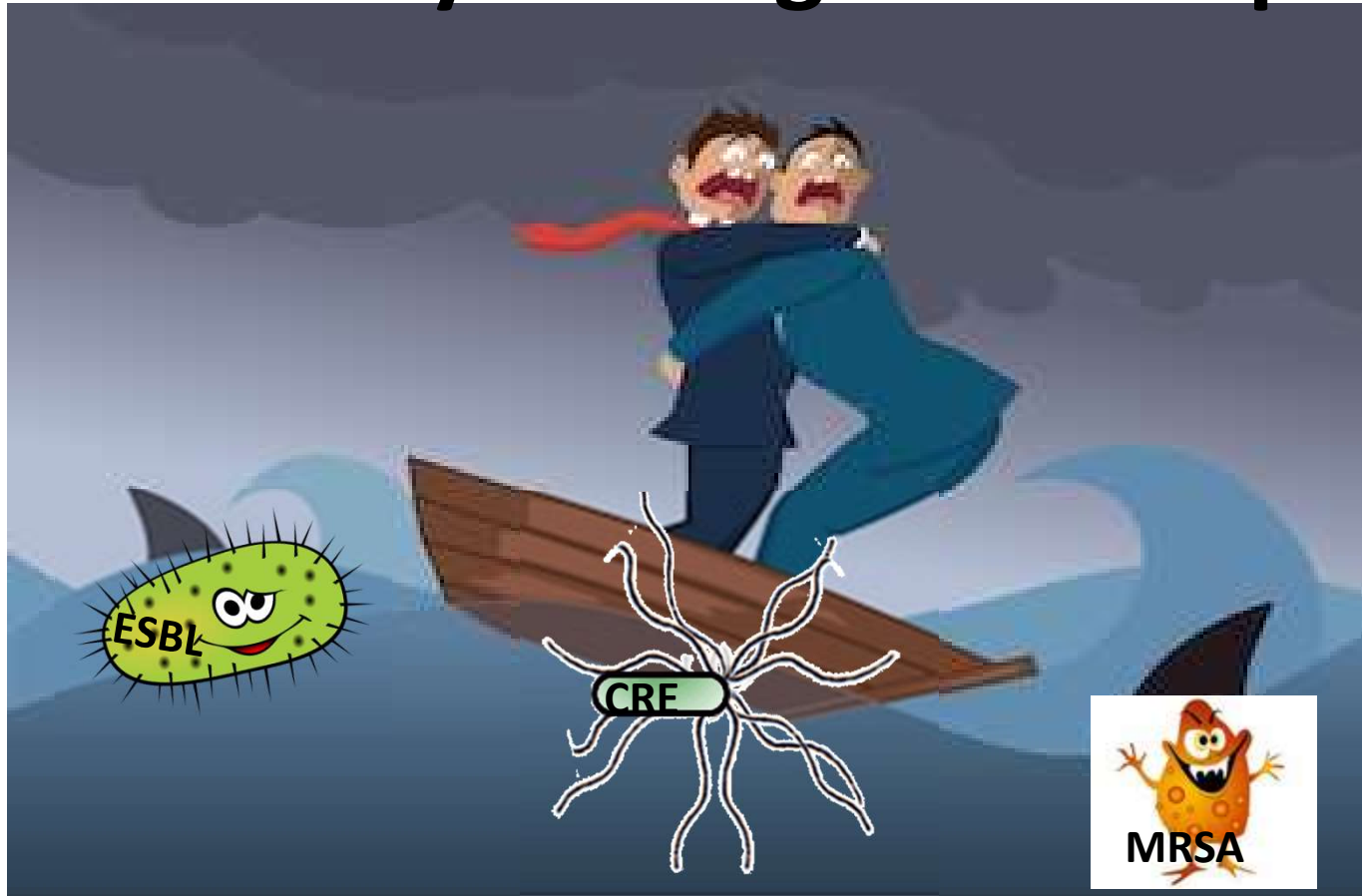


Antimicrobial Stewardship: How the Microbiology Laboratory Can Right the Ship



Dr Chetna Govind, Lancet Labs, KZN

United Nations high-level meeting on antimicrobial resistance

Antimicrobial resistance summit to shape the international agenda



Date: 21 September 2016

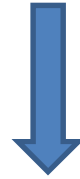
Place: New York, USA

Antimicrobial Stewardship at the Helm

Antimicrobial stewardship can be defined as a **bundle of interventions** to promote and ensure the optimal use of antimicrobial treatment “that results in the **best clinical outcome** for the treatment or prevention of infection, with minimal toxicity to the patient and **minimal impact on subsequent resistance**”

