

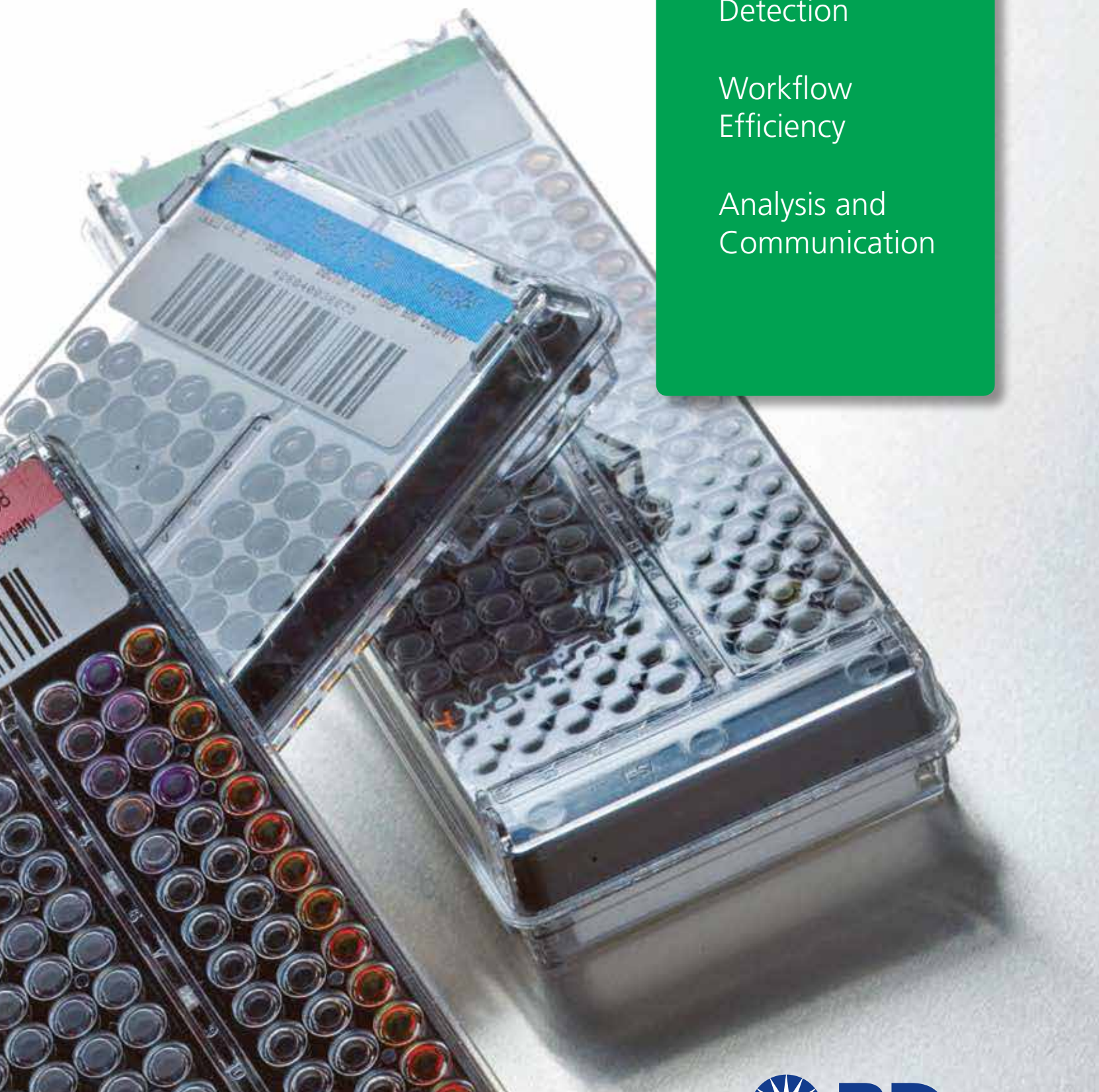
# BD Phoenix™

Automated Microbiology System

Resistance  
Detection

Workflow  
Efficiency

Analysis and  
Communication



# Phoenix

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Helping all people  
live healthy lives

*...rapid, accurate and reliable antimicrobial susceptibility results...*

## Resistance Detection

### *Detecting Resistance Today and in the Future*

The BD Phoenix Susceptibility System incorporates the use of an oxidation-reduction indicator, turbidometric growth detection, full on-panel antimicrobial concentrations and the BDXpert™ System. Together these make up the Phoenix Susceptibility System resulting in rapid, accurate and reliable antimicrobial susceptibility results. These results are further enhanced by specific delayed resistance features, providing additional assurance that Phoenix results are not only rapid but accurate.

