Public Health England

# Health Protection Report
weekly report

**Volume 9 Number 2** Published on: **16 January 2015**

## Current News



## Infection Reports

### Antimicrobial resistance

### Carbapenem resistance: implementation of an enhanced surveillance system

*The planned implementation of an electronic reporting system for the enhanced surveillance of carbapenem resistance in Gram-negative bacteria*.

**Volume 9 Number 2** Published on: **16 January 2015**

## Ebola virus disease: international epidemiological summary (at 11 January 2015)

Up to the end of 11 January 2014, a total of 21,296 clinically compatible cases (CCC) of Ebola virus disease (EVD) including 8,429 deaths associated with the West African EVD outbreak (table 1) have been recorded. Provided case totals and particularly deaths are known to still under-represent the true impact of the outbreak in West Africa. While the majority of cases have been reported from Guinea, Liberia and Sierra Leone, cases have also been reported from Mali, Nigeria, Senegal, Spain, the United Kingdom (UK) and the United States of America (USA).

Current reports indicate an overall improving epidemiological situation in Sierra Leone and Liberia with a continued decrease in weekly incidence. However, trends in national incidence in Guinea have yet to demonstrate a similar consistent decline.

In Guinea, reported case incidence showed a decrease again this week to the lowest level nationally since the week ending 17 August 2014, and in the capital Conakry since late November 2014. However, the geographical distribution of cases continues to vary and shift. Incidents of community resistance remain an issue and may impede progress in EVD control.

In Liberia reported case incidence remains at a low level. In the last week only two districts reported confirmed cases: Grand Cape Mount and Montserrado. As in Guinea, community resistance to EVD control measures, particularly in Grand Cape Mount, may hinder progress.

While Sierra Leone remains the worst affected country (having reported nearly three times as many new confirmed cases in the last 21 days than in Guinea and Liberia combined), a decrease in national case incidence has been reported for the second week in a row. This week's total is the lowest weekly total of new confirmed cases reported since the week ending 31 August 2014. Significant transmission continues in the western districts, particularly in Freetown, Port Loko and the Western Rural Area, where a combined total of 131 confirmed cases were reported in the last week.

Case fatality rates remain high across Guinea, Liberia and Sierra Leone where for cases with a definitive outcome the rate is 71%. For hospitalised patients, the case fatality rate is lower at 60% in Sierra Leone and 58% in Liberia and 57% in Guinea.

To date, a total of 24 EVD cases have been cared for outside of Africa. Of these, 18 repatriated cases (hospitalised in USA, Spain, UK, Germany, France, Norway, Switzerland, Italy and the Netherlands), three imported cases (diagnosed in the USA and the UK) and three incidents of local transmission (in Spain and the USA).

More detailed information on the international epidemiological situation can be found in PHE's weekly Ebola Epidemiological Update.

