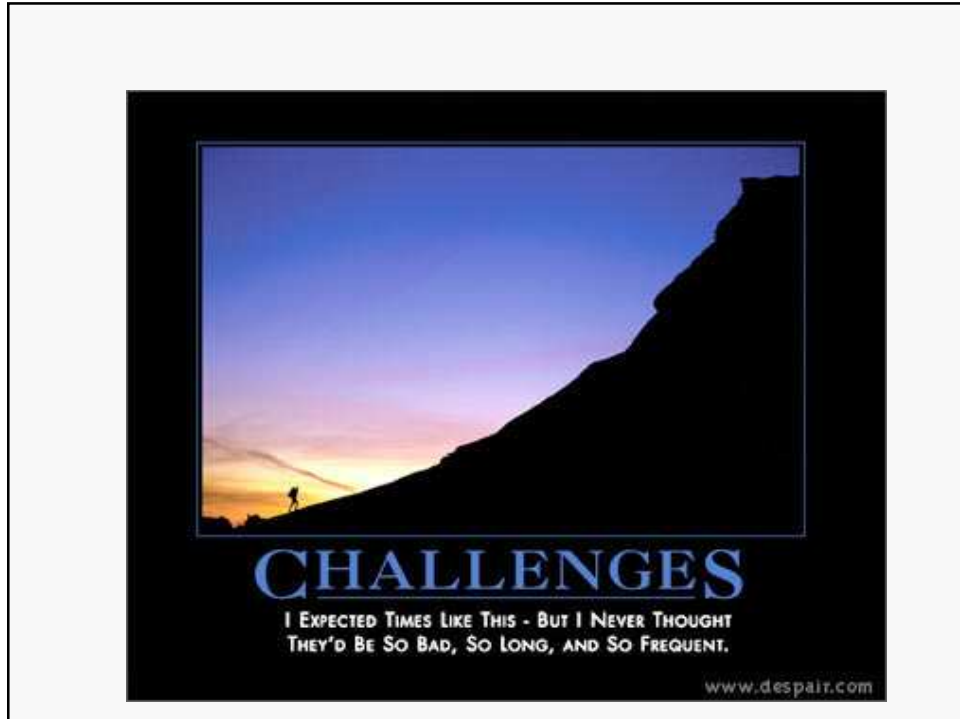


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A Little Something About
Staphylococcus aureus

John Golobic
Manager of Microbiology
S.E.D Medical Laboratories



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Superbugs Spread Fear Far and Wide

Drug resistant bugs, including MRSA and several others that are emerging in hospitals, are more difficult to treat, requiring stronger antibiotics that are more costly and in some cases have to be given intravenously.



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A Menace In The Locker Room

MRSA, a strain of antibiotic-resistant staphylococcus once confined to hospitals is striking athletes at an alarming rate and with dire consequences



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“Superbug” MRSA Worries Doctors, Athletes

Drug-Resistant Germ Found in Locker Rooms; Can Kill Within Days



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JOHNS HOPKINS
MEDICINE

“Superbug” Outside the Hospital Poses Risk to Caregivers Inside

Threat can be minimized by tighter infection control and cleaning policies.



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OnThePharm

MRSA Infections In Prisons On The Rise

Doctors may need to consider adding MRSA coverage to patients with skin and soft tissue infections who are candidates for empiric antibiotic therapy.



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Infectious Disease News

The Threat of CA-MRSA Is No Longer Emerging; It's Here

MRSA is turning into a real problem in prisons. Not only for prisoners, but for guards as well.



HOPE

MAY NOT BE WARRANTED AT THIS POINT.

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Culture Method

- Routine culture using Blood Agar
 - Must do susceptibility to confirm MRSA
 - Turnaround time of 48 hours
- Selective MRSA Agars
 - Isolate color determines if MRSA or not
 - Turnaround time of 24-48 hours.



Culture Method cont.

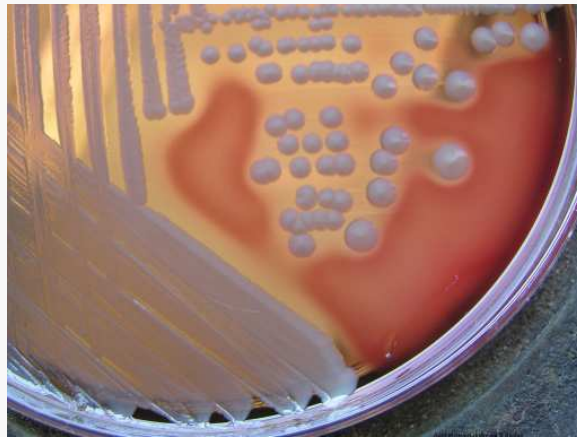
- Advantage:
 - Relatively inexpensive. About \$5-10.
- Disadvantage
 - Takes 24-48 hours for final results.
 - Less sensitive than PCR.