The inclusion of all reported antimicrobial concentrations on the panel provides the foundation for detection of emerging resistance. Simply stated, the Phoenix Susceptibility System was designed to detect antimicrobial resistance today and in the future.



RESISTANCE  
DETECTION



Phoenix™ 1000

03-27-08 10:04

**PHOENIX** 0.5  
0.5

30.96 C

# 1

V5.15A / V4.31A

●	000
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○	100
⊗	000

Navigation icons: Home, Back, Forward, Stop, Power, Refresh, Print, Help, and a large arrow.

### Isolate AST Results

Antimicrobial	MIC or Concentration	Interp	Expert SIR	Final SIR	Rule Number	Drug Test Group
Ampicillin	>16	R		R		A
Piperacillin/Tazobactam	4-4	S	R	R	1403	A
Cephalothin	>16	R		R		A
Cefepime	<=1	S	R	R	1529	B
Cefoxitin	16	I	R	R	1403	B
Cefotaxime			R	R	1529	N
Gentamicin	<=2	S		S		A
Tobramycin	<=2	S		S		A
Trimethoprim Sulfamethoxazole	<=0.5/9.5	S		S		B
Nitrofurantoin	<=16	S		S		U
Ceftazidime	1	S	R	R	1529	A
Aztreonam	2	S	R	R	1529	A
Ciprofloxacin	<=0.5	S		S		B
Ceftriaxone	<=2	S	R	R	1529	B
Cefuroxime	16	I	R	R	1529	B
Levofloxacin	<=1	S		S		B
Imipenem	<=1	S		S		B
Meropenem	<=1	S		S		B
Ampicillin/Sulbactam	16/8	I	R	R	1403	B
Tetracycline	<=2	S		S		N
Amikacin	<=8	S		S		N

### Resistance Markers

Rule 1505 ESB.  Extended Spectrum Beta-lactamase

### Expert Triggered Rules

Rule 1505 Automatic Isolate is confirmed positive for ESB. Alert clinician and infection control practitioner. Verify results if uncommon.

Rule 1529 Automatic When ESB is detected, an interpretation of susceptible or intermediate for penicillins, cephalosporins (other than cephamycins), and aztreonam is reported as resistant.

## Confirmation is the key feature of the BD Phoenix ESBL Resistance Marker Detection.

- Confirmatory extended spectrum beta-lactamase (ESBL) testing for *Escherichia coli*, *Klebsiella pneumoniae* and *Klebsiella oxytoca*
- Definitive beta-lactamase detection in staphylococci
- Methicillin Resistance in *Staphylococcus aureus*
- Predictive *mecA* detection utilizing Cefoxitin for *Staphylococcus aureus*
- Vancomycin resistance in enterococci
- High-level aminoglycoside resistance in enterococci
- Vancomycin resistance in *Staphylococcus aureus*

All resistance marker testing is included on every panel of the appropriate type so there is no need for additional tests or added incubation. This results in faster reporting and less additional or repeat testing.