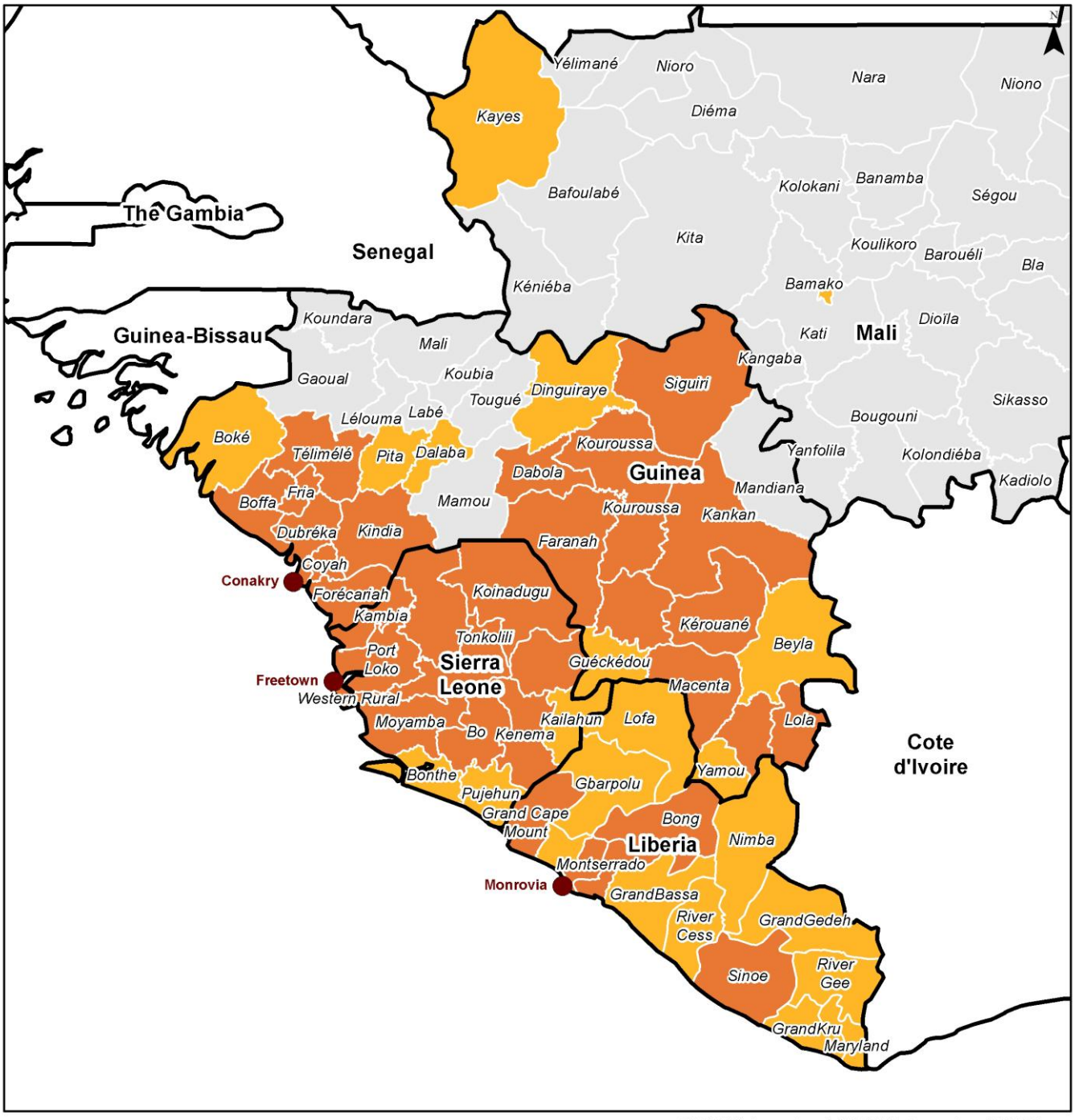
**Summary of Ebola virus disease international epidemiological information as at 11 January 2014**

| Country | Total CCCs | Total deaths | Current status |
|---|---|---|---|
| Guineau | 2,806 | 1,814 | Ongoing transmission |
| Liberia | 8,331 | 3,538 | Ongoing transmission |
| Sierra Leone | 10,124 | 3,062 | Ongoing transmission |
| Mali | 8 | 6 | Awaiting EVD-free status |
| Nigeria | 20 | 8 | EVD free |
| Senegal | 1 | 0 | EVD free |
| Spain | 1 | 0 | EVD free |
| UK | 1 | 0 | Single imported case |
| USA | 4 | 1 | Awaiting EVD-free status |
| **TOTAL** | **21,296** | **8,429** | |

Further information on the international epidemiological situation can be found in PHE's weekly Ebola Epidemiological Update at:
https://www.gov.uk/government/publications/ebola-virus-disease-epidemiological-update.

See also Ebola Outbreak Distribution Map below.

## Ebola Outbreak Distribution Map






Capital Cities

Country Boundaries

***WHO data as of 11 January***

**Transmission in last 21 days by district**

- Newly Affected
- Active
- No longer active
- Unaffected

### Reference

1. PHE guidance. "Ebola virus disease: risk assessment of outbreak in West Africa", 8 December 2014.

## Surveillance schemes for blood-borne viruses in healthcare workers

Latest data from the UK's Surveillance of Significant Occupational Exposures (Sig. Occ.) scheme, details of the imminent launch of web-based electronic reporting for all healthcare worker exposures to blood and body fluids, and information about arrangements for the clinical management of HCWs infected with blood-borne viruses (BBVs) were themes of the fifth biennial POINTERS conference held in Cardiff in December [1].

