West Virginia
Carbapenem-resistant *Enterobacteriaceae* (CRE) Surveillance Report
January 1, 2014 – December 31, 2014

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INTRODUCTION

Enterobacteriaceae are an important cause of community-acquired and healthcare-associated infections. They cause a wide range of infections, including urinary tract infections, bacteremia, pneumonia, and wound infections. Carbapenem-resistant *Enterobacteriaceae* (CRE) infections are very difficult to treat and are associated with a high mortality rate, up to 50% in some studies.[1] This type of resistance is spreading, so surveillance for CRE is an important aspect of prevention and control efforts.

Since August 2013, laboratories testing specimens from West Virginia residents have been required to report cases of CRE to the local health department of the patient's county of residence within one week of detection (see 64CSR7 http://apps.sos.wv.gov/adlaw/csr/readfile.aspx?DocId=25071&Format=PDF). The following surveillance report summarizes data from cases of CRE reported between January 1, 2014 and December 31, 2014.

METHODS

For surveillance purposes, a case of CRE is defined as an *Enterobacteriaceae* that is nonsusceptible to one of the following carbapenems: doripenem, meropenem, or imipenem and resistant to all of the following third-generation cephalosporins that were tested: ceftriaxone, cefotaxime, and ceftazidime (http://www.cdc.gov/hai/organisms/cre/cre-toolkit/background.html#definition).

Case counts are based on date of report. Each individual case is only counted one time, regardless of how many lab results are received for this individual. The exception to this is when a single individual is reported as being infected/colonized with more than one carbapenem-resistant organism.

From January–December 2014, four individuals were diagnosed with two or more separate carbapenem-resistant organisms. Thus, the data were analyzed two ways: at the organism level (see Specimen data) and at the patient level (see Demographics). Data were analyzed at the state level and at the regional level. Variables with 0-4 cases are indicated with a value of "<5" in order to protect patient confidentiality. When variables have missing data, the number of cases included in the analysis is noted beside the variable name.

RESULTS

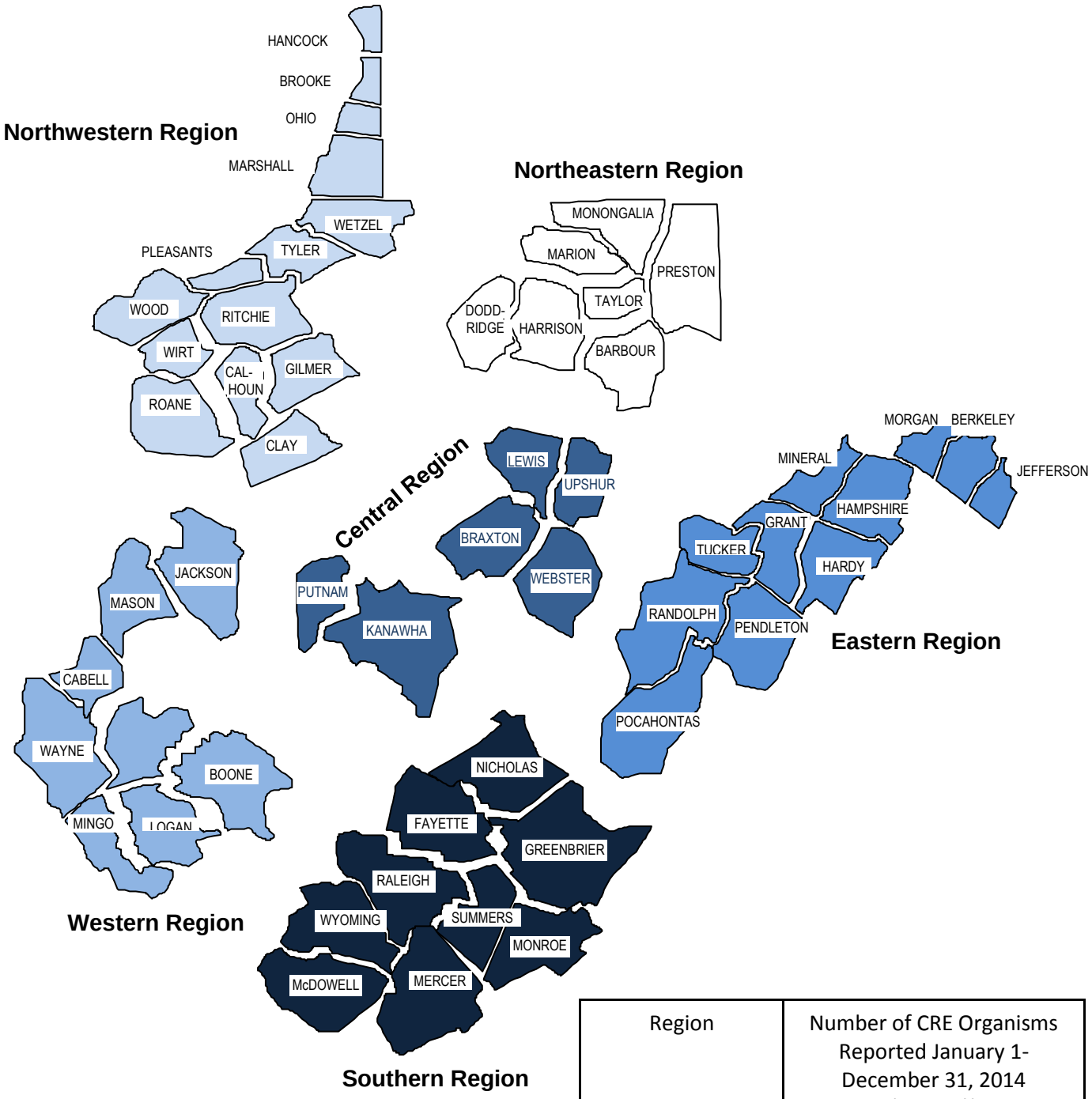
One hundred and thirty-two (132) patients were reported and one hundred thirty-six (136) organisms were identified. Each individual was counted once and information about the demographics was collected. Furthermore, a separate list was compiled of the organisms and a variety of organisms were reported (see Table 1), the most common CREs were *Klebsiella pneumoniae* and *Enterobacter cloacae.*

