Poster 1490:
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Capacity Building within the Microbiology Laboratory is Needed to Ensure Implementation of Strategies to Control the Spread of CRE

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Abstract

Background: Carbapenem-resistant Enterobacteriaceae (CRE) represent an urgent threat to patient safety and public health across the United States and in California. Centers for Disease Control and Prevention strategies for CRE containment in healthcare facilities include screening epidemiologically-linked contacts of previously unrecognized CRE patients to evaluate for transmission, and as part of active surveillance strategies. Carbapenemase-producing CRE (CP-CRE) are prioritized for these interventions. We assessed capacity of California hospital microbiology laboratories to support CRE surveillance and control strategies.

Methods: The California Antimicrobial Resistance Laboratory Network Assessment (CARLA) was a cross-sectional, voluntary survey targeted to microbiology staff among acute care hospitals in California. Non-respondents were contacted by phone to improve response rates. Respondents were asked to classify the laboratory capacity to screen rectal swab specimens for CRE, and to test CRE isolates for the presence of carbapenemases. Hospital beds and patient volume data were obtained from the National Healthcare Safety Network (NHSN) 2015 Annual Survey.

Results: CARLA included 263 (67%) hospitals representing 75% of hospital beds in the state. Respondents were directors n=165, clinical scientists n=97, and infection preventionists n=2. Among 178 (68%) hospitals reporting access to CRE screening tests, 157 (88%) use the hospital lab and 21 (12%) use a referral lab; 85 (48%) hospitals capable of performing CRE screening tests on-site would require additional time to obtain supplies and assess quality control, including 40 that would require >2 weeks. Among 182 (69%) hospitals reporting access to carbapenemase testing, 115 (63%) use the modified Hodge test, 43 (24%) use polymerase chain reaction (PCR), and 7 (4%) use the Carba NP assay.

Conclusion: Microbiology laboratories play a critical role in the response to CRE. State and local public health can provide education to assist hospitals laboratories in building local capacity to ensure implementation of CRE prevention strategies; an evaluation of public health capacity to supplement clinical labs in CRE screening and carbapenemase testing is ongoing.

Background

- Carbapenems have become increasingly important in the management of healthcare associated infections.
- Carbapenem resistant Enterobacteriaceae (CRE) are a public health threat.
- Carbapenem resistance is variable across the state of California:
- Los Angeles County is known to be a high CRE prevalence region, with 21% carbapenem resistance among *Klebsiella* spp. in acute care hospitals and 71% in long-term acute care hospitals. [Poster 329]
- CDC prevention strategies for CRE containment in healthcare facilities include screening and active surveillance testing. Carbapenemase-producing CRE are prioritized for these interventions.
- Current CDC protocols for CRE screening are complex and involve multiple steps, and implementation requires a local validation process.
- CRE prevention efforts require timely action from local microbiology laboratories to be effective.

Methodology

- We compiled data from the California Antimicrobial Resistance Laboratory Network Assessment (**CARLA**)
  - Cross-sectional voluntary, online survey of microbiology laboratories that serve acute care hospitals and long-term acute care hospitals (LTAC) in California
  - Questions related to laboratory process, diagnostic testing, laboratory reporting, and antibiogram development
- Unlike other national surveys, target audience for CARLA was the Clinical Microbiology Director or microbiology laboratory staff
- Survey was conducted with the use of Survey Monkey in the Fall 2015 to Spring 2016
- *A priori* response threshold of 60% was used
- Non-respondents were contacted by phone
- Responses were aggregated and data are presented by hospital
- Hospital bed and patient volume data were obtained from the NHSN 2015 Annual Survey

Results

Table 1: Survey Respondents (n=263)

Roles	Responses
Lab Directors	165 (63%)
Clinical Lab Scientists	97 (37%)
Infection Preventionists	2 (1%)

Figure 1: Hospital Response Rate

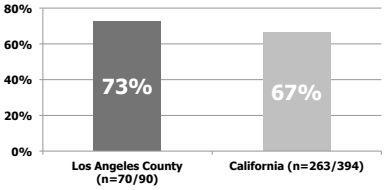


Figure 2a: Is your lab prepared to screen rectal swabs for CRE? (n=263)