The Sig. Occ. scheme generates the data that are reported in the biennial Eye of the Needle report, the fifth edition of which was launched at the Cardiff conference [2]. This report covers significant occupational exposures reported between 2004 and 2013, where the source patient is either known or thought to have been infected with HIV, hepatitis B (HBV) and/or hepatitis C (HCV). It highlights how such occupational BBV exposures in the healthcare setting continue to be of public health concern [3].

The objectives of the Sig. Occ. scheme are:

- to monitor incidence of significant occupational exposures of healthcare workers to HIV, hepatitis C (HCV) and hepatitis B (HBV);
- to analyse the circumstances in which significant exposures take place, including procedures involved and the extent of use of safety devices;
- to monitor significant exposures involving use of HIV post-exposure prophylaxis, regardless of source patient status;
- to monitor outcomes of significant exposures such as seroconversion;
- to inform healthcare workers and raise awareness about incidence of significant occupational exposures in the healthcare system.

Since the coming into force of the UK sharps injuries in healthcare regulations in 2013, the Sig. Occ. scheme contributes to the UK's arrangements for monitoring compliance with the EU Sharps Directive.

Sig. Occ. is one of four surveillance schemes concerning the transmission of BBVs in healthcare workers (HCWs) described at the Cardiff conference. The other schemes are:

- the sentinel network of reporting hospitals – an electronic reporting system covering all HCW exposures to blood and body fluids – known as the COHORT Sentinel;

- the UK Advisory Panel for Healthcare Workers Infected with Bloodborne Viruses (UKAP) Occupational Health Register (UKAP-OHR);
- the UKAP scheme for managing cases of HCWs newly diagnosed with HIV, HBV or HCV.

The COHORT Sentinel scheme covers all healthcare worker exposures to blood and body fluids regardless of the viral status of the patient involved. Data from this surveillance scheme provides a denominator useful for calculating the incidence of occupational exposure incidents, necessary in developing effective prevention interventions.

In the near future, the Sig.Occ. and COHORT Sentinel schemes will operate on a web-based electronic system, allowing HCWs to register incidents online, directly and immediately post-exposure, facilitating effective reporting and follow-up by the occupational health department.

After launch, more hospitals will be invited to participate in the online reporting system in the hope that the level of under-reporting associated with the current form-based reporting system can be reduced.

Formed in 1991, the UK Advisory Panel for healthcare workers infected with bloodborne viruses (UKAP) issues advice and guidance on practice restriction and management of healthcare workers infected with HIV, hepatitis B and hepatitis C. The panel provides support for local incident management teams when a retrospective exercise may be needed, where patients may have been put at risk of blood borne virus infection by an infected healthcare worker as a result of exposure prone procedures (EPPs) being performed.

UKAP also oversees a confidential register of HIV and hepatitis B infected healthcare workers (the UKAP-OHR), who wish to perform EPPs under specific national criteria including strict viral load monitoring.

The UKAP-OHR will also operate online in 2015 allowing occupational health physicians to manage and monitor an HIV and/or hepatitis B infected HCWs, via a confidential database.

In 2015, UKAP will be publishing consolidated guidance for the management of BBV-infected HCWs that will be used with the register.

**References**

1. Prevention of occupational infection, treatment and exposure reporting strategies (fifth POINTERS conference), Cardiff, 11 and 12 December 2014.

2. *Eye of the Needle: United Kingdom surveillance of significant occupational exposures to blood-borne viruses in healthcare workers* (December 2014). Downloadable (with associated documentation and resources) from: Blood-borne viruses: Eye of the Needle.
3. "Work exposures to HIV, hepatitis B, and hepatitis C still rising", PHE press release, 11 December 2014.
4. "Surveillance systems relating to the transmission of BBVs in HCWs", Cardiff poster presentation.