# Emerging Resistance Detection

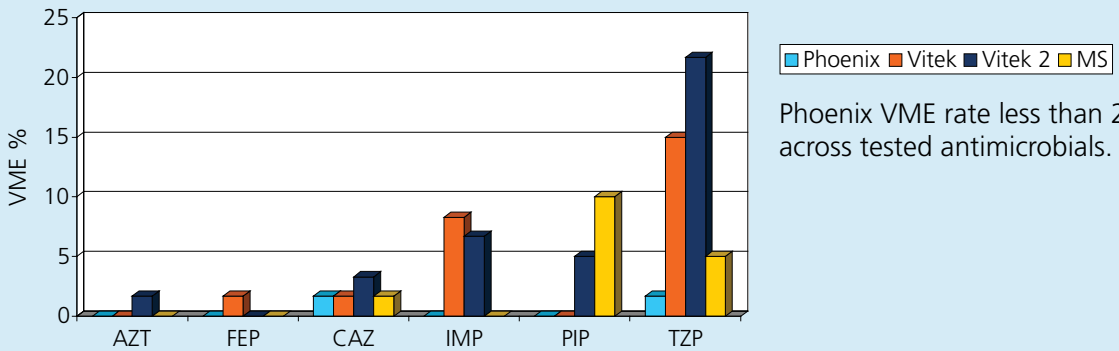
In addition to accurately confirming known resistance, the Phoenix Susceptibility System is an industry leader in rapidly detecting resistance in organisms to antimicrobials that historically have been susceptible. This rapid detection allows for appropriate patient therapeutic intervention.

The combination of the Phoenix Susceptibility System and extensive resistance marker detection provides rapid results from instrument to report without delays.

EMERGING RESISTANCE

## Beta-Lactam Susceptibility and *Pseudomonas aeruginosa*

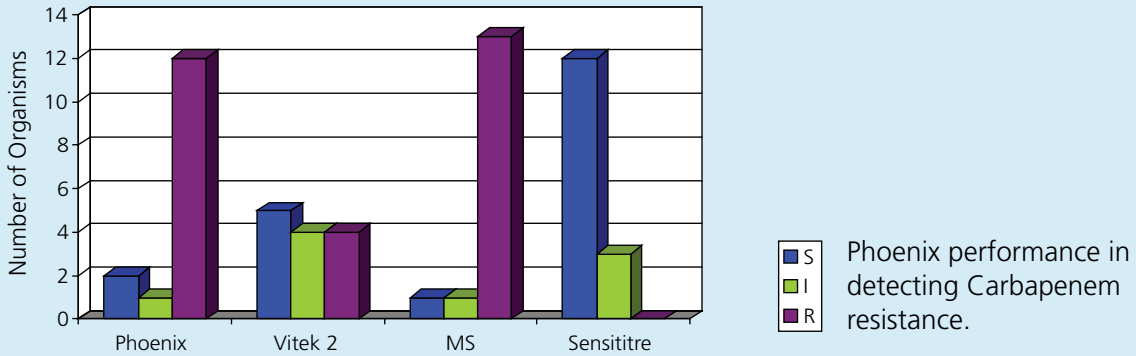
Juretschko, et. al., JCM Vol 45, No 4, Apr 2007



Phoenix VME rate less than 2% across tested antimicrobials.

## Detection of Carbapenem Resistance in *Klebsiella pneumoniae* – Meropenem

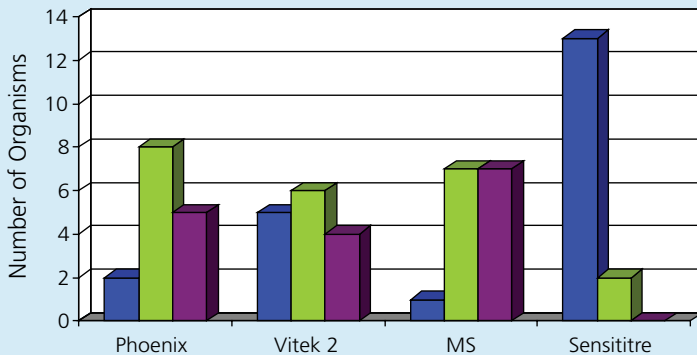
Tenover, et. al. Emerging Inf. Dis. Vol 12 No 8, Aug 06



Phoenix performance in detecting Carbapenem resistance.

