New Lab Capacity to Combat AR Threats

- Detecting new AR
- Delivering data to prevent infections
- **Delivering data to treat infections**

More Resistant Bacteria and Bacteria that are Resistant to More Drugs

Morbidity and Mortality Weekly Report

Notes from the Field

Pan-Resistant New Delhi Metallo-Beta-Lactamase-Producing *Klebsiella pneumoniae* — Washoe County, Nevada, 2016

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On August 25, 2016, the Washoe County Health District in Reno, Nevada, was notified of a patient at an acute care hospital with carbapenem-resistant Enterobacteriaceae (CRE) that was resistant to all available antimicrobial drugs. The specific CRE, *Klebsiella pneumoniae*, was isolated from a wound specimen collected on August 19, 2016. After CRE was identified, the patient was placed in a single room under contact precautions. The patient had a history of recent hospitalization outside the United States. Therefore, based on CDC guidance (*1*), the isolate was sent to CDC for testing to determine the mechanism of antimicrobial resistance, which confirmed the presence of New Delhi metallo-beta-lactamase (NDM).

The patient was a female Washoe County resident in her 70s who arrived in the United States in early August 2016 after an extended visit to India. She was admitted to the acute care hospital on August 18 with a primary diagnosis of systemic inflammatory response syndrome, likely resulting from an infected right hip seroma. The patient developed septic shock and died in early September. During the 2 years preceding this U.S. hospitalization, the patient had multiple hospitalizations in India related to a right femur fracture and subsequent osteomyelitis of the right femur and hip; the most ...tion in India had been in June 2016.

...susceptibility testing in the United States indi-

A point prevalence survey, using rectal swab specimens and conducted among patients currently admitted to the same unit as the patient, did not identify additional CRE. Active surveillance for multidrug-resistant bacilli including CRE has been conducted in Washoe County since 2010 and is ongoing; no additional NDM CRE have been identified.

This report highlights three important issues in the control of CRE. First, although CRE are commonly sent to CDC as part of surveillance programs or for reference testing, isolates that are resistant to all antimicrobials are very uncommon. Among >250 CRE isolate reports collected as part of the Emerging Infections Program, approximately 80% remained susceptible to at least one aminoglycoside and nearly 90% were susceptible to tigecycline (*2*). Second, to slow the spread of bacteria with resistance mechanisms of greatest concern (e.g., gene encoding NDM or *mcr-1*) or with pan-resistance to all drug classes, CDC recommends that when these bacteria are identified, facilities ensure that appropriate infection control contact precautions are instituted to prevent transmission and that health care contacts are evaluated for evidence of transmission (*3*). Third, the patient in this report had inpatient health care exposure in India before receiving care in the United States. Health care facilities should obtain a history of health care exposures outside their region upon admission and consider screening for CRE when patients report recent exposure outside the United States or in regions of the United States known to have a higher incidence of CRE (*1*).

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An Example:

- 70 yo female hospitalized for an infection in her hip
- The patient recently traveled to India and was hospitalized for treatment of a hip fracture
- Infecting isolate: NDM-producing *Klebsiella pneumoniae* that was pan-resistant
- The patient developed septic shock and died

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Antimicrobial Susceptibility Testing of New Drugs

- Challenge - There are often gaps in between a new drug being approved for use and the availability of a FDA-approved antimicrobial susceptibility test on a commercial device.
- Why?
  - Device manufacturers have competing priorities for test development
  - There is limited room on a MIC panel for new drugs
  - Drug development times are getting shorter so test development times are getting shorter

At least, a disk diffusion testing should be available when the drug is approved

A Pilot Program

- Antimicrobial Susceptibility Testing of New Antibiotics
  - There is often a gap between the approval of a new drug and the availability of testing methods in hospital laboratories
  - This gap can result in under use and over use of a new antibiotic
  - Testing is most important for pan or nearly pan-resistant bacteria
  - We can leverage AR Lab Network capacity to place reference broth microdilution testing capabilities in regional labs and use electronic test order and report capabilities for rapid reporting

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Verification of an Automated, Digital Dispensing Platform for At-Will Broth Microdilution-Based Antimicrobial Susceptibility Testing

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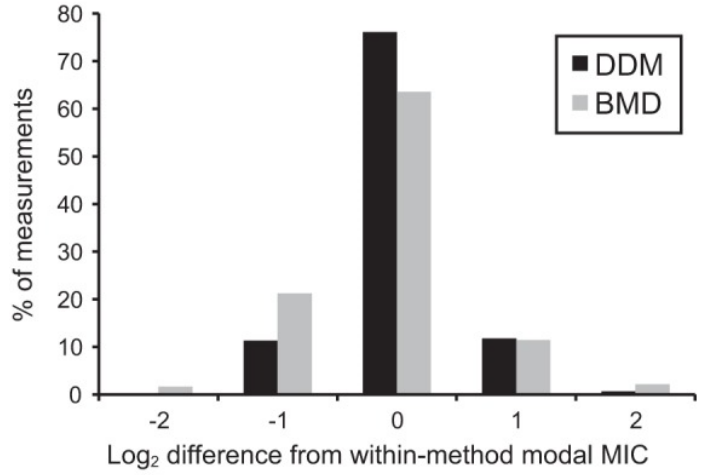
With rapid emergence of multidrug-resistant bacteria, there is often a need to perform susceptibility test used or newer antimicrobial agents. Such testing can often be performed only by using labor-intensive, r and lies outside the capacity of most clinical labs, necessitating reference laboratory testing and thereby of susceptibility data. To address the compelling clinical need for microbiology laboratories to perform s explored a novel, automated, at-will broth microdilution-based susceptibility testing platform. Specifica inkjet printer technology in the HP D300 digital dispensing system to dispense, directly from stock solut plate, the 2-fold serial dilution series required for broth microdilution testing. This technology was com absorbance readings and data analysis to determine MICs. Performance was verified by testing members *ceae* for susceptibility to ampicillin, cefazolin, ciprofloxacin, colistin, gentamicin, meropenem, and tetra the results obtained with a broth microdilution reference standard. In precision studies, essential and ca els were 96.8% and 98.3%, respectively. Furthermore, significantly fewer D300-based measurements wer from the modal MIC, suggesting enhanced reproducibility. In accuracy studies performed using a panel isolates, rates of essential and categorical agreement and very major, major, and minor errors were 94%, 3.4%, respectively. Based on these promising initial results, it is anticipated that the D300-based method tal-based clinical microbiology laboratories to perform at-will broth microdilution testing of antimicrob critical testing gap.

FIG 1



On Demand MIC Panels

- Easy method to place reference BMD capacity in AR Lab Network regional labs
- Applications
  - Testing susceptibility of pan-R pathogens to new drugs
  - Collect AST data for breakpoint decisions
- Can leverage electronic test order and result processes for faster turn-around times