## Electronic reporting for carbapenem resistance under development

Carbapenems have become the antibiotics of last resort for many serious bacterial infections, especially in the healthcare setting, and it is therefore crucial to prevent the spread of carbapenem-resistant bacteria, to identify emerging resistance mechanisms and to monitor changing resistance patterns.

In December 2013, PHE published the "Acute Trust Toolkit for the early detection, management and control of carbapenemase-producing Enterobacteriaceae", including a risk assessment matrix, to support efforts in the management and control of carbapenem resistance [1]. Although the toolkit is focussed on Enterobacteriaceae, it is recognised that carbapenem resistance is also of concern in other Gram-negative organisms, including Pseudomonas spp. and Acinetobacter spp.

A national enhanced surveillance programme for carbapenem resistance, with a focus on Gram-negative bacteria expressing acquired carbapenemases, is being developed by PHE, which will help to provide improved understanding of the current situation across England. The programme includes introduction of a web-based electronic reporting system (ERS) that will allow laboratories to request confirmation and characterisation of carbapenem-resistant Gram-negative bacteria where expression of an acquired carbapenemase is suspected and facilitate the reporting of bacteraemias caused by carbapenem-resistant Gram-negative bacteria. The ERS will collect information on patient demographics, submitting laboratory (including specimen and Trust details), healthcare setting and risk factors.

An article describing the background to the electronic reporting system is published in the infection reports section of this issue of *HPR* [2].

**Reference**

1. PHE (2013). Acute Trust toolkit for the early detection, management and control of carbapenemase-producing Enterobacteriaceae. See also *HPR* **8**(9).

1. Carbapenem resistance: implementation of an enhanced surveillance system, *HPR* **9**(2): infection reports.

---

## Royal Society of Medicine conference on national TB strategy

The respiratory medicine section of the Royal Society of Medicine is hosting a one-day conference to review the provisions of the national tuberculosis strategy for England [1,2].

The conference programme covers the collaborative TB strategy, and related scientific advances and developments in clinical practice.

This includes:

- an overview of developments in the diagnosis and treatment of TB; current priorities of care in the UK, including provision for new-entrant patients; and
- the complementary responsibilities of PHE, the NHS, councils and the voluntary sector.

Also to be covered are the needs of ethnic minority and new-entrant communities, including care pathway algorithms and barriers to latent TB screening; this will include discussion of the difficulties of effectively communicating with 'hard-to-reach' populations and how they can be screened for active TB, in London and other urban centres.

**References**

1. The new national TB strategy – can we deliver?, London, 18 March, 2015.

2. PHE/NHS England policy paper: "Collaborative tuberculosis strategy for England".

---

Public Health England

Health Protection Report
weekly report

Infection report

Volume 9 Number 2 Published on: 16 January 2015

Antimicrobial resistance

# Carbapenem resistance: implementation of an enhanced surveillance system

***This article describes the background to the planned implementation of an electronic reporting system for the enhanced surveillance of carbapenem resistance in Gram-negative bacteria.***

Increasing carbapenem resistance among Gram-negative bacteria is a major public health concern in the UK and worldwide [1,2]. Carbapenems have become the antibiotics of last resort for many serious bacterial infections, especially in the healthcare setting. Therefore it is crucial to prevent the spread of carbapenem-resistant bacteria, to identify emerging resistance mechanisms and to monitor changing resistance patterns. This imperative was highlighted in the recently published UK Five Year Antimicrobial Resistance Strategy 2013 to 2018 [3].

In Gram-negative bacteria, carbapenem resistance results from one or more of several different mechanisms, including the production of acquired carbapenemases. Acquired carbapenemases are included in Ambler β-lactamase classes A, B and D. Ambler class A β-lactamases include the *Klebsiella pneumoniae* carbapenemases (KPC), one of the most frequently isolated carbapenemase families [4,5]. New Delhi metallo-β-lactamases (NDM) belong to the Ambler class B carbapenemases, as also do the Verona integron-encoded metallo-β-lactamase (VIM) and IMP (named after their affinity for imipenem) families of carbapenemases. The final class of carbapenemases, known as the carbapenem-hydrolysing class D β-lactamases (CHDLs), are most frequently found in *Acinetobacter* spp., but recently there has been increasing detection of OXA-48 and OXA-48-like enzymes among Enterobacteriaceae [6].