## Detection of Carbapenem Resistance in *Klebsiella pneumoniae* – Imipenem

Tenover, et. al. Emerging Inf. Dis. Vol 12 No 8, Aug 06



## BD Phoenix AP

- Decreases technologist time and labor to prepare panel
- Standardizes inoculum in laboratory
- Incorporates state-of-the-art automated nephelometry



## BD Phoenix™ AP Workflow Efficiency

With the availability of the BD Phoenix AP, the Phoenix System incorporates state-of-the-art technology, providing the laboratory workflow efficiency and standardized isolate inoculum. The BD Phoenix AP is the first system to incorporate automated nephelometry in ID/AST testing. This step has traditionally been the most time consuming, manual step associated with isolate preparation.

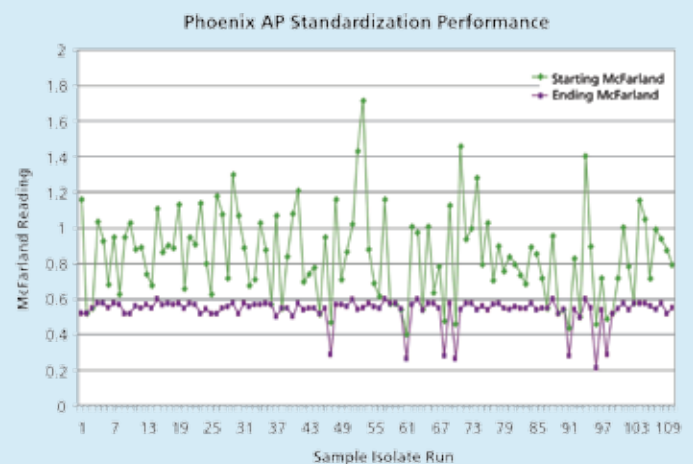
To inoculate a panel using Phoenix AP, laboratory technologists simply make a 'heavy' suspension of the isolate to be tested in Phoenix ID broth. The Phoenix AP is capable of processing a starting McFarland of 0.20 to 4.0 to the appropriate testing McFarland. The ID broth and corresponding AST broth are placed in a Phoenix AP rack and loaded onto the system for preparation.

The estimated rack processing time is 5-7 minutes. Each Phoenix AP is capable of processing 200 ID/AST sets in less than 4.5 hours.

The Phoenix AP incorporates the BD EpiCenter™ Barcode Printing Software into the workflow. Each ID broth may be identified with an EpiCenter generated barcode label

that may include patient name, patient location, sample accession number, specimen type, Phoenix panel type, and isolate number. Utilizing the EpiCenter barcode eliminates the need for additional keystrokes by the technologist, further streamlining the panel loading process.

### Starting – Ending McFarland Per Isolate



# BD Phoenix™ AP Workflow – Prep and Pour

## 1 PREPARE INOCULUM

- Label ID tube with EpiCenter™ or LIS barcode
- Select colonies and make a heavy suspension in ID broth
- Place in rack with AST broth

## 2 BD PHOENIX AP

- Performs automatic nephelometry to 0.5 or 0.25 McFarland
- Adds AST indicator to AST broth
- Transfers isolate to AST broth
- Mixes both samples

## 3 REMOVE PROCESSED TUBES AND PLACE ON INOCULATION STATION WITH PHOENIX PANELS

- Single or batch inoculation
- Central or individual work stations

## 4 SCAN BARCODES INTO BD EPICENTER™ AND INOCULATE PANELS

- Provides rapid, efficient batch sample login
- Supports single-handed barcode scanning
- Provides positive sample ID for Phoenix isolate

## 5 OPEN BD PHOENIX DOOR AND PLACE PANEL IN ANY AVAILABLE STATION



# BD Phoenix AP





BD EpiCenter

## BD EpiCenter™ System Monitor....Analyze....and Communicate

Monitoring, analyzing and communicating microbiology data in a timely manner can directly impact patient care and should be the goal of every facility. Obtaining, organizing and communicating this information is labor intensive and current information systems can make even routine antibiogram generation difficult. Today microbiologists, infection control officers, physicians and pharmacists need immediate access to patient focused information to rapidly identify and react to emerging resistance or HAI events. EpiCenter provides the real-time data access and analysis tools these professionals can use to improve patient care.