THE LABORATORY'S SEAT AT THE CAPTAIN'S TABLE

65yr , AB, fever, rash



Diagnostics

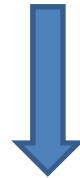
Empiric antibiotic choice

Admitted

Commenced on antibiotics

Culture and susceptibility result

Early Warning Systems/Alerts



ICU requiring ventilation
? Nosocomial event

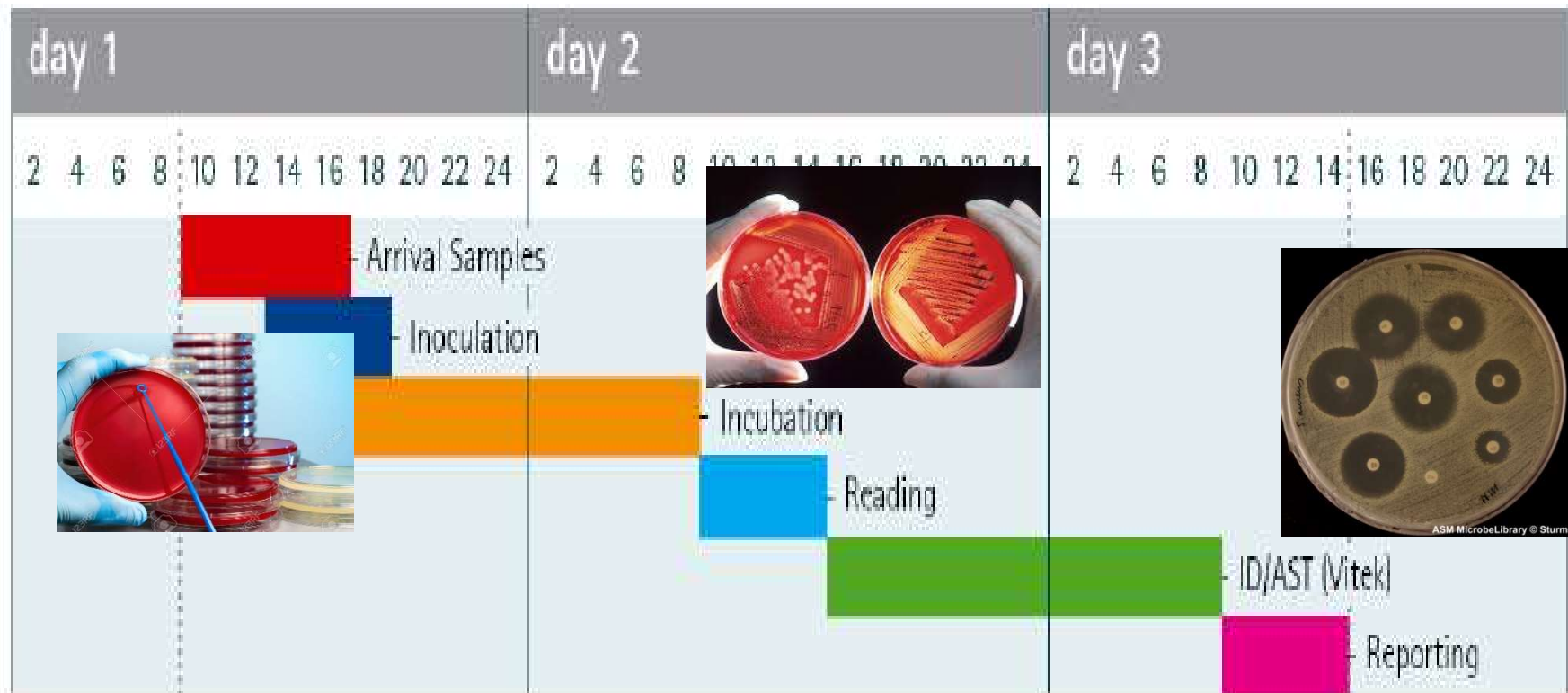
Sepsis Markers

ICU Surveillance Reports

Role of the Lab

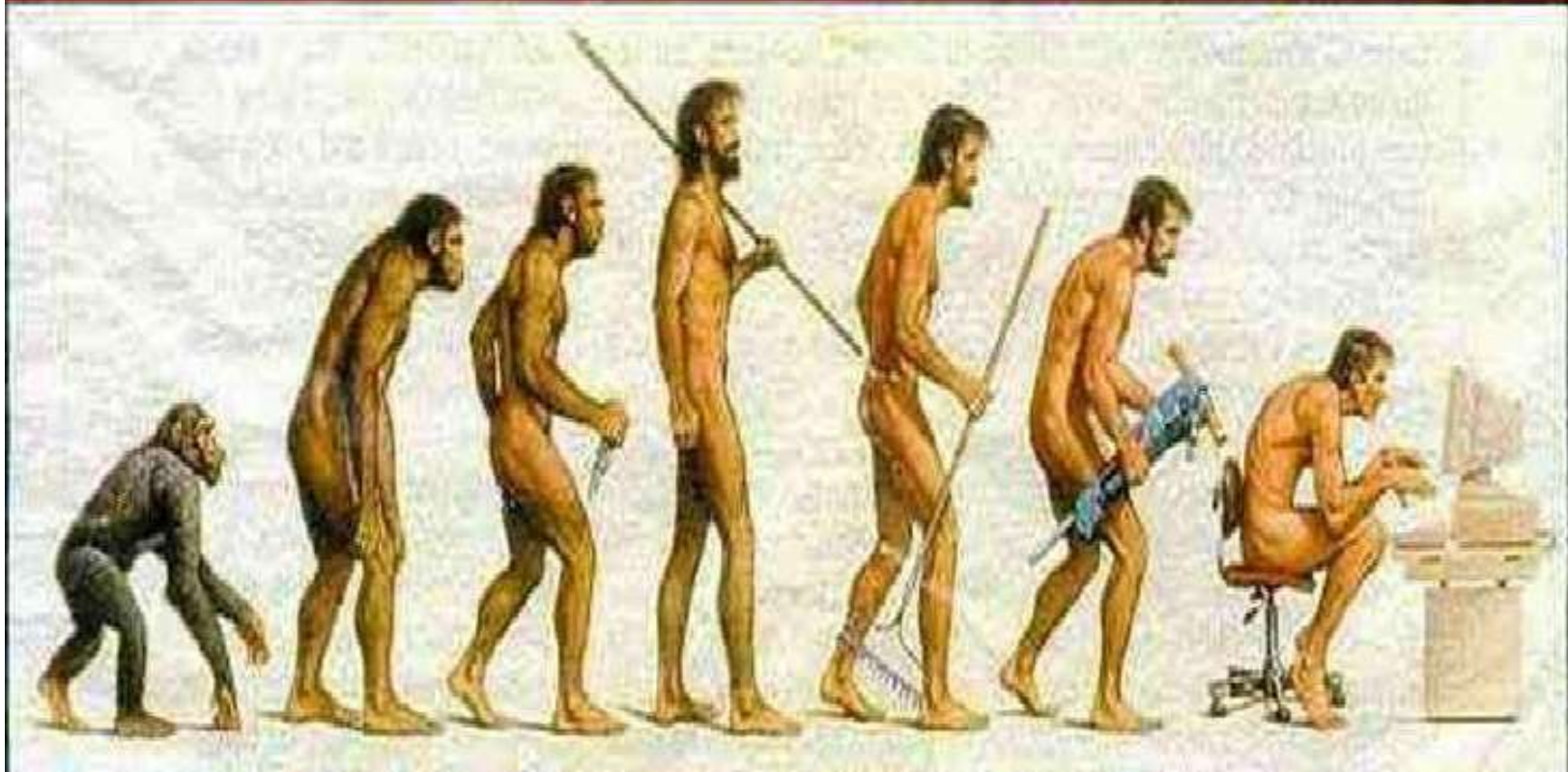
- provide patient-specific culture and susceptibility data to optimize individual antimicrobial management
- assist infection control efforts in the surveillance of resistant organisms and other notifiable infections
- generate cumulative antimicrobial susceptibility reports (CASRs) to inform local guidelines
- collaborating with infection control professionals in outbreak investigations
- surveying for bacterial resistance