Aerobic Culturette



Staphylococcus aureus





Remel Spectra MRSA Agar

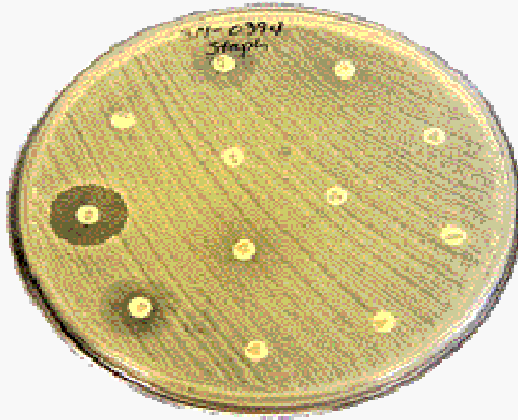


BD Chrome Agar

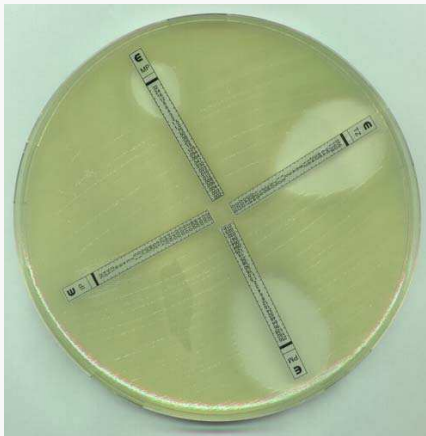




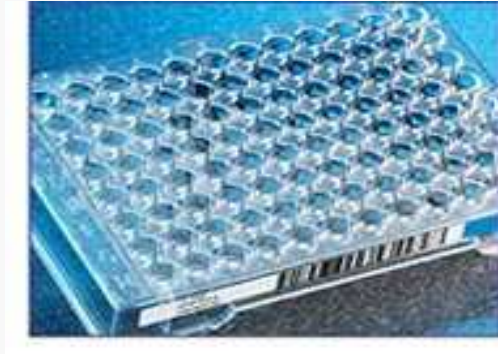
Kirby Bauer Disk Diffusion



E-Test



MIC Plate by Microscan



Dade (Siemen's) MicroScan



BD Phoenix



BioMerieux Vitek 2

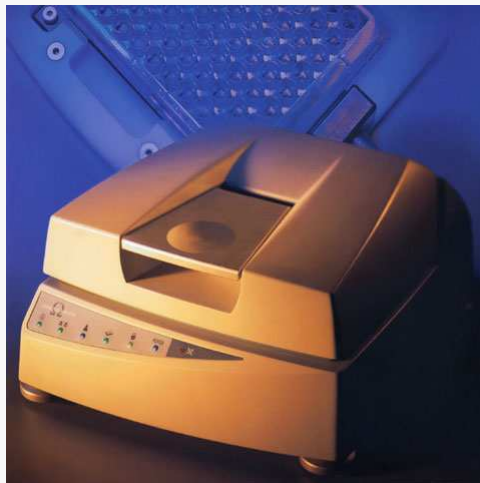




Nucleic Acid Amplification Tests

- **BD GeneOhm**
 - Cost is about \$30 per test.
 - Must be batched to run.
- **Cepheid GeneXpert**
 - Cost is about \$45 per test
 - Can be run singly
 - Turnaround time is approximately 1.5 hours.
 - Must purchase instrument.

BD Geneohm



Cepheid GeneXpert



TRADITION

JUST BECAUSE YOU'VE ALWAYS DONE IT THAT WAY
DOESN'T MEAN IT'S NOT INCREDIBLY STUPID.

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Staphylococcus aureus

- Causes a wide variety of diseases.
- Colonizes the skin and mucosa of virtually all animals including mammals and birds.
- In humans, *S. aureus* demonstrates a niche preference for the anterior nares, especially in adults.
- MRSA is 4 times more likely to colonize the nares than MSSA.



S. aureus Infections

- Bacteremia (which is what the collaborative is focusing on).
- Skin infections
- Wound infections
- Pneumonia
- Cellulitis
- Osteomyelitis
- Pericarditis
- Etc.



Antibiotic Resistance

- *S. aureus* have developed resistance to virtually all antibiotic classes available for clinical use.
- Use of antibiograms to follow the trends of resistance is extremely important.