# Expert Systems

## ID/AST Result Consistency

### Quality Assurance Policy Compliance

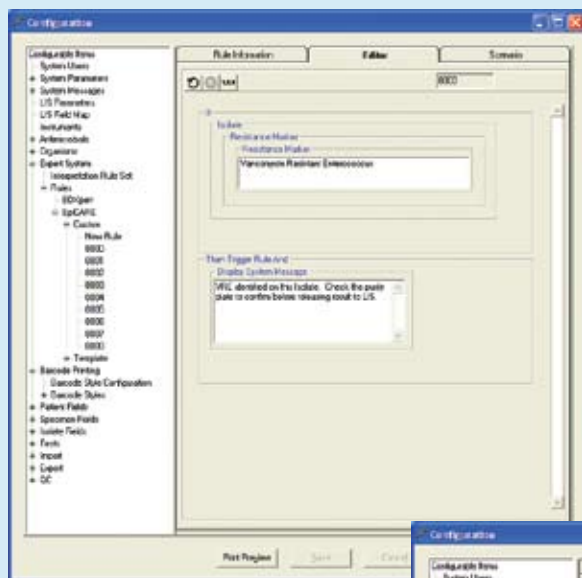
The BD Phoenix™ Automated Microbiology System, when connected to EpiCenter, employs an enhanced BDXpert system that presents expertised results to technologists. The BDXpert system represents a “best practice” microbiology system as it incorporates Clinical and Laboratory Standards Institute standards in the analysis of ID/AST results.

To complement the BDXpert system, the optional EpiCenter Clinical Application Rule Editor, BD EpiCARE™, is available to EpiCenter users. The EpiCARE software provides managers in microbiology and other departments the ability to define specific rules and

actions to ensure policy compliance for the reporting of microbiology data.

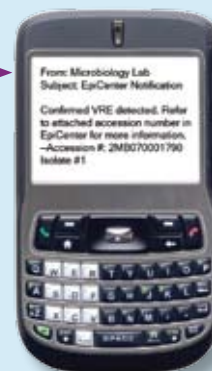
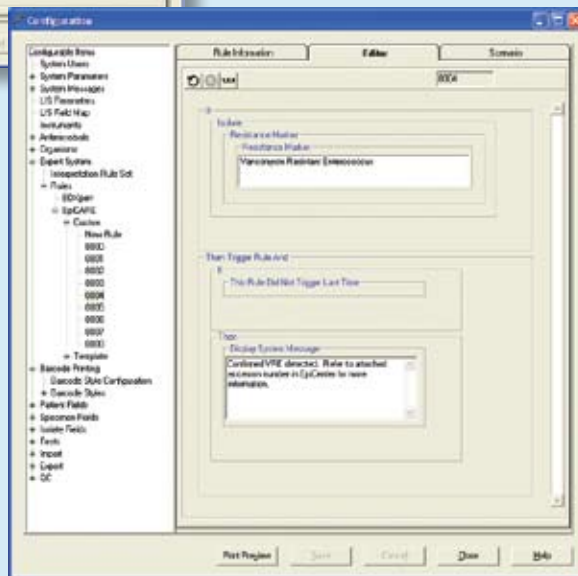
The software allows users to define rules based on any patient or facility demographic coupled with an ID/AST result outcome. Managers can utilize the proactive alerting capability integrated into the EpiCenter software to ensure that the proper action is taken when each event is identified. Using EpiCenter, an Infection Control Officer is able to ensure that the correct individuals are notified when an HAI event occurs and/or what specific organisms or resistance patterns are detected.

#### Rule 1 Generates the message for the system message



Time Stamp	Errr Code	Originating Computer	Message
04/21/2006 21:31:30	21069	MD20025	Finalized PHL-101 test with S sequence 42616074251 has been assigned a new status or result. Please refer to the auditing for details.
04/21/2006 21:31:30	21235	MD20025	Final isolate T on specimen 2MB070001790 has been changed to Pretherapy.
04/21/2006 21:34:13	98000	MD20025	VRE identified on the isolate. Check the patho plate to confirm before releasing result to LIS -Accession #: 2MB07001790, Isolate #: 1

#### Rule 2 Generates the message for the e-mail to blackberry



# Epidemiology

Performing time-sensitive epidemiology studies as well as quality and workload management analysis is simplified and intuitive using the software's powerful data mining tools, graphical interface and Microsoft XP™ and SQL Server™ architecture. Compiling, analyzing and communicating information has never been easier because the software is easily networked so that everyone can have secure access to this time-sensitive patient data.