Manual Bacteriology



**In microbiology we've long had a culture--
no pun intended--of having a laboratory
that is very manual**

Man has Evolved So also the
Microbes, so the need for
Automation



Meet the “ladies” in the lab

Meet IRIS



Molly

RAPID DIAGNOSTICS

IMPROVED QUALITY



Maxi



Genie



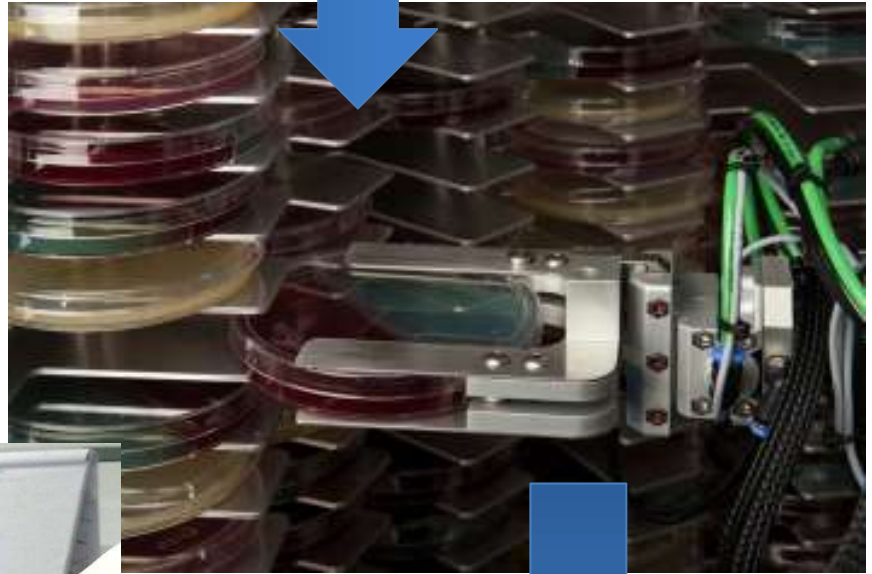
MALDI-TOF MS

- Matrix-assisted laser desorption ionization–time of flight mass spectrometry (MALDI-TOF MS) can accurately identify a large range of pathogens such as bacteria, yeasts, filamentous fungi, and mycobacteria in as little as a few minutes
- A recent study reported average **savings** of \$3,411 in hospital costs along with **a reduced time to appropriate therapy** when MALDI-TOF was coupled with a pharmacist intervention for bloodstream infections in two community hospitals in Texas—nicely illustrating the results of successful collaboration between clinical microbiology and antimicrobial stewardship.

