

# Analysis of the risk factors associated with an outbreak of NDM-producing CPE in a London hospital

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## 1. Background

- The prevalence of carbapenem-producing Enterobacteriaceae (CPE) is increasing worldwide.
- CPE risk factors include advanced age, reduced functional status, invasive procedures, and recent use of antibiotics.<sup>1,2</sup>
- We report an analysis of risk factors associated with outbreak cases of CPE (Figure 1).

## 2. Methods

- 40 CPE NDM outbreak cases and 121 controls were compared. Controls were chosen randomly in a 3 control :1 case ratio matched by organism (carbapenem-susceptible *K. pneumoniae*), ratio of clinical isolates to screens, and time period (April 2015 to October 2015).
- Logistic regression was used to examine associations between the following hypothesised clinical risk factors and cases: age, gender, number of comorbidities and antibiotic therapy in the 12 months prior to the specimen date, specialty, and in-hospital mortality in the 12 months after the specimen date.
- All descriptive and comparative analysis was conducted in STATA v12.0

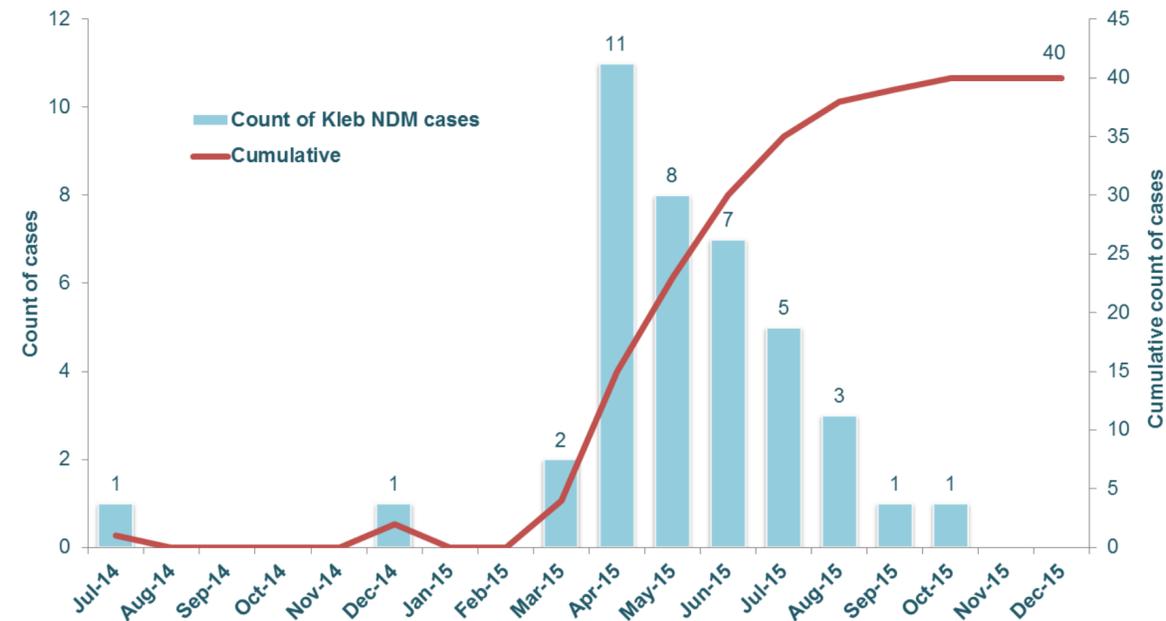


Figure 1: Trend graph charting the outbreak of NDM-producing CPE

Clinical risk factor	Control (carbapenem-susceptible <i>K. pneumoniae</i> ) n=121	Case (NDM-producing <i>K. pneumoniae</i> ) n=40	Odds ratio (95% CI)	p-value
Age (mean, SD)	62.3 (19.8)	65.0 (17.9)	1.01 (0.97 to 1.10)	0.4
Gender (n, %)				
Male	78 (64)	28 (57)		
Female	43 (36)	17 (43)	1.34 (0.65 to 2.78)	0.4
Number of co-morbidities (mean, SD)	11 (7)	11 (8)		
Antibiotic use in the previous 12 months (n, %)				
Yes	66 (64)	19 (50)		
No	37 (36)	19 (50)	1.78 (0.84 to 3.78)	0.13
Specialty				
Other	45 (37)	3 (8)	REF	
ICU	18 (15)	4 (10)	3.33 (0.67 to 16.41)	0.14
Cardiac	13 (11)	7 (18)	8.07 (1.82 to 35.72)	<0.01
Renal	37 (30)	16 (40)	6.48 (1.75 to 23.88)	<0.01
Vascular	8 (7)	10 (25)	18.75 (4.21 to 83.48)	<0.001

Table 1: Association between clinical risk factors and cases

## 3. Results

- Ward specialty was strongly associated with cases; a higher proportion of cases were reported in vascular, renal or cardiovascular wards compared with other specialties.
- There was a suggestion that case patients were older, more likely to suffer 12-month in-hospital mortality and have had antibiotics prior to their specimen.
- There was no significant difference in the number of comorbidities between the two groups.

## 4. Conclusions

- Unlike in other studies of CPE risk factors,<sup>1,2</sup> age, number of co-comorbidities and antibiotic therapy were not associated with case CPE patients when compared to controls matched by having a carbapenem-susceptible *K. pneumoniae*. The low case patients numbers may explain this finding.
- CPE was not associated with in-hospital mortality in this analysis; the control group of patients had a high level of co-morbidity, which may explain this outcome.
- Specialty was significant risk factor, reflecting the wards involved in the outbreak (Table 1).
- Further work focusing on the type and duration of antibiotic therapy as well as pathway crossover on the risk of CPE is planned.

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**References:** 1. Logan et al. *J Infect Dis*. 2017 Feb 15;215(suppl\_1):S28-S36. 2. Eshetie et al. *Antimicrob Resist Infect Control*. 2015 Apr 17;4:12.