The EpiCenter library is enhanced with over one hundred predefined queries and reports. This extensive library provides the ability to quickly access data, analyze it in multiple formats, and share your findings with others. Integrated into the software are simple-to-use tools to customize the predefined reports and save them as personal favorites.


		Name Collection Date (Formatted)												
		Cefazolin		Cefoxitin		Clindamycin		Gentamicin		Levofloxacin		Oxacillin		Van
Name	Specimen Hospital Service	# Results	% S	# Results	% S	# Results	% S	# Results	% S	# Results	% S	# Results	% S	# R
Staphylococcus aureus	3 BLUE	13	30.77%	13	30.77%	13	84.62%	13	100.00%	13	92.31%	13	30.77%	
	3 ORANGE	32	37.50%	32	37.50%	32	84.38%	32	100.00%	32	78.13%	32	37.50%	
	4 ADOLESCENT MED	30	30.00%	30	30.00%	30	50.00%	30	93.33%	30	60.00%	30	30.00%	
	4 MEDICINE	28	32.14%	28	32.14%	28	67.86%	28	78.57%	28	71.43%	28	32.14%	
	4 SOUTH	28	32.14%	28	32.14%	27	85.19%	28	100.00%	28	75.00%	28	32.14%	
	5 NORTH	11	27.27%	11	27.27%	11	54.55%	11	81.82%	11	81.82%	11	27.27%	
	ADOLESCENT MEDICINE CLINIC	15	20.00%	15	20.00%	15	93.33%	15	100.00%	15	73.33%	15	20.00%	
	ALLERGY CLINIC	11	72.73%	11	72.73%	11	63.64%	11	100.00%	11	90.91%	11	72.73%	
	BURN CENTER	33	57.58%	33	57.58%	33	60.61%	33	100.00%	33	69.70%	33	57.58%	
	BURN TREATMENT	15	46.67%	15	46.67%	15	66.67%	15	100.00%	15	60.00%	15	46.67%	
	EMERGENCY ROOM	182	19.23%	182	19.23%	179	93.85%	182	100.00%	182	86.28%	182	19.23%	
	GEN PEDIATRIC EVENING CLINIC	68	25.00%	68	25.00%	62	93.55%	68	100.00%	68	80.88%	68	25.00%	
	GENERAL PEDIATRIC CLINIC	25	16.00%	25	16.00%	25	96.00%	25	100.00%	25	72.00%	25	16.00%	
	PULMONARY CLINIC	200	44.50%	201	44.28%	198	41.41%	201	88.56%	201	52.74%	201	44.28%	
	Total	691	33.00%	692	32.95%	679	71.28%	692	95.23%	692	71.39%	692	32.95%	
Total		691	33.00%	692	32.95%	679	71.28%	692	95.23%	692	71.39%	692	32.95%	



## Communication

Using BD EpiCenter Multi-User™ software opens up avenues for improved laboratory productivity and communication between the laboratory and other departments. The laboratory can add workstations to improve workflow between different areas within the lab. In addition, physicians, infection control professionals and pharmacists can gain real-time access to information and EpiCenter data analysis tools from the convenience of their own computers. Whether it is monitoring organism phenotypic trends to resistance marker alerts and organism surveillance, BD EpiCenter provides real-time information to those clinicians that can affect patient care.

