

## **Best Practices for Surveillance of Antimicrobial Resistance via Electronic Laboratory Reporting**

### *Recommendations from the CSTE AR/ELR Working Group*

Many surveillance initiatives, such as monitoring new and reemerging antimicrobial resistance (e.g., Carbapenem-Resistant Enterobacteriaceae (CRE)), are conducted entirely based on laboratory observation findings and are only made possible through electronic laboratory reporting (ELR), since manual data collection processes are too resource intensive. CSTE convened an AR/ELR Workgroup to focus on best practices and issues related to capturing CRE in HL7 2.5.1 standard format for reporting purposes to Public Health Agencies (PHA).

The purpose of this document is to capture AR/ELR workgroup members' experience with receiving and processing CRE ELRs from laboratories and recommend related best practices for working with laboratories and CRE ELR messages. Although the focus of the workgroup is on CRE reporting, these best practices may be applicable to surveillance for other antimicrobial resistant organisms.

#### **I. Communicating with Labs**

- A. State health agencies should clearly communicate with laboratories regarding reporting requirements for CRE. This communication should include:
  - o Whether CRE is reportable in their jurisdiction
  - o Your jurisdiction's definition of CRE
  - o What to report for CRE
  - o When to report CRE

Examples of written guidance for labs:

- o [Link to MA guidance]
  - o [Link to NM guidance]
- B. State health agencies should also be aware of laboratory practices that may impact the quality of ELR messages for CRE. These may include:
  - o Differences among laboratories in how CRE ELR messages are triggered.
  - o Laboratory compliance with current CLSI guidelines for MIC values. The use of outdated MIC breakpoints can affect the interpretation of test results, especially for qualitative results.
  - o Suppression of certain resistance test results according to CLSI guidelines. This may result in resistance test results for some antimicrobials to not be sent to PHAs.

#### **II. Receiving and Processing HL7 ELR Messages**

[Description of what we want and why.]

[Maybe include links to HL7 IGs that labs should adhere to.]

[Discuss 2.5.1 as ideal but also mention 2.3.1 and related issues]

##### **A. Common issues with HL7 ELR message structure:**

- 1) Comments may be sent in multiple result (OBX) segments (OBX|7 "identification and susceptibility", OBX|8 "Testing to follow"). This can result in potentially important information not being communicated to downstream systems. If the information does come through, use of multiple OBX segments can make reading results difficult.

- o *Recommendation:* Placing comments in NTE segments. Utilization of the OBX|4 (observation sub-id) to link comments to test results
- 2) Categorical results sent in the result section and quantitative sent in a note (NTE) segment. Quantitative results should be sent in the OBX 5 segment and categorical results sent as the abnormal flag in OBX 8 (or categorical sent as an NTE).
- 3) No utilization of parent/child linking of susceptibility labs to the organism(s), or parent-child relationships are used incorrectly. The parent/child linking of organism/susceptibility labs could be a problem, but we don't actually know without a paper copy of the labs
  - o *Recommendation:* Make sure facilities are submitting the correct linking values and the jurisdictions have the capabilities to utilize the parent/child result to link the susceptibility test to the organism.
  - o [include reference to correct way to use parent/child relationships]
  - o Example: We have a patient that is testing positive for two or more organisms. (Vanco resistant Staph Aureus came in as a VRSA because it pulled the resistance from the Enterococcus event/case. The resistance was reported from the wrong organism. We have recently seen this with a case of two reportables (SP and KP). The two events were sent together and a CRE was created despite the fact that the KP didn't have any resistance at all. (Baystate). Additional cases are created that should not be created. Time spent calling lab for additional information.
- 4) Missing organism
- 5) Missing specimen site

#### B. LOINC codes

- 1) Generic LOINC codes being used, making it difficult for our system to classify results correctly (Our system classifies at the result level). Culture tests where LOINC codes are used are "generic" and require SNOMED codes in order to properly classify the results to the correct condition without being down manually. If generic LOINC codes are used without SNOMED, the receiving system cannot identify what the culture results were positive for.
  - o *Recommendation:* Addition of specific SNOMED codes, specifically use of ones that include CRE in them (446870005 for Carbapenem resistant Klebsiella pneumoniae instead of 56415008 for Klebsiella pneumoniae)

#### C. MIC values.

Both MIC values and interpretations are needed by the PHA. If current guidelines are used by labs, then MIC values are not needed (only reported out abnormal flags S, I, R). Assuming the current guidelines are used, then we are classifying correctly based on the interpretation alone.

- 1) Missing MIC values
- 2) *Recommendation:* Use the current CLSI guidelines (M100-S23) for cut-offs and that interpretations are sufficient for reporting. [Add reference here to guidelines?]

- 3) Reference lab reporting of MIC values may be affected by their clients' limitations, such as their willingness and ability to receive MIC values. If ordering providers are not willing or able to receive MIC values, they may not be entered in the LIS and reference labs may not be able to send these directly to PHAs.

D. Issues with sending laboratory's LIM system

- 1) Missing carbapenemase results. Lack of carbapenemase testing results (MHT/CarbaNP, molecular panels, PCR). Facilities may be performing carbapenemase testing but not sending results to PHAs. This results in PHAs not knowing the resistance mechanism for CRE cases and needing to contact facilities to find out the testing mechanism. Some labs may report these results in comments. Reports may say "carbapenemase production" without including what tests were used to come to that conclusion, or the lab may not have run the appropriate tests.
- 2) Unclear if carbapenemase test was actually performed ("Demonstrates production of a carbapenemase" but no evidence of that) *(from MA)*
- 3) Reported as a CRE but there are no carbapenem susceptibilities mapped *(from MA)*. We have several hospital facilities that send out their tests to a reference lab. The reference lab is not able to send their susceptibilities through our legacy ELR feed. The hospital is unable to incorporate the susceptibilities into the EMR/ELR system as well. Electronic information gap. MA has to contact the hospital for susceptibilities or if we know the current guidelines are in effect then we can accept the S, I, R results. We also sometimes don't even receive the S, I, R results which means you have to take it on face value from that facility what they are reporting is in fact a CRE (UMASS Memorial).