to December 2007

Resort country	<i>Salmonella</i> spp			Total
	<i>S. Typhi</i>	<i>S. Paratyphi</i> A	<i>S. Paratyphi</i> B	
India	7	8	–	15
Pakistan	5	5	–	10
Bangladesh	5	3	–	8
Nepal	2	1	–	3
Afghanistan	1	-	–	1
Australia	–	1	–	1
China	–	1	–	1
The Gambia	–	1	–	1
Ghana	1	–	–	1
South America	–	–	1	1
Sri Lanka	1	–	–	1
Turkey	1	–	–	1
Country not stated	3	1	–	4
Total	26	21	1	48

Intestinal helminths

In the fourth quarter of 2007 there were 63 reports of intestinal helminth infection, of which only one was associated with recent foreign travel; this was a case of hookworm infection associated with travel to Afghanistan. Helminth infections can persist in the body for months and it may not be possible to say for certain where these infections were acquired; they are probably associated with new entrants to the UK as well as short-term travellers.

Arthropod borne infections

Malaria

During the fourth quarter of 2007, there were 425 cases of malaria reported in the United Kingdom, 78% (330 cases) of which were caused by the parasite, *Plasmodium falciparum* and 19% (55 cases) were caused by *P. vivax*. Where country of travel was known (206), 83% of malaria cases caused by *P. falciparum* were reported to be acquired in west Africa, and 71% (32/45) of *P. vivax* cases were reported to be acquired in Asia.

Dengue

Fifty-six cases (includes 17 confirmed and 39 probable) were reported by the HPA Special Pathogens Reference Unit (SPRU) in the fourth quarter. Of those, 45 had information about foreign travel. Twenty-one cases were associated with travel to the Indian sub-continent, nine with the Caribbean, seven to south east Asia, and four to South America. Country of travel for dengue fever cases is very under-reported.

Leishmaniasis

There were eight cases of leishmaniasis reported in the fourth quarter, two of which were presumed to be cutaneous leishmaniasis and two were visceral leishmaniasis; the type was unknown for the remaining cases. The cutaneous cases had travelled to Ethiopia (one) and Ecuador (one) and one visceral case had travelled to both India and Mexico.

Other infections

Schistosomiasis

Of 11 reports of infection with *Schistosoma* spp, only one had any information about travel, which was associated with travel to Kenya and Uganda.

Rickettsial infections

There were 11 cases of rickettsial infection reported by the SPRU in the fourth quarter. Four were confirmed as spotted fever of which one had travelled to Gabon and one to another African country; five were probable spotted fever of which one each travelled to Botswana, South Africa, Swaziland, Australia, and an unspecified African country. Two further reports were probable epidemic typhus of which one travelled to Ethiopia and one to Australia and Singapore.

Legionnaires' disease

There were 73 cases of Legionnaires' disease reported in the third quarter, of which 29 (40%) were associated with foreign travel. Most cases are sporadic but five of the travel-associated cases were involved in four different outbreaks occurring in Tunisia, China, Italy, and two cases occurred on a cruise.

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1. Health Protection Agency. *Illness in England, Wales, and Northern Ireland associated with foreign travel – a baseline report to 2002*. London: HPA, 2004. Available at http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1203496904956?p=1158945066450.
2. Health Protection Agency. *Pilot of enhanced surveillance of enteric fever in England, Wales, and Northern Ireland, 1 May 2006 to 30 April 2007*. London; Health Protection Agency: March 2008. Available at http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1206575041900?p=1158945066450.