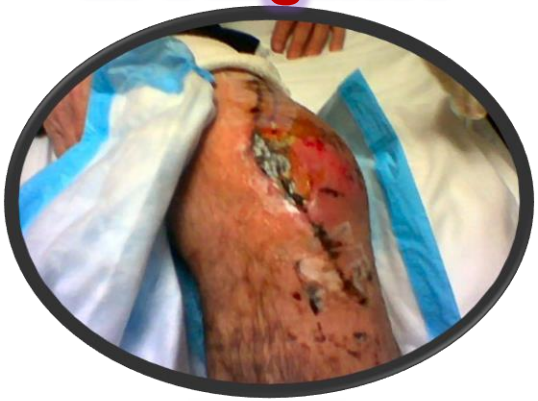
بسم الله الرحمن الرحيم

MRSA

Methicillin-Resistant Staphylococcus Aureus

In Surgeries



2019

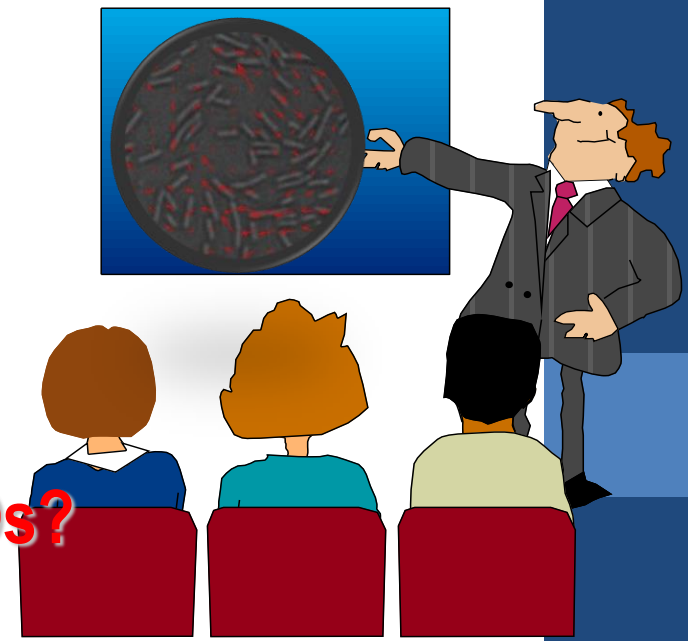
Mohamad Hamad

Infection Control Manager, VPS Healthcare, UAE.

Learning Objectives

Upon completion of this presentation, you will be able to Know:

- What is MDROs?
- Types of MDROs
- What Is Staphylococcus Aureus?
  - History of MDRO/MRSA
  - How To Diagnose?
  - What it cause?
  - How it could be transmitted?
- MDRO & Action Plan
- How To Protect Patients from MDROs?

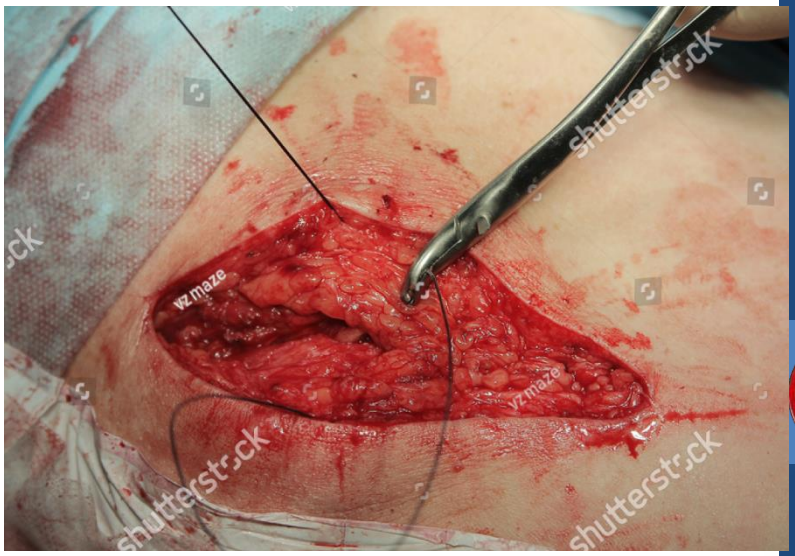


Introduction

Two of the most commonly performed elective surgeries or operations are the Hip & Knee replacement surgeries.

Although it is not common, there is a chance of infection stemming from the surgery that some patients might face.