A Few Other Things to know about *S. aureus*

- It is the cause of Toxic Shock Syndrome
- It is a cause of food poisoning
 - May account for 6-8 million cases per year in the United States.
 - The toxins are heat stable so they are not denatured by cooking
 - The disease typically starts 2-6 hours after ingestion.
 - The symptoms generally resolve within 6-12 hours.



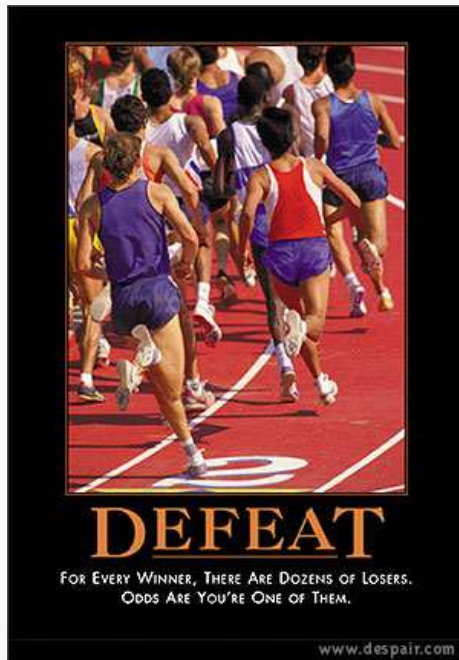
MRSA Found Most Often

- MRSA can spread rapidly and aggressively.
- MRSA spreads rapidly through
 - Sports teams
 - Prisons
 - Healthcare environments
- MRSA looks like a boil or spider bite, usually on the extremities.



CDC Recommendations

- Increased recognition
- Appropriate treatment
- Wound care and containment
- Personal hygiene
- Exclusion from activities
- Clean environment



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National Burden Estimates for
MRSA (Invasive primarily BSI)

- 2005
 - Total Cases: 108,281
 - Deaths: 20,601
- 2006
 - Total Cases: 104,228
 - Deaths 18,964

www.cdc.gov



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Most Invasive MRSA Infections are Healthcare Associated

- Community Associated (CA-MRSA) 14%
- Healthcare Associated 86%

Kievens et al JAMA 2007; 298:1763-71



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Most Healthcare-Associated MRSA Infections Have Their Onset Outside of the Hospital

- Community Associated 14%
- Healthcare Associated (community-onset) 59%
- Healthcare Associated (hospital-onset) 28%

Kievens et al JAMA 2007; 298:1763-71



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Mortality Rate due to MRSA

- Overall mortality rate: 6.3 per 100,000
- Among persons 65 and older: 35.3 per 100,000
- Males: 7.4 per 100,000

Kievens et al JAMA 2007; 298:1763-71



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Important to Know

- SA is 14% of all health care associated infections.
- Gram negative bacteria are more prevalent than MRSA in health care associated infections.



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MRSA Carriage Sites Among ICU Patients

<u>Culture Site</u>	<u>Sensitivity (%)</u>
• Nose only	69
• Throat only	71
• Groin only	67
• Nose and throat	82
• Nose and groin	88
• Nose, throat and groin	96
• Nose, throat, groin, axila	100

JCM 2007;45:3855



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Colonized Patients

- From the previous slide, MRSA can colonize other areas of the body, however, the nose appears to be the primary reservoir for replication and spread to other body sites.
- If *Staph aureus* colonization is temporarily eliminated, colonization often disappears from other colonized body sites.
- Nasal *Staph aureus* isolates are often identical to the strains that cause clinical infection.
- Short term eradication is generally successful, but patients are later recolonized with the same strain.



Colonized Patient

- Prior to surgery may want to decolonize.
 - Mupirocin
 - A patient self administered ointment that is usually given 5 consecutive days before surgery.
 - Chlorohexadine
 - Topical antiseptic used for hand hygiene.
 - Laboratories use it for skin prep.
 - Surgical preoperative skin prep.



MISTAKES

IT COULD BE THAT THE PURPOSE OF YOUR LIFE IS
ONLY TO SERVE AS A WARNING TO OTHERS.

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Transmission Prevention

- Screen all patients coming into the hospital.
- Isolate MRSA patients.
- Cohabitation of MRSA patients?
- Cohabitation of MRSA colonized MRSA patients without open wounds?



Transmission Prevention cont.

- Proper gowning and gloving before going into rooms.
- Use dedicated implements in each patient's room.
- Be aware of what you are touching.
- Wash your hands!!!



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MRSA Hospital Patient Quandries

- Isolate the patient. How does the patient feel about this?
- Everyone gowns and gloves when visiting.
- What do you do when moving the patient around the hospital?
- How long is the patient considered positive?
- What about the next patient in the room?