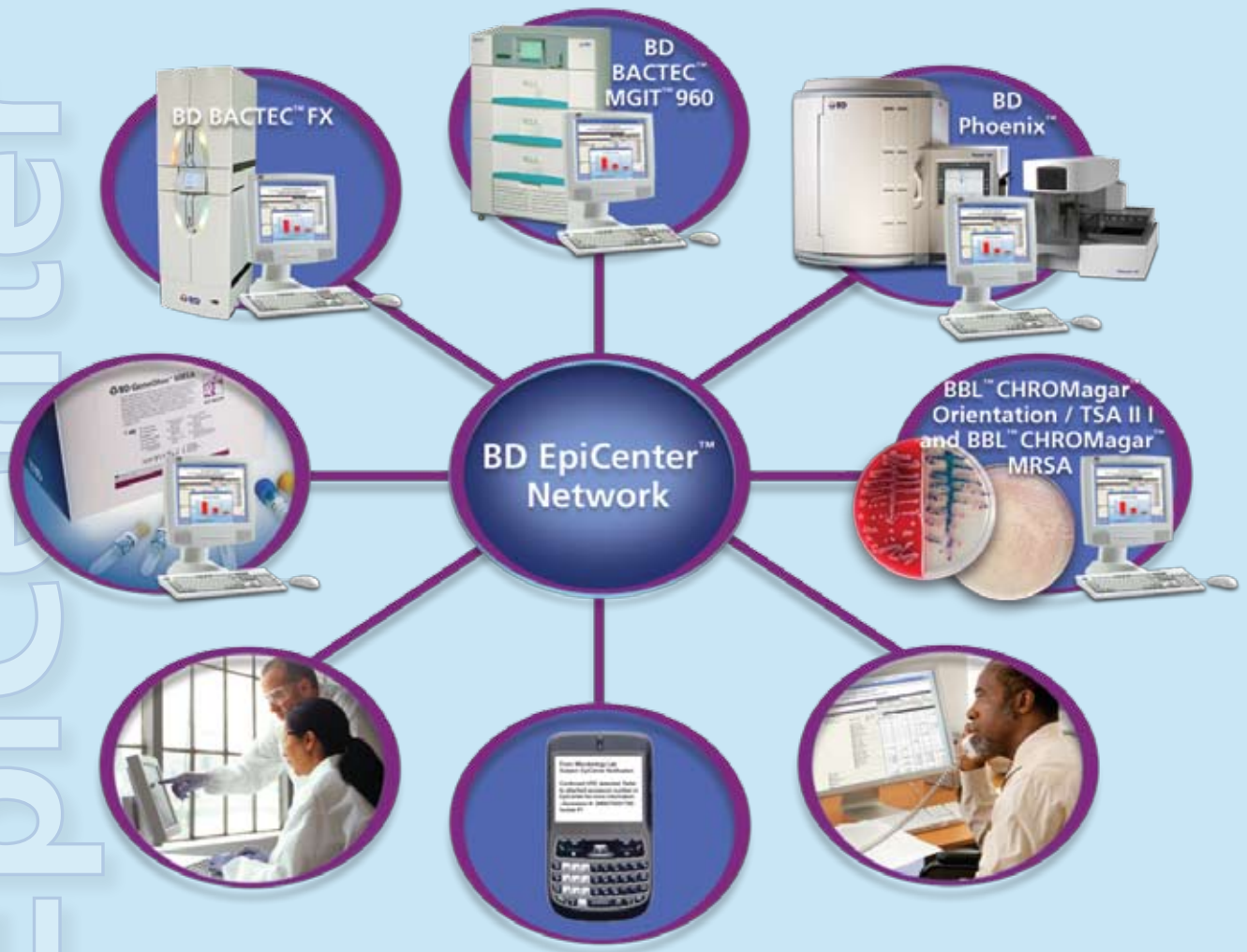
Adding the BD Sentinel™ option to the BD EpiCenter™ System improves communication capabilities within the Multi-User network. The System Message Distribution feature allows messages to be directed to specific user clients or to multiple EpiCenter workstations. In addition, Sentinel messages can be distributed by e-mail to a computer, PDA or text message phone.



comycin  
results % S

13	100.00%
32	100.00%
30	93.33%
28	96.43%
28	89.29%
11	100.00%
15	93.33%
11	100.00%
33	100.00%
15	100.00%
182	98.90%
68	98.53%
25	100.00%
201	95.02%
692	97.11%
692	97.11%

# BD EpiCenter



Data management for BD Diagnostics instrumentation and manual testing. Communication of data within the lab and beyond.





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