LIMITATIONS

Limitations to this report include the fact that this is a passive surveillance system and some cases may not be reported, including West Virginia residents who may seek medical care outside of the state. In addition, neither a true incidence nor a true prevalence can be calculated based on this data; since case counts are based on laboratory reports, the cases being reported may be newly identified cases of infection/colonization or they may be known cases being retested for a variety of other reasons. Finally, the mechanism of resistance for these organisms is unknown.

[1] CDC, 2012 CRE Toolkit - Guidance for Control of Carbapenem-resistant *Enterobacteriaceae* (CRE)

Regional Distribution of CRE cases, West Virginia, January 1 – December 31, 2014



Region	Number of CRE Organisms Reported January 1-December 31, 2014 (N=136*)
Southern	50
Central	33
Eastern	18
Western	15
Northwestern	12
Northeastern	8

*Four patients with two CRE organisms

Table 1: Demographics and characteristics of confirmed CRE cases reported in **West Virginia**, January 1, 2014 to December 31, 2014 - Person (N=132) Organism (N=136)

Demographics (N=132)	**Mean (SD, Median) or N (%)**
Age, years	68 (17, 70)
Age, categories	
0-4	<5
5-24	<5
25-44	5 (4%)
45-64	35 (27%)
≥65	87 (66%)
Sex	
Female	90 (68%)
Race (n=113)	
White	108 (96%)
Ethnicity (n=103)	
Not Hispanic or Latino	103 (100%)
Resided in Nursing Home or Long Term Care Facility LTCF at collection (n=125)	
Yes	56 (45%)
Hospitalized at collection (n=126)	
Yes	72 (57%)
Specimen data (N=136)†	**Mean (SD) or N (%)**
Organism Cultured	
Klebsiella pneumoniae	68 (50%)
Enterobacter cloacae	39 (29%)
Enterobacter aerogenes	11 (8%)
Escherichia coli	8 (6%)
Less than 5 of each of the following: *Citrobacter freundii, Enterobacter amnigenus 2, Enterobacter cancerogenus, Klebsiella oxytoca, Providenceia stuartii, Serratia marcescens*	
Type of Culture (Clinical or Surveillance)	
Clinical	124 (91%)
Surveillance	12 (9%)
Specimen Source (n=141)‡	
Urine	98 (70%)
Wound	14 (10%)
Rectum	11 (8%)
Sputum	8 (6%)
Other specimen sources including: Blood Venous, Bronchial, Stool, Sputum, Peritoneal Fluid/Ascites	10 (7%)
Outbreak Related (n=115)	
No	113 (98%)
Epidemiologically Linked to another CRE case (n=111)	
No	100 (90%)