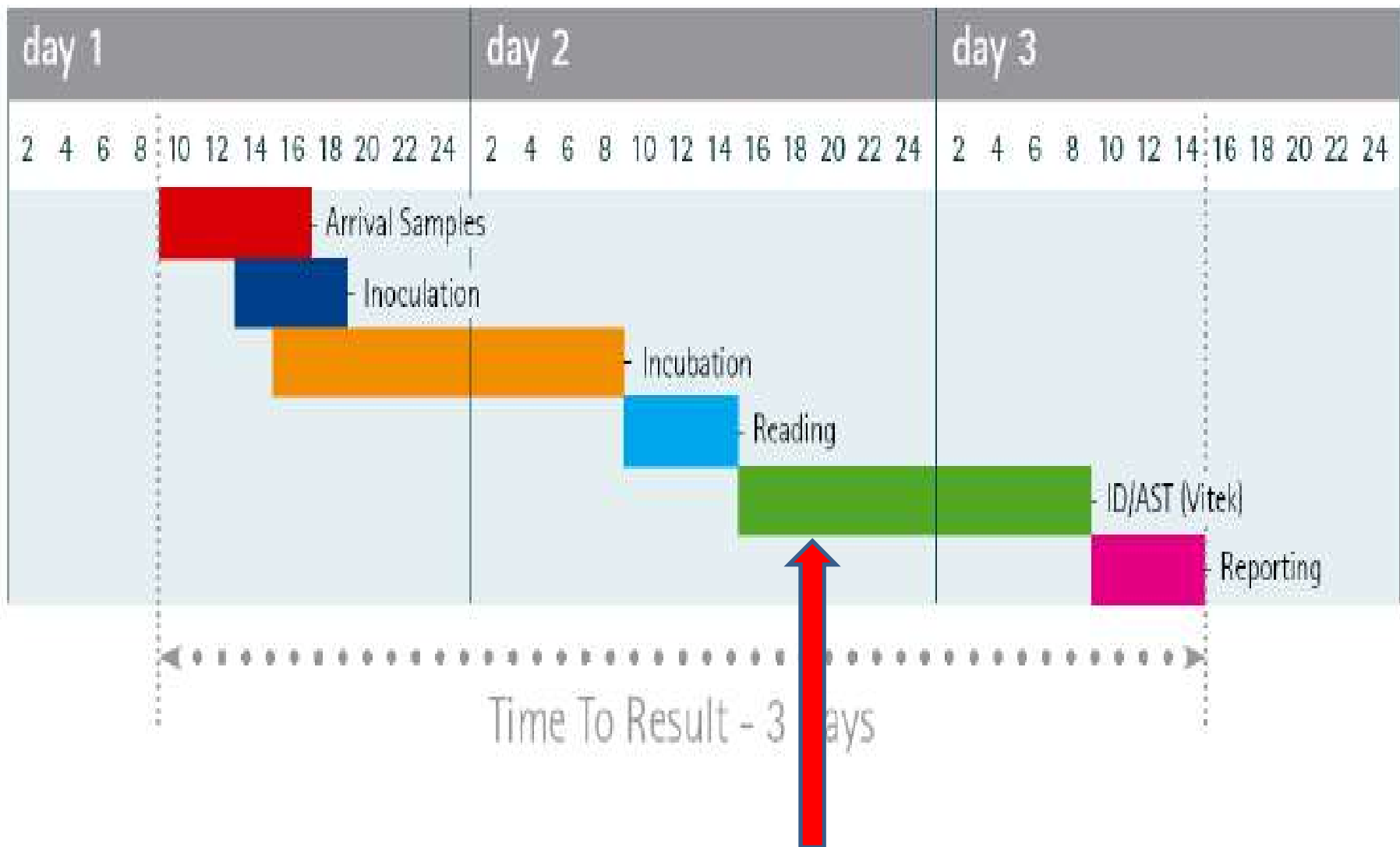
Microbiology Total Laboratory Automation



**Putting specimens on a track – with no human
intervention until plate reading time– and
even then its not like you know it...
Hands Off Microbiology!!**



Maximal Bacteriology



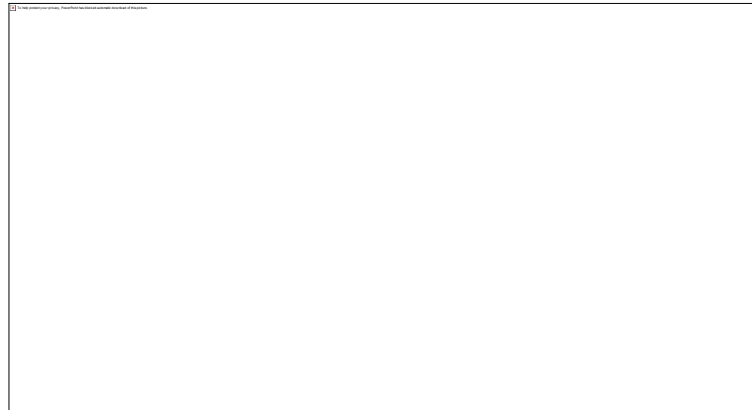
Performance of Kiestra Total Laboratory Automation Combined with MS in Clinical Microbiology Practice

Ann Lab Med. Mar 2014; 34(2)

Mutters, et al

- 219 blood culture isolates
- Pathogen identification using Kiestra TLA combined with MS resulted in a **30.6 hr time gain** per isolate compared to conventional microbiology
- Pathogens were successfully identified in 98.4% (249/253) of all tested isolates
- Early microbial identification without susceptibility testing led to an **adjustment of antibiotic regimen in 12%** (24/200) of patients

“Workflow trumps Fancy Tests”



It actually doesn't matter that much how many fancy assays you have, or how much money your laboratory has. If you can't get your workflow right then it all becomes a bit academic.

