

## Advisor Live Executive Summary from February 10, 2010 program:

### ***Using the Antibiogram to Guide Anti-Microbial Therapy and Reduce Resistance***

#### **Speakers:**

- **Barry Fox, M.D.**, clinical professor of medicine, division of infectious diseases, University of Wisconsin School of Medicine and Public Health
- **Salah Qutaishat, Ph.D., CIC, FSHEA**, director, infection prevention, Premier Inc.

#### **Summary of presentations:**

##### **Salah Qutaishat, Ph.D., CIC, FSHEA, director, infection prevention, Premier Inc.**

Antimicrobial resistance is the result of microbes changing in ways that reduce or eliminate the effectiveness of drugs, chemicals, or other agents to cure or prevent infections.

An antibiogram is a report of laboratory testing for the sensitivity of an isolated bacterial strain to different antibiotics. It is used for trend analysis for clinical decision making. The primary function is to aid clinicians in the selection of the most appropriate agents for initial empirical antimicrobial therapy. It is a guide for choosing the right antibiotics for the right bug.

Use of an antibiogram can encourage the responsible use of antimicrobials throughout the hospital, help employees advocate for evidence-based changes in antimicrobial therapy, and detect odd resistance patterns in specific areas of the hospital.

- **Caveats**
  - The antimicrobial susceptibility data generated from testing individual patients' microbial isolates can be helpful if cumulative data from such tests are assembled and appropriately reported at regular intervals.
  - For the cumulative reports to be useful and comparable with those of previous years or other institutions, data must be obtained and presented in a clear and consistent manner.

#### **Basic guidelines for generating antibiograms: NCCLS M39-A3 Guidelines**

- Analyze/present a cumulative antibiogram report at least annually.
- Include only final, verified test results.
- Include only species with testing data for  $\geq 30$  isolates.
- Include only diagnostic (not surveillance) isolates
- Eliminate duplicates by including only first isolate of a species/patient/analysis period, irrespective of body site or antimicrobial profile.
- Include only antimicrobial agents routinely tested; do not include supplemental agents selectively tested on resistant isolates only.

**Table 3. Antibigram Components**

<i>REQUIRED</i>	<i>OPTIONAL</i>		
	<i>Antibiotic Information</i>	<i>Policy Issues</i>	<i>Additional Information</i>
<i>Basic Elements</i>			
Antibiotics tested	Formulary drugs	Restricted drugs	Body surface area
Organisms tested	Cost data	Protocol drugs	Metric conversions
Number of isolates for each organism	Common oral and IV dosing	Nonformulary requests required	Temperature conversions
Percent susceptible data for each drug–pathogen combination	Oral bioavailability	Automatic substitution policies	Equations (eg, Cockcroft-Gault)
Specimen sites notations (eg, urine or other)	Renal dosing	IV-to-oral conversion criteria	Ideal and adjusted body weight equations
Specific unit notations (eg, outpatient, intensive care areas)	Dosing nomograms (eg, aminoglycosides)		Unit-specific (eg, MICU, SICU) antibiograms
	Hepatic dosing		Footnotes in each section

NCCLS. *Analysis and Presentation of Cumulative Susceptibility Test Data: Approved Guideline*. NCCLS document M39-A; 2002.

If possible, you should also do antibiograms at the unit level (e.g., ICU, cardiovascular, neurosurgical). In the future, you will be able to do a real-time antibiogram.

Antibiogram challenges:

- Maintaining current, accurate susceptibility data
- Difficult to generalize to all facilities
  - Small number of isolates
  - Outsourcing of culture/susceptibility testing
- Distribution
  - Access restrictions regularly hinder streamlined dissemination of the information
- Interpretation/compliance

**See sample antibiogram on page 3.**



**Barry Fox, M.D., clinical professor of medicine, division of infectious diseases, University of Wisconsin School of Medicine and Public Health**

It is very important in selecting antimicrobial therapies that you have at least one initial effective antibiotic on board as soon as someone presents with a suspected infection. Make some educated guesses as to which antibiotic(s) may be effective, and start the therapy from the beginning. This process effects morbidity and mortality.

Many factors control resistance issues, but the most important is antimicrobial use. It's more important than infection control and individual host factors.

A dual cross-table antibiogram is a sophisticated analysis most organizations can't do just yet. It takes into account cross-resistance among bacteria with respect to susceptibility.

**Table 2.** Cross-table dual susceptibility analysis of 604 hospital-wide, gram-negative bloodstream and lower respiratory tract isolates, University of Wisconsin hospital and clinics, 2004-2006

	Cefepime	Piperacillin-tazobactam	Imipenem	Ciprofloxacin	Gentamicin
Cefepime	89	93	95	93	93
Piperacillin-tazobactam		87	95	91	94
Imipenem			91	95	95
Ciprofloxacin				82	91
Gentamicin					85

This example shows if you use the combination of Gentamicin and Cefepime, you have a 93 percent chance you will effectively be able to treat gram negative organisms.

**Conclusions:**

- Conventional hospital antibiogram reporting of individual drug susceptibilities is currently used to guide empiric antimicrobial therapy.
- Standard antibiogram susceptibilities may not predict the best initial empiric drug combination because of unpredictable cross-resistance across antibacterial classes.
- Cross-table susceptibility analysis permits selection of dual regimens that are more likely to be effective.
- Surprisingly, double b-lactam regimens were highly effective combinations, and empiric use of such combinations should be reconsidered.

**Link to presentation and audio recording:**

[www.premierinc.com/advisorlive](http://www.premierinc.com/advisorlive)

**Resources: Premier's SafetySurveillor®**

<http://www.premierinc.com/quality-safety/tools-services/performance-suite/safety-surveillor.jsp>