† Represents number of organisms collected ‡ Some patients had specimens collected from

Table 2: Demographics and characteristics of confirmed CRE cases reported in the **Southern Region**, West Virginia, January 1, 2014 to December 31, 2014 - Person (N=48) Organism (N=50)

Demographics (N=48)	**Mean (SD, Median) or N (%)**
Age, years	67 (18, 69)
Age, categories	
0-4	<5
5-24	<5
25-44	<5
45-64	16 (33%)
≥65	29 (60%)
Sex	
Female	32 (67%)
Race (n=45)	
White	41 (91%)
Ethnicity (n=40)	
Not Hispanic or Latino	40 (100%)
Resided in Nursing Home or LTCF at collection (n=45)	
Yes	25 (56%)
Hospitalized at collection (n=44)	
Yes	18 (41%)
Specimen data (N=50)	**Mean (SD) or N (%)**
Organism Cultured	
Klebsiella pneumoniae	27 (54%)
Enterobacter cloacae	15 (30%)
Less than 5 of each of the following:	
Citrobacter freundii, Enterobacter aerogenes, Enerobacter cancergenus, Escherichia coli, Klebsiella oxytoca, Providencia stuartii	
Type of Culture (Clinical or Surveillance)	
Clinical	48 (96%)
Specimen Source (n=51)‡	
Urine	40 (78%)
Wound	5 (10%)
Other specimen sources including:	6 (12%)
Rectum	
Sputum	
Peritoneal Fluid/Ascites	
Outbreak Related (n=34)	
No	34 (100%)
Epidemiologically Linked to another CRE case (n=37)	
No	34 (92%)

‡ Some patients had specimens collected from multiple sources

Table 3: Demographics and characteristics of confirmed CRE cases reported in the **Central Region**, West Virginia, January 1, 2014 to December 31, 2014 - Person (N=31) Organism (N=33)

Demographics (31)	**Mean (SD, Median) or N (%)**
Age, years	69 (16, 71)
Age, categories	
0-4	0
5-24	<5
25-44	<5
45-64	8 (26%)
≥65	20 (65%)
Sex	
Female	21 (68%)
Race (n=20)	
White	20 (100%)
Ethnicity (n=19)	
Not Hispanic or Latino	19 (100%)
Resided in Nursing Home or LTCF at collection (n=29)	
Yes	7 (24%)
Hospitalized at collection	
Yes	24 (77%)
Specimen data (33)	**Mean (SD) or N (%)**
Organism Cultured	
Klebsiella pneumoniae	5 (15%)
Enterobacter cloacae	18 (55%)
Enterobacter aerogenes	5 (15%)
Less than 5 of each of the following: *Escherichia coli, Klebsiella oxytoca, Serratia marcescens*	5 (15%)
Type of Culture (Clinical or Surveillance)	
Clinical	33 (100%)
Specimen Source	
Urine	26 (79%)
Other specimen sources including: Bronchial Wound	7 (21%)
Outbreak Related (n=32)	
No	32 (100%)
Epidemiologically Linked to another CRE case (n=30)	
No	30 (100%)

‡ Some patients had specimens collected from multiple sources

Table 4: Demographics and characteristics of confirmed CRE cases reported in the **Eastern Region**, West Virginia, January 1, 2014 to December 31, 2014 - Person (N=18) Organism (N=18)

Demographics (18)	**Mean (SD, Median) or N (%)**
Age, years	70 (15, 69)
Age, categories	
0-4	0
5-24	0
25-44	<5
45-64	<5
≥65	14 (78%)
Sex	
Female	9 (50%)
Race (n=15)	
White	14 (93%)
Ethnicity (n=15)	
Not Hispanic or Latino	15 (100%)
Resided in Nursing Home or LTCF at collection (n=17)	
Yes	13 (76%)
Hospitalized at collection	
Yes	9 (50%)
Specimen data (18)	**Mean (SD) or N (%)**
Organism Cultured	
Klebsiella pneumonia	16 (89%)
Less than 5 of each of the following:	2 (11%)
Enterobacter aerogenes, Escherichia coli	
Type of Culture (Clinical or Surveillance)	
Clinical	8 (44%)
Specimen Source (n=21)‡	
Rectum	9 (43%)
Urine	8 (38%)
Other specimen sources including:	4 (19%)
Stool	
Blood	
Wound	
Outbreak Related (n=16)	
No	14 (88%)
Epidemiologically Linked to another CRE case (n=14)	
No	6 (43%)