Turnaround times generally don't just include the actual analysis of the sample. More often than not, it includes storage time, transport/courier time, registration time, verification time, etc.

NEW TRADE WINDS MAY HELP YOU REACH YOUR DESTINATION

- Molecular Diagnostics
- Sepsis markers

Molecular Diagnostics

Molecular assays have been the main focus in the development of rapid diagnostic technologies in recent years

- Viral diagnostics - promoting appropriate antiviral therapy and discontinuation of anti-bacterials
- Rapid diagnosis of “difficult to culture” bacteria
- “panel” of organisms in a single test
- Identification of resistance mechanisms

BIOMARKERS

- Accurate biomarkers could be a boon to antimicrobial stewardship programs by
 - providing more accurate infection diagnosis
 - suggesting the class of infectious agent (bacterial, fungal, viral, etc.)
 - monitoring clinical responses
 - guiding the duration of treatment

Procalcitonin

- Serum PCT is detectable as soon as 4 h and peaks between 12 and 48 h after infection onset
- Most studies have focused on its use for respiratory infections and sepsis, and data support its use more often as an indicator to stop, rather to start, therapy
- A Cochrane review in 2012 of the use of PCT algorithms in acute respiratory infections found that the median exposure to antimicrobials was reduced from 8 to 4 days without any adverse impact on the mortality rate

Antibiotic Susceptibility Reporting and Cumulative Reports : Beyond the Horizon

Antimicrobial Susceptibility Reporting

- Cascade or selective reporting can be used to promote the judicious use of antimicrobials
- Cascades provide only a limited number of tested antimicrobial susceptibilities
- reporting of susceptibility to broader-spectrum drugs only when isolates are resistant to drugs in the first “cascade.”
- Clear and concise messages on patient reports may be useful to guide therapy :
 - *Enterobacter cloacae* with AmpC-type β -lactamase profile; cefepime is usually effective for infections caused by this pathogen
 - Gram stain and culture of this specimen represent normal skin flora

SURVEILLANCE

Cumulative organism and antimicrobial susceptibility report :

- helping prescribers select effective therapy when culture results are pending, informing
- updating local guidelines for empirical treatment
- updating perioperative prophylaxis recommendations
- surveying local resistance and benchmarking
- identifying targets for stewardship interventions and best practices
- providing the context for new drug susceptibility testing results

SOUNDING THE ALL-HANDS-ON-DECK ALARM: ALERTS AND OUTBREAK CONTROL



Rapid communication



Scientists discover a new superbug.

PROVIDER EDUCATION: HOW TO TIE THE KNOTS

The participation of clinical microbiologists in designing and delivering antimicrobial stewardship-related teaching, which is ideally multimodal, including rounds and conferences but also staff bulletins and management guidelines.

Clinical Infectious Diseases

IDSA GUIDELINE



A Guide to Utilization of the Microbiology Laboratory for Diagnosis of Infectious Diseases: 2018 Update by the Infectious Diseases Society of America and the American Society for Microbiology^a

J. Michael Miller,¹ Matthew J. Binnicker,² Sheldon Campbell,³ Karen C. Carroll,⁴ Kimberle C. Chapin,⁵ Peter H. Gilligan,⁶ Mark D. Gonzalez,⁷ Robert C. Jerris,⁷ Sue C. Kehl,⁸ Robin Patel,² Bobbi S. Pritt,² Sandra S. Richter,⁹ Barbara Robinson-Dunn,¹⁰ Joseph D. Schwartzman,¹¹ James W. Snyder,¹² Sam Telford III,¹³ Elitza S. Theel,² Richard B. Thomson Jr,¹⁴ Melvin P. Weinstein,¹⁵ and Joseph D. Yao²

MICROBIOLOGY AT SEA: RETURNING TO HARBOR?



MICROBIOLOGY AT SEA: RETURNING TO HARBOR?

Future :

- Rapid diagnostics
- Whole genome sequences
- Microbiome research
- Use of big data and precision machine learning to improve antimicrobial prescribing
- Use of mobile devices

“The recent proliferation of innovative rapid diagnostic methods could boost the clinical relevance of clinical microbiologists to levels unseen since the time of Koch and Pasteur.”

Complex problem