Data from PHE's Antimicrobial Resistance and Healthcare Associated Infections (AMRHAI) Reference Unit shows that many carbapenemase-producing Enterobacteriaceae are resistant not only to carbapenem antibiotics, but to many classes of antibiotics (table 1). Only colistin remained active against >90% of all carbapenemase-producing Enterobacteriaceae confirmed by AMRHAI in 2014 (table 1). However, colistin-resistant isolates have been referred to AMRHAI from UK laboratories.

**Table 1. Antibiotic susceptibilities of carbapenemase-producing Enterobacteriaceae isolates from the UK, submitted to the AMRHAI Reference Unit in 2014**

| Antibiotic | Proportion of susceptibility, % [a] | | | | | |
|---|---|---|---|---|---|---|
| | Metallo-enzyme producers (NDM, VIM, IMP) (n=c. 400) | | | Non-metallo-enzyme producers (KPC, OXA-48, GES, IMI) (n=c. 1250) | | |
| | *E. coli* | *Klebsiella* | *Enterobacter / Citrobacter* | *E. coli* | *Klebsiella* | *Enterobacter / Citrobacter* |
| **Imipenem (IPM)** | 3 | 2 | 3 | 48 | 7 | 40 |
| **IPM-EDTA** [b] | 100 | 88 | 94 | 69 | 17 | 42 |
| **Meropenem** | 6 | 5 | 8 | 73 | 12 | 51 |
| **Ertapenem** | 3 | 0 | 3 | 4 | 0 | 1 |
| **Ampicillin** | 0 | 0 | 0 | 0 | 0 | 0 |
| **Co-amoxiclav** | 1 | 0 | 0 | 1 | 0 | 0 |
| **Piperacillin (PIP)** | 0 | 0 | 1 | 0 | 0 | 1 |
| **PIP-tazobactam** | 2 | 0 | 1 | 1 | 0 | 1 |
| **Cefotaxime** | 1 | 0 | 0 | 10 | 3 | 13 |
| **Ceftazidime** | 1 | 0 | 0 | 25 | 7 | 34 |
| **Aztreonam** | 13 | 13 | 23 | 15 | 7 | 34 |
| **Ciprofloxacin** | 17 | 6 | 20 | 61 | 30 | 68 |
| **Gentamicin** | 31 | 24 | 24 | 51 | 56 | 66 |
| **Tobramycin** | 22 | 7 | 8 | 51 | 47 | 59 |
| **Amikacin** | 49 | 33 | 62 | 92 | 82 | 96 |
| **Colistin** | 100 | 93 | 93 | 100 | 94 | 100 |
| **Tigecycline** | 99 | 52 | 73 | 98 | 59 | 80 |

a. Susceptibility defined using BSAC v. 13 (June 2014) breakpoints

b. Diagnostic test to distinguish metallo- from non-metallo- enzymes; not for therapeutic use

| |
|---|
| Active in vitro against <50% isolates |
| Active in vitro against 50-90% isolates |
| Active in vitro against >90% isolates |

Evidence of transmission of genes conferring carbapenem resistance between bacterial species has been well documented and this poses challenges in the surveillance, management and control of antimicrobial resistance [7]. In December 2013, Public Health England (PHE) published the “Acute trust toolkit for the early detection, management and control of carbapenemase-producing Enterobacteriaceae”, including a risk assessment matrix, to support efforts in the management and control of carbapenem resistance [8]. Although the toolkit is focussed on Enterobacteriaceae, it is recognised that carbapenem resistance is also of concern in other Gram-negative organisms, including *Pseudomonas* spp. and *Acinetobacter* spp. [9]. A national enhanced surveillance programme for carbapenem resistance, with a focus on Gram-negative bacteria expressing *acquired* carbapenemases, is in development and will help to provide improved understanding of the current situation across England.