Table 5: Demographics and characteristics of confirmed CRE cases reported in the **Western Region**, West Virginia, January 1, 2014 to December 31, 2014 - Person (N=15) Organism (N=15)

Demographics (15)	**Mean (SD, Median) or N (%)**
Age, years	74 (14, 77)
Age, categories	
0-4	0
5-24	0
25-44	<5
45-64	<5
≥65	13 (87%)
Sex	
Female	13 (87%)
Race (n=14)	
White	14 (100%)
Ethnicity (n=12)	
Not Hispanic or Latino	12 (100%)
Resided in Nursing Home or LTCF at collection (n=14)	
Yes	6 (35%)
Hospitalized at collection (n=14)	
Yes	9 (64%)
Specimen data (15)	**Mean (SD) or N (%)**
Organism Cultured	
Klebsiella pneumoniae	7 (47%)
Less than 5 of each of the following:	
Enterobacter aerogenes, Enterobacter amnigenus 2, Enterobacter cloacae, Escherichia coli	
Type of Culture (Clinical or Surveillance)	
Clinical	15 (100%)
Specimen Source (n=16)‡	
Urine	12 (75%)
Other specimen sources including:	4 (25%)
Blood	
Wound	
Sputum	
Outbreak Related	
No	15 (100%)
Epidemiologically Linked to another CRE case (n=13)	
No	13 (100%)

Table 6: Demographics and characteristics of confirmed CRE cases reported in the **Northwestern Region**, West Virginia, January 1, 2014 to December 31, 2014 - Person (N=12) Organism (N=12)

Demographics (12)	**Mean (SD, Median) or N (%)**
Age, years	63 (20, 66)
Age, categories	
0-4	0
5-24	<5
25-44	0
45-64	<5
≥65	7 (58%)
Sex	
Female	7 (58%)
Race (n=10)	
White	12 (100%)
Ethnicity (n=10)	
Not Hispanic or Latino	10 (100%)
Resided in Nursing Home or LTCF at collection (n=12)	
Yes	2 (17%)
Hospitalized at collection	
Yes	9 (75%)
Specimen data (12)	**Mean (SD) or N (%)**
Organism Cultured	
Klebsiella pneumoniae	8 (67%)
Less than 5 of each of the following:	4 (33%)
Enterobacter cloacae, *Escherichia coli,* *Klebsiella oxytoc, Serratia marcescens*	
Type of Culture	
Clinical	12 (100%)
Specimen Source	
Urine	6 (50%)
Other specimen sources including:	6 (50%)
Bronchial	
Wound	
Sputum	
Outbreak Related (n=11)	
No	11 (100%)
Epidemiologically Linked to another CRE case (n=11)	
No	11 (100%)

Table 7: Demographics and characteristics of confirmed CRE cases reported in the **Northeastern Region**, West Virginia, January 1, 2014 to December 31, 2014 - Person (N=8) Organism (N=8)

Demographics (N=8)	**Mean (SD, Median) or N (%)**
Age, years	58 (17, 63)
Age, categories	
0-4	0
5-24	<5
25-44	0
45-64	<5
≥65	4 (50%)
Sex	
Female	8 (100%)
Race (n=7)	
White	7 (100%)
Ethnicity (n=7)	
Not Hispanic or Latino	7 (100%)
Resided in Nursing Home or LTCF at collection	
Yes	3 (38%)
Hospitalized at collection (n=7)	
Yes	3 (43%)
Specimen data (N=8)	**Mean (SD) or N (%)**
Organism Cultured	
Klebsiella pneumoniae	5 (63%)
Less than 5 of each of the following: *Enterobacter cloacae, Escherichia coli, Citrobacter freundii*	
Type of Culture (Clinical or Surveillance)	
Clinical	8 (100%)
Specimen Source	6 (75%)
Urine	
Other specimen sources including:	2 (25%)
Blood	
Outbreak Related (n=7)	
No	7 (100%)
Epidemiologically Linked to another CRE case (n=6)	
No	6 (100%)