



The Role of the Nebraska Public Health Laboratory in Response to the Increase in Antibiotic Resistant Microorganisms


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1

Objectives

Summarize	Summarize the role of NPHL in collecting and testing suspected resistant isolates
Locate	Locate the position of NPHL in the larger Antimicrobial Resistant (AR) Lab Network
Describe	Describe the educational function of NPHL in response to Antimicrobial Resistance



2



NPHL
Nebraska Public Health Laboratory

“Dedicated to protecting the health and safety of Nebraskans through diagnostic laboratory science, technology, and education.”

The slide features a vertical decorative bar on the left with red, green, and blue diagonal stripes. It includes three images: a petri dish with a glowing orange streak, a petri dish with white bacterial streaks, and a laboratory worker in a white coat and mask. A red 'N' logo is in the bottom right corner.

3

ANTIBIOTIC RESISTANCE THREATS
IN THE UNITED STATES
2019




The slide features a vertical decorative bar on the left with red, green, and blue diagonal stripes. The main content is the cover of the report 'Antibiotic Resistance Threats in the United States 2019', which includes a collage of microscopic images of bacteria and fungi. The CDC logo and the text 'U.S. Department of Health and Human Services, Centers for Disease Control and Prevention' are at the bottom left, and a red 'N' logo is at the bottom right.

4

Urgent Threats

These germs are public health threats that require urgent and aggressive action:

-  CARBAPENEM-RESISTANT **ACINETOBACTER**
-  **CANDIDA AURIS**
-  **CLOSTRIDIoidES DIFFICILE**
-  CARBAPENEM-RESISTANT **ENTEROBACTERIACEAE**
-  DRUG-RESISTANT **NEISSERIA GONORRHOEAE**

Serious Threats

These germs are public health threats that require prompt and sustained action:

-  DRUG-RESISTANT **CAMPYLOBACTER**
-  MULTIDRUG-RESISTANT **PSEUDOMONAS AERUGINOSA**
-  DRUG-RESISTANT **SHIGELLA**
-  DRUG-RESISTANT **TUBERCULOSIS**



5

Healthcare Facilities



6

NPHL Testing

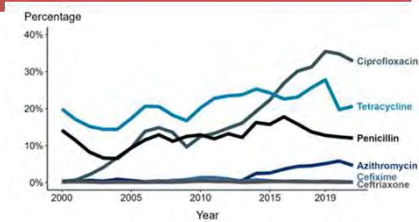
Candida auris

- Commonly misidentified
- Instruments have to be up-to-date
 - Communication continually sent to laboratories
- Reported cases increased 318% in 2018
- Some strains resistant to all available classes of antifungals



Neisseria gonorrhoeae

- Culture
- AST
 - Ciprofloxacin, Tetracycline, Penicillin, Azithromycin, Cefixime, Ceftriaxone
- Whole Genome Sequencing



* Resistance: Ciprofloxacin: MIC $\geq 1.0 \mu\text{g}/\text{mL}$; Penicillin: MIC $\geq 2.0 \mu\text{g}/\text{mL}$ or Beta-lactamase positive; Tetracycline: MIC $\geq 2.0 \mu\text{g}/\text{mL}$.
 † Elevated MICs: Azithromycin: MIC $\geq 1.0 \mu\text{g}/\text{mL}$; Cefixime: MIC $\geq 2.0 \mu\text{g}/\text{mL}$; Ceftriaxone: MIC $\geq 0.125 \mu\text{g}/\text{mL}$; Cefixime: MIC $\geq 0.25 \mu\text{g}/\text{mL}$.
 NOTE: Cefixime susceptibility was not tested in 2007 and 2008.

7

NPHL Testing

Carbapenem Resistance

- Phenotypic
 - Modified Carbapenem Inactivation Method (mCIM)
 - Any mechanism of carbapenem resistance
- Genotypic
 - Carba-R
 - Rapid molecular detection of 5 main genes
 - OXA-48, VIM, IMP, KPC, NDM

Any type of Resistance

- Sequencing
 - Whole Genome
 - Targeted
 - Plasmid Based



8

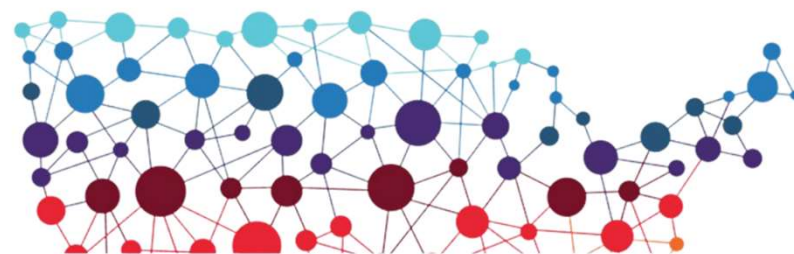
NPHL Testing

National Antimicrobial Resistance Monitoring System for Enteric Bacteria (NARMS)

- Collaboration among state and local public health, CDC, FDA and USDA
- Participant since 2018
- Submit subset of isolates quarterly
 - *Salmonella*, *Shigella*, *E. coli*, *Campylobacter* and *Vibrio*
- Perform extensive AST on multiple classes
 - Aminoglycosides, β -lactam combination agents, Cepheims, Folate pathway antagonists, Macrolides, Penems, Penicillins, Phenicol, Quinolones, Tetracyclines, Lincosamides, Ketolides
- Whole Genome Sequencing
 - Resistance Genes



