Description of Repeat Carbapenem-resistant Enterobacterales (CRE) Submitted to a State Laboratory from the Same Individuals — December 2018 – March 2022

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Background

- CRE and carbapenemase-producing CRE (CP-CRE) can colonize the GI tract
- CRE and CP-CRE have been persistently detected in long-term care facility residents
- Re-identification of CRE and CP-CRE in other healthcare settings is less well described

Objective

- To describe repeated submission of CRE to a state laboratory, including persistence of detection and progression from colonization to infection

Methods

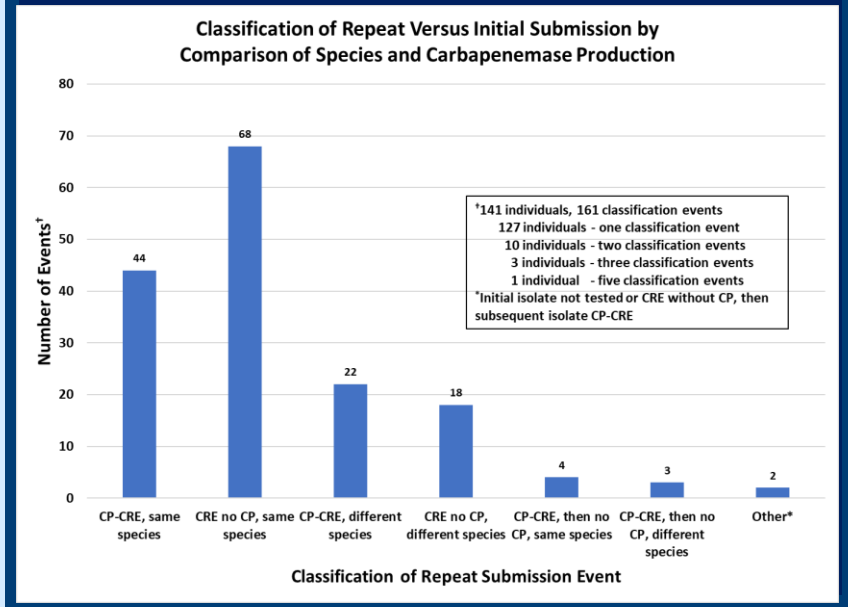
- Review of CRE isolates submitted to Kentucky Division of Laboratory Services
- Specimens collected December 2018 through March 2022
- Tested for carbapenemase production using modified carbapenem inactivation method (mCIM)
- Positive mCIM followed by Cepheid Xpert Carba-R assay for detection of specific carbapenemases
- Descriptive statistics derived and summarized

Results

- 1,822 isolates submitted to DLS from 1,498 distinct individuals
- 324 submissions were repeat submissions; from 214 individuals
- 141 individuals were tested >14 days after collection of initial specimen
- Same CP-CRE identified from 42 individuals (median 71 days, IQR 40-151 days, max 857 days)
- Same CRE without CP identified from 66 individuals (median 111.5 days, IQR 55-237 days, max 676 days)
- Urine was most common specimen source among resubmissions (67%)
- Of 47 individuals with a discrepant resubmission result, only four had the same species identified initially as CP-CRE and then subsequently as non-CP-CRE
- Ten individuals had screening and then clinical specimens with the same carbapenemase gene or species

Conclusions

- Persistence can occur with CP-CRE and with CRE without CP
- Detection can occur after more than 500 days
- The in vivo loss of CP by CRE appears to occur infrequently
- Clinicians and infection preventionists should remain vigilant for persistent CRE colonization during clinical and infection control decision making



1,498 individuals; 1,822 isolates

Repeat submissions
- 214 individuals (14.3%), 324 isolates
- 141 individuals, testing >14 days apart

Same CP-CRE (species & mechanism)
- 42 individuals (29.8%)
- Median 71 days apart (IQR 40-151), max 857 days

Same non-CP-CRE species
- 66 individuals (46.8%)
- Median 111.5 days apart (IQR 55-237), max 676 days

CP-CRE, then non-CP-CRE, same species

- KPC *Klebsiella aerogenes* → non-CP CR-*Klebsiella aerogenes*
- VIM *Enterobacter cloacae* → non-CP CR-*Enterobacter cloacae*
- OXA-48 *Klebsiella pneumoniae* → non-CP CR-*Klebsiella pneumoniae* (x2)

CP-CRE, then non-CP-CRE, different species

- KPC *Klebsiella aerogenes* → non-CP CR-*Klebsiella ozaenae*
- KPC *Klebsiella oxytoca* → non-CP CR-*Klebsiella aerogenes*
- KPC *Klebsiella oxytoca* → non-CP CR-*Enterobacter cloacae*

Screening, then clinical specimen (clinical specimen source)

- Non-CP CR-*Klebsiella pneumoniae* – 53 days (urine)
- Non-CP CR-*Enterobacter cloacae* – 60 days (wound)
- KPC *Klebsiella pneumoniae* – 70 days (urine)
- KPC *Escherichia coli* – 73 days (blood)
- KPC *Klebsiella pneumoniae* – 347 days (urine)
- KPC *Enterobacter cloacae* → KPC *Citrobacter koseri* – 21 days (sputum)
- KPC *Citrobacter freundii* → KPC *Enterobacer cloacae* – 33 days (blood)
- KPC *Klebsiella pneumoniae* → KPC *Enterobacter cloacae* – 38 days (blood)
- KPC *Citrobacter freundii* → KPC *Proteus mirabilis* – 139 days (urine)
- KPC & VIM *Enterobacter cloacae* → non-CP-CR-*Enterobacter cloacae* – 750 days (blood)

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