The enhanced surveillance of carbapenem-resistant Gram-negative bacteria will use a web-based electronic reporting system (ERS). The ERS will serve two main functions: (i) as a system for laboratories to request confirmation and characterisation of carbapenem-resistant Gram-negative bacteria where expression of an acquired carbapenemase is suspected and; (ii)

as a system for laboratories to report bacteraemias caused by carbapenem-resistant Gram-negative bacteria. The ERS will collect information on patient demographics, submitting laboratory (including specimen and Trust details), healthcare setting and risk factors. Some of this information must be provided at the time of isolate referral or bacteraemia reporting (core dataset). All other information should be provided within seven days of the isolate referral or bacteraemia report (enhanced dataset).

Laboratories will be requested to refer and report organisms suspected of producing acquired carbapenemases as detailed in the most recent version of the "UK Standards for Microbiology Investigations: Laboratory Detection and Reporting of Bacteria with Carbapenem-Hydrolysing β-lactamases (Carbapenemases)" [10]. Furthermore, laboratories will be requested to report all cases of bacteraemia caused by carbapenem-resistant Gram-negative bacteria, irrespective of suspected resistance mechanism.
The ERS will be implemented in spring/summer 2015. User guides for laboratories and Infection Prevention and Control Teams will be prepared and circulated prior to the system going live.

The enhanced surveillance of carbapenem resistance in Gram-negative bacteria will help stakeholders develop a greater understanding of the epidemiology of carbapenem resistance in England through the regular analysis and feedback of results. Analysis of data at the regional and national levels will allow identification of patient groups that may be more affected by carbapenem-resistant organisms, monitoring of changes in the epidemiology of carbapenemase-producing bacteria and the evaluation of interventions introduced to prevent the spread of carbapenem resistance. Furthermore, Trusts and laboratories will be able to access and manage their data locally, providing an opportunity for local-level data analysis.

The enhanced surveillance programme is one of many activities initiated by PHE, in collaboration with the NHS, that aims to tackle the emergence of carbapenem resistance in England. The collection and analysis of enhanced surveillance data will be crucial in informing and refining policy and guidelines around the prevention and management of patients infected with or colonised by carbapenem-resistant Gram-negative bacteria.

## Note

This report was jointly prepared by scientists from PHE's Field Epidemiology Training Programme, the Antimicrobial Resistance and Healthcare Associated Infections Reference Unit, Field Epidemiology Services, and the Healthcare Associated Infection and Antimicrobial Resistance Department.

## References


1. DH (2013). Annual Report of the Chief Medical Officer (Volume Two): infections and the rise of antimicrobial resistance.

2. WHO (2104). Antimicrobial Resistance: Global Report on Surveillance.

3. DH (2013). UK Five Year Antimicrobial Resistance Strategy 2013 to 2018.

4. Nordmann P, Cuzon G, Naas T (2009). The real threat of Klebsiella pneumoniae carbapenemase-producing bacteria. *Lancet Infect Dis* **9**:228-36.

5. Woodford N, Turton JF, Livermore DM (2011). Multiresistant Gram-negative bacteria: the role of high-risk clones in the dissemination of antibiotic resistance. *FEMS Microbiol Rev* **35**: 736-55.

6. Mathers AJ, Hazen KC, Carroll J, Yeh AJ, Cox HL, Bonomo RA, et al (2013). First clinical cases of OXA-48-producing carbapenem-resistant *Klebsiella pneumoniae* in the United States: the "menace" arrives in the new world. *J Clin Microbiol* **51**: 680-3.

7. Goren MG, Carmeli Y, Schwaber MJ, Chmelnitsky I, Schechner V, Navon-Venezia S (2010). Transfer of carbapenem-resistant plasmid from Klebsiella pneumoniae ST258 to Escherichia coli in patient. *Emerg Infect Dis* **16**: 1014-7.8.

8. PHE (2013). Acute Trust toolkit for the early detection, management and control of Carbapenemase-Producing Enterobacteriaceae.

9. Freeman R, Moore LSP, Charlett A, Donaldson H, Holmes AH (2014). Exploring the epidemiology of carbapenem-resistant Gram-negative bacteria in west London and the utility of routinely collected hospital microbiology data. *J Antimicrob Chemother*.

10. PHE. UK Standards for Microbiology Investigations: Laboratory Detection and Reporting of Bacteria with Carbapenem-Hydrolysing b-Lactamases (Carbapenemases).