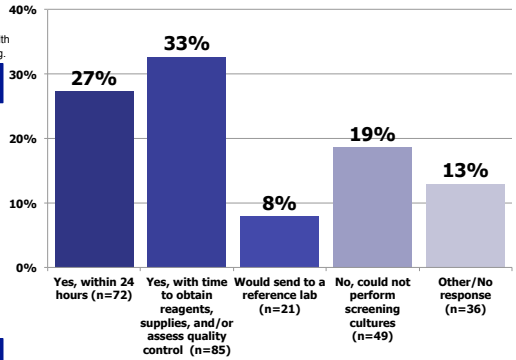


Figure 2b: To perform CRE screening tests onsite, how long to obtain reagents, supplies and/or assess quality control? (n=86)

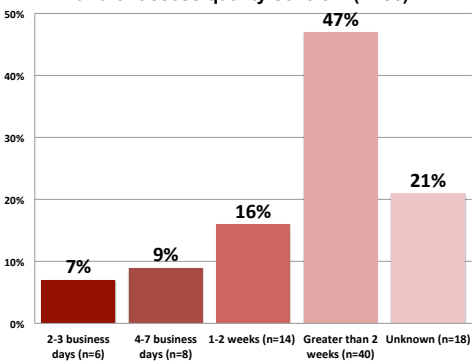
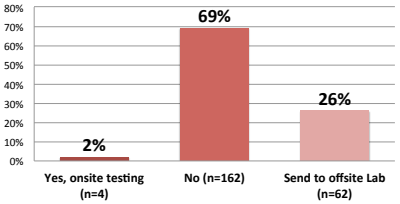


Table 2: Carbapenemase Testing

	LA COUNTY (n=70)	STATE (n=263)
Any Type of Carbapenemase Testing Available	40 (57%)	182 (69%)
mHodge test	37 (53%)	115 (44%)
PCR	4 (6%)	43 (16%)
Carba NP	1 (1%)	7 (3%)

Figure 3: Can your lab test for genetic relatedness, e.g. PFGE, whole genome sequencing? (n=236)



Results

- The majority of respondents were either microbiology lab directors or clinical lab scientists. (**Table 1**)
- Laboratory responses represented 263 (67%) of 394 hospitals in the state. (**Figure 1**)
- Although most (68%) California hospitals reported access to CRE screening tests, 27% were prepared for onsite testing of rectal swab specimens for CRE within 24 hours of a request. (**Figure 2a and Figure 2b**)
- Among 158 (60%) hospitals reporting laboratory capability to perform CRE screening tests on-site, 85 (48%) would require additional time to obtain supplies and assess quality control, including 40 that would require >2 weeks. (**Figure 2b**)
- The majority of responding hospitals have access to at least one form of carbapenemase testing, either on or offsite; the modified Hodge test was the most commonly reported method (**Table 2**)
- Most (69%) hospitals report not having access to genetic relatedness testing for CRE, such as Pulsed Field Gel Electrophoresis (PFGE) or whole genome sequencing, as part of the investigation of a cluster or outbreak (**Figure 3**)

Discussion

Microbiology Laboratories should be aware of rising rates of carbapenem resistance and the need for routine CRE surveillance. Performing CRE screening and carbapenemase testing are critical roles for the laboratory to support hospital infection prevention efforts.

Public Health Laboratories may serve as a resource for hospitals with laboratories that are not capable of performing CRE screening and carbapenemase testing. In the event of a suspected cluster or outbreak, public health departments can facilitate access to testing for genetic relatedness, e.g.PFGE or whole genome sequencing.

Healthcare Epidemiologists should recognize that local laboratories may not be able to perform CRE screening and carbapenemase testing. Hospitals should reach out to their local and/or state public health departments to identify referral testing resources.

Hospital Administrators should understand that CRE screening tests are part of the CDC's CRE prevention strategies. Because these are non-reimbursed tests, microbiology laboratory funding and staffing limitations may present barriers to implementation of CDC recommendations.

American Society of Microbiology/Clinical Laboratory and Standards Institute/CDC should be aware that implementation of CRE screening protocols is currently limited. New FDA-cleared, molecular tests for CRE screening (i.e., Cepheid) are costly, which might limit access for some hospitals. Less time-consuming and more cost-effective methods for CRE surveillance are needed.

Acknowledgments

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The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of the California Department of Public Health or Los Angeles County Department of Public Health.