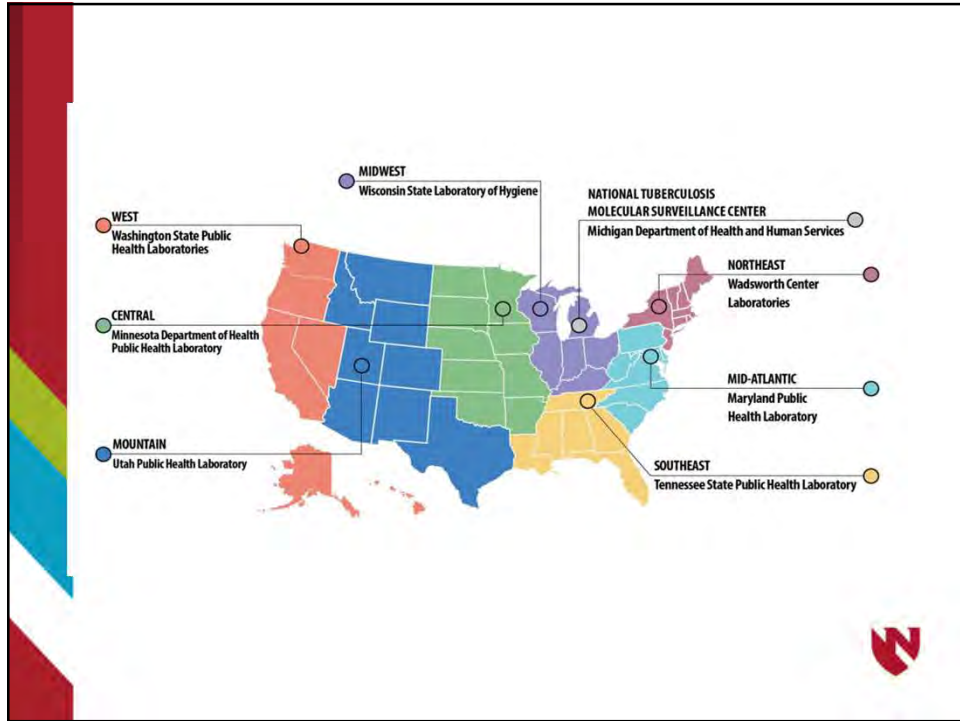
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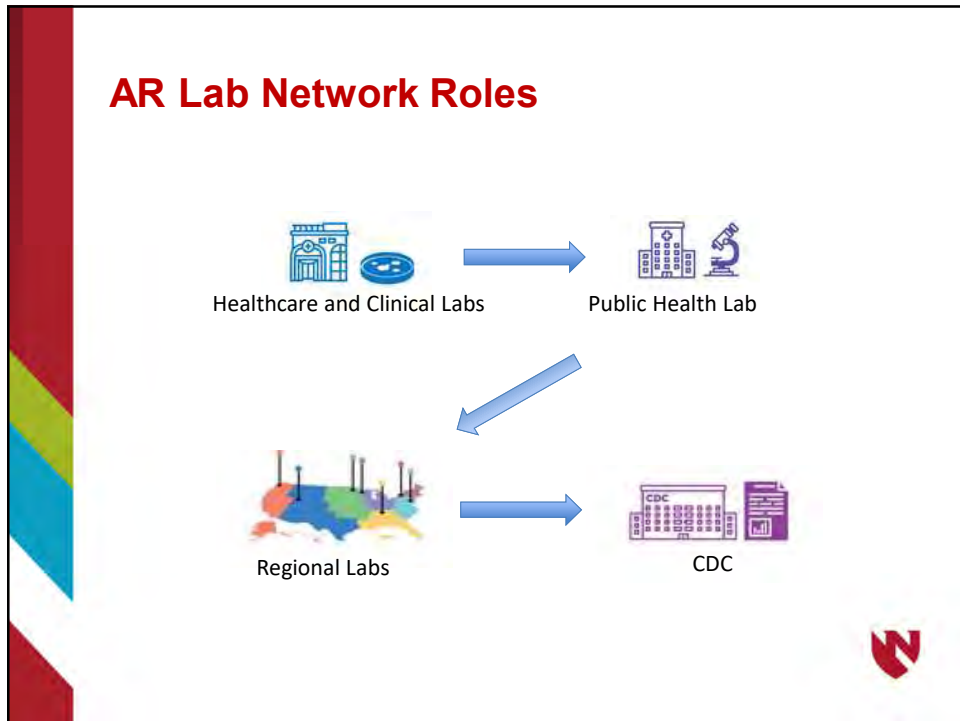
ARLABnetwork



10

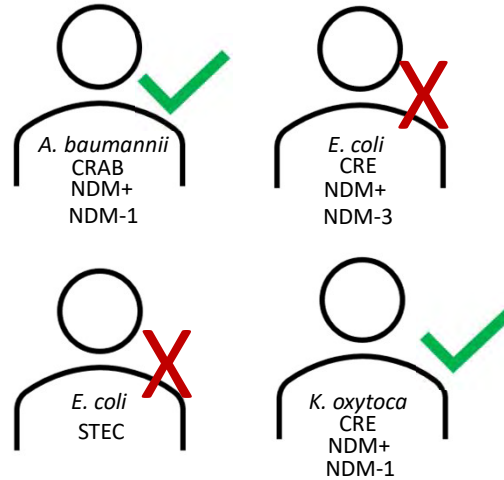


11



12

Example



13

NPHL Education Efforts

Lab Alerts

Newsletters

Laboratory
SurveysStatewide
Laboratory
CallsIndividual
Communication

Trainings

14

Looking Forward



Sequencing used for Clinical Care



Same Day Sequencing



Direct from Specimen Sequencing



Wastewater Surveillance



15

Contact Us

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16

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NEBRASKA

Good Life. Great Mission.

DEPT. OF HEALTH AND HUMAN SERVICES