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Hospital Room Terminal Cleaning

- Who Does it?
- What is cleaned and with what?
- Who makes certain that it was done properly?
- Among patients whose prior room occupant was MRSA positive, 3.9% acquired MRSA compared with 2.9% of patients whose prior room occupant was MRSA negative.



Take Away

- Environmental contamination with MRSA appears to be a contributing factor in healthcare MRSA acquisition.
- It looks like the terminal room cleaning is not what it appears.



More Tidbits about MRSA

- MRSA can live on steel for 7 days
- MRSA can live on dust for 210 days
- MRSA can live on carpet fibers for 180 days
- MRSA can live on cotton (clothes, towels) for 63 days



Still More About MRSA

- Nasal carriage has become a means of persistence and spread of multi-resistant staph (MRSA).
- MRSA is easily spread in hospitals and continues to be a major cause nosocomial infection.
- What is the MRSA rate in your facility?



Transmission Prevention Non-Patient

- Fomites are anything that is touched by someone else and then touches you that can transmit infection.
- Nose to fingers...
- Fingers to... Think about everything that you touch.



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Who Has MRSA?

- How do we tell the units, providers, hospitals who has MRSA?
- How do we tell other facilities when patient is transferred?
- Accepting MRSA transfers... Whose MRSA rate does it affect? CMS reporting.



MEDIOCRITY

IT TAKES A LOT LESS TIME
AND MOST PEOPLE WON'T NOTICE THE DIFFERENCE
UNTIL IT'S TOO LATE.

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New Mexico MRSA Collaborative

- Goals
 - To measure the implementation of and barriers to MRSA intervention.
 - To create community standards regarding infection control and communication.
 - To create and share educational guidelines for patients and community providers.



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New Mexico MRSA Collaborative

- Who is in the collaborative?
 - Hospitals and long term facilities from throughout the state.
- What do we do?
 - Meet with the hospitals, IC practitioners and anyone else to discuss and trade ideas on how to fix the problem.



MRSA and MDRO Control

- Measure adherence to prevention measures.
- Judicious antimicrobial use.
- Surveillance.
- Get the buy-in from leadership.
- Education for staff.
- Conduct periodic risk assessments.



Antibiotic Stewardship

- Does antibiotic stewardship work? Who knows? But we know what happens with antibiotic over use/abuse.
- Is Vancomycin is the drug of choice?
- Starting to see Vancomycin creep.
- Daptomycin seems to be a good alternative to Vanco.
- Trimethoprim/Sulfamethoxazole + Rifampin.
- Are you watching and checking your Vanco results?
 - Instrument versus E-test.



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Vanco Creep

- Vancomycin MIC
 - 0.5 ug/ml
 - 1 ug/ml
 - 2 ug/ml
- Treatment Failures
 - 47.6% (10/23)
 - 70% (12/17)
 - 92% (23/25)

Janet Hindler Teleconference 4/23/09



DESTINY

YOU WERE MEANT FOR ME. PERHAPS AS A PUNISHMENT.

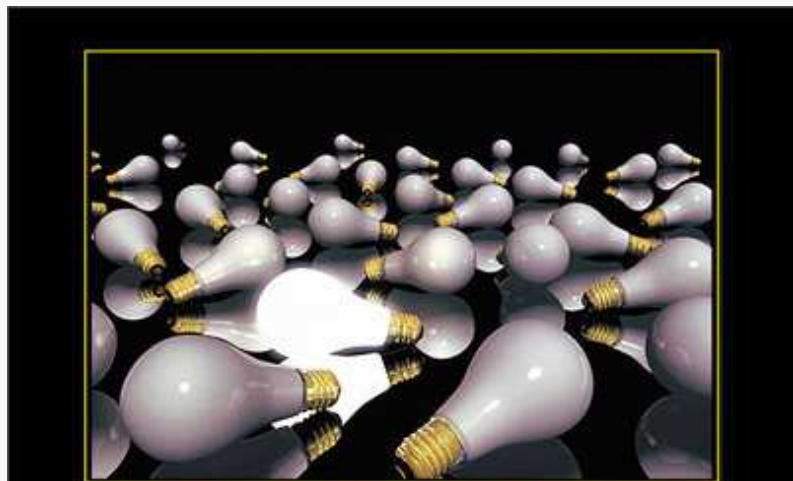
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Thank you for your time.

- Questions and discussion.



CLUELESSNESS

THERE ARE NO STUPID QUESTIONS,
BUT THERE ARE A LOT OF INQUISITIVE IDIOTS.

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Transmission Prevention

- WASH YOUR HANDS!