Infections can be deep and internal, surrounding the artificial implant, or can be seen on the superficial level through wounds.



Therefore, to successfully eradicate the wound infection, it is imperative that the best practice and treatment method is employed.

Researches Studies

Impact

JAMA Surgery | Special Communication

Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection, 2017

Sandra I. Berríos-Torres, MD; Craig A. Umscheid, MD, MSCE; Dale W. Bratzler, DO, MPH; Brian Leas, MA, MS; Erin C. Stone, MA; Rachel R. Kelz, MD, MSCE; Caroline E. Reinke, MD, MSHP; Sherry Morgan, RN, MLS, PhD; Joseph S. Solomkin, MD; John E. Mazuski, MD, PhD; E. Patchen Dellinger, MD; Kamal M. F. Itani, MD; Elie F. Berbari, MD; John Segreti, MD; Javad Parvizi, MD; Joan Blanchard, MSS, BSN, RN, CNOR, CIC; George Allen, PhD, CIC, CNOR; Jan A. J. W. Kluytmans, MD; Rodney Donlan, PhD; William P. Schecter, MD; for the Healthcare Infection Control Practices Advisory Committee

https://jamanetwork.com/journals/jamasurgery/fullarticle/2623725

In 2017, CDC estimates 2 million people become infected with bacteria that are resistant to antibiotics and at least 23,000 people die each year as a direct result of these infections.

By 2030, Prosthetic Joint Arthroplasties are projected to increase to 3.8 million procedures per year; & SSI risk for hip and knee arthroplasty is expected to increase from 2.18% to 6.5% & 6.8%, respectively at a cost of more than $1.62 billion.

JAMA: Journal of the American Medical Association
JAMA Surg. 2017;152(8):784-791. doi:10.1001/jamasurg.2017.0904

Do we have a problem?

Yes

In spite of a selective treatment program for carriers & confirmed eradication, there is still a significant increased risk of SSI in MRSA colonized patients undergoing surgeries

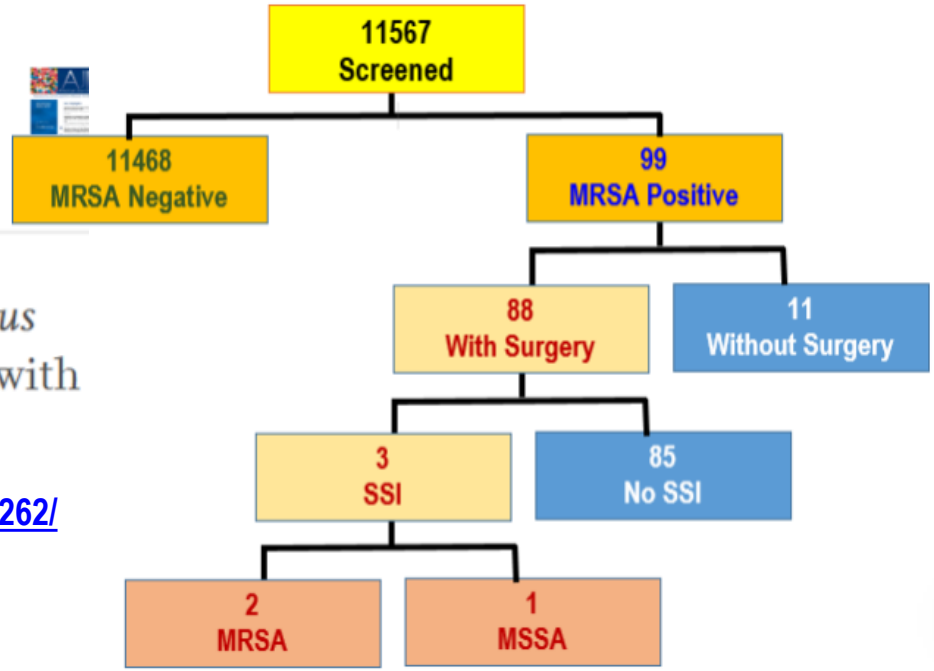
ELSEVIER

American Journal of Infection Control
Volume 41, Issue 12, December 2013, Pages 1253-1257

Major article

Risk of methicillin-resistant *Staphylococcus aureus* surgical site infection in patients with nasal MRSA colonization

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4174262/



Clinical Infectious Diseases

MAJOR ARTICLE

IDSA Infectious Diseases Society of America

hivma hiv medicine association

OXFORD

Multidrug-resistant Organisms in Hospitals: What Is on Patient Hands and in Their Rooms?

Published: 13 April 2019

Lona Mody,[1,2] Laraine L. Washer,[3,4] Keith S. Kaye,[4] Kristen Gibson,[1] Sanjay Saint,[5,6] Katherine Reyes,[7] Marco Cassone,[1] Julia Mantey,[1] Jie Cao,[1] Sarah Altamimi,[7] Mary Perri,[7] Hugo Sax,[8] Vineet Chopra,[5,6] and Marcus Zervos[7]

Multidrug-resistant Organisms in Hospitals: What Is on Patient ...https://academic.oup.com › cid › advance-article › doi › cid › ciz092

[1]Department of Internal Medicine, Division of Geriatric and Palliative Medicine, University of Michigan Medical School, [2]Geriatrics Research Education and Clinical Center, Veterans Affairs Ann Arbor Healthcare System, [3]Department of Infection Prevention and Epidemiology, Michigan Medicine, [4]Department of Internal Medicine, Division of Infectious Diseases, University of Michigan Health System, [5]Patient Safety Enhancement Program and Center for Clinical Management Research, Veterans Affairs Ann Arbor Healthcare System, and [6]Division of Hospital Medicine, Department of Medicine, University of Michigan Health System, Ann Arbor, and [7]Division of Infectious Diseases, Henry Ford Health System, Detroit, Michigan; and [8]Division of Infectious Diseases and Hospital Epidemiology, University Hospital Zurich, University of Zurich, Switzerland

Background. The impact of healthcare personnel hand contamination in multidrug-resistant organism (MDRO) transmission is important and well studied; however, the role of patient hand contamination needs to be characterized further.

Methods. Patients from 2 hospitals in southeast Michigan were recruited within 24 hours of arrival to their room and followed prospectively using microbial surveillance of nares, dominant hand, and 6 high-touch environmental surfaces. Sampling was performed on admission, days 3 and 7, and weekly until discharge. Paired samples of methicillin-resistant *Staphylococcus aureus* (MRSA) isolated from the patients' hand and room surfaces were evaluated for relatedness using pulsed-field gel electrophoresis and staphylococcal cassette chromosome *mec*, and Panton-Valentine leukocidin typing.

Results. A total of 399 patients (mean age, 60.8 years; 49% male) were enrolled and followed for 710 visits. Fourteen percent (n = 56/399) of patients were colonized with an MDRO at baseline; 10% (40/399) had an MDRO on their hands. Twenty-nine percent of rooms harbored an MDRO. Six percent (14/225 patients with at least 2 visits) newly acquired an MDRO on their hands during their stay. New MDRO acquisition in patients occurred at a rate of 24.6/1000 patient-days, and in rooms at a rate of 58.6/1000 patient-days. Typing demonstrated a high correlation between MRSA on patient hands and room surfaces.

Conclusions. Our data suggest that patient hand contamination with MDROs is common and correlates with contamination on high-touch room surfaces. Patient hand hygiene protocols should be considered to reduce transmission of pathogens and health-care-associated infections.

What About Mortality Risk

Mortality risk is high among patients with SSIs

- **A patient with an SSI is:**
  - **5x** more likely to be readmitted after discharge[1]
  - **2x** more likely to spend time in intensive care[1]
  - **2x** more likely to die after surgery[1]

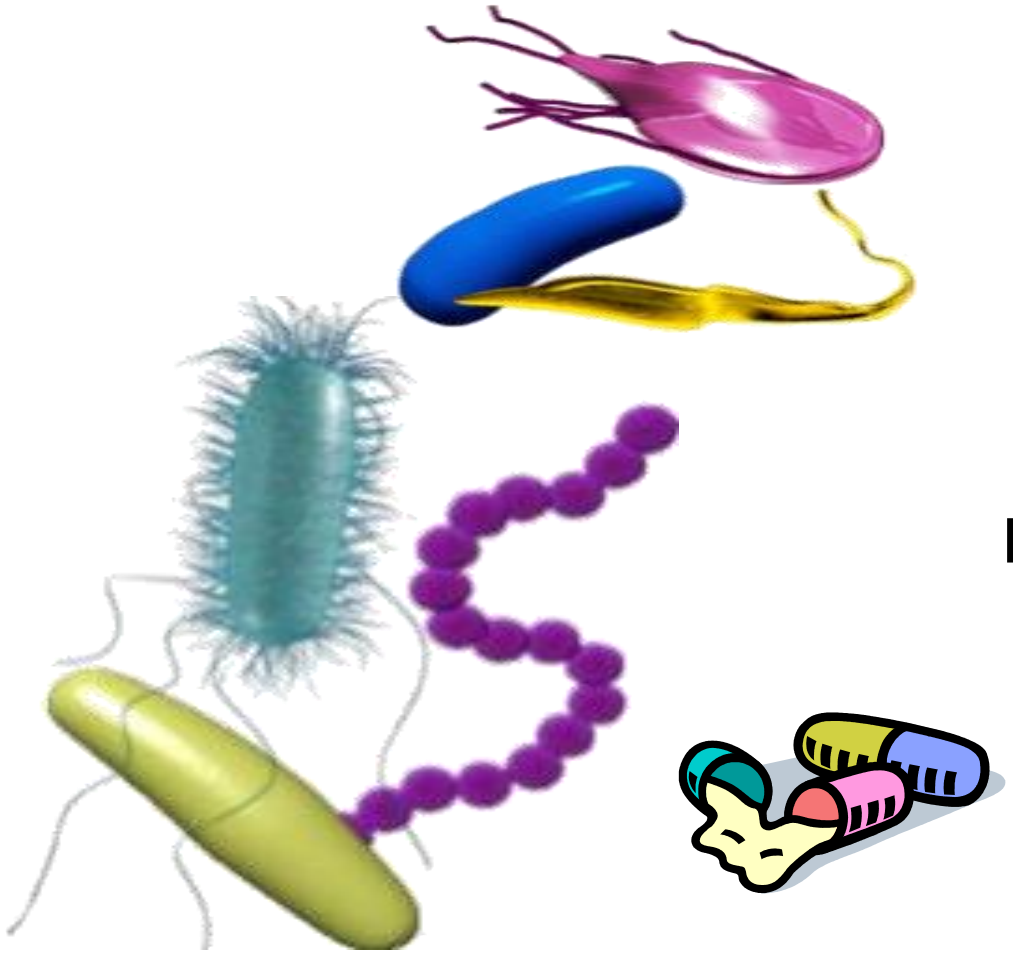
- **The mortality risk is higher when SSI is due to MRSA**
  - **A patient with MRSA is 12x more likely to die after surgery[2]**

1. *WHO Guidelines for Safe Surgery 2009*.
2. Engemann JJ et al. *Clin Infect Dis*. 2003;36:592-598.

World Health Organization

MDRO: General Definition

Ha-MDRO: Isolated after 3 calendar days of admission.



MDROs are defined as microorganisms, predominantly bacteria, that are resistant to one or more classes of antimicrobial agents.

Classes of Antimicrobial Agents

The organism is resistant to all *B*-Lactams antibiotics (all Penicillins, Cephalosporins, Carbapenems and usually resistant to most of other antimicrobial groups.

MDRO: Specific Definition

To be defined as an MDRO the organism must meet any of these criteria:

1. **MDRO-01 (MRSA):** Includes *S. aureus* cultured from any specimen that tests is resistant to: **Oxacillin, Cefoxitin, or Methicillin.**

2. **MDRO-02 (VRE):** Includes **Enterococcus Faecalis, Enterococcus Faecium, or Enterococcus Species** (regardless of whether identified to the species level).

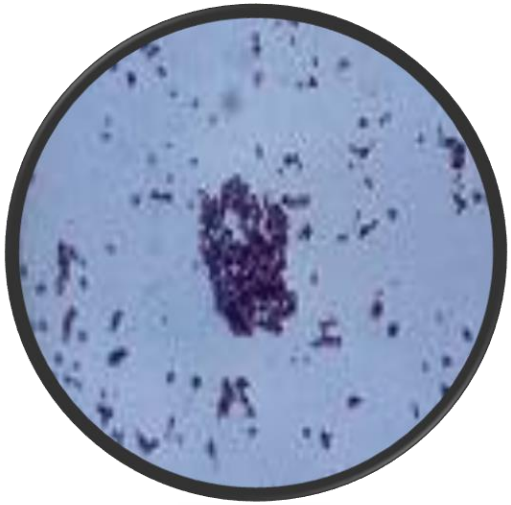
3. **MDRO-03 (CephR-Klebsiella):** Klebsiella Oxytoca or Klebsiella Pneumoniae cultured from any specimen that tests resistant at least to ONE of the following antibiotics: **Ceftazidime, Cefotaxime, Ceftriaxone, or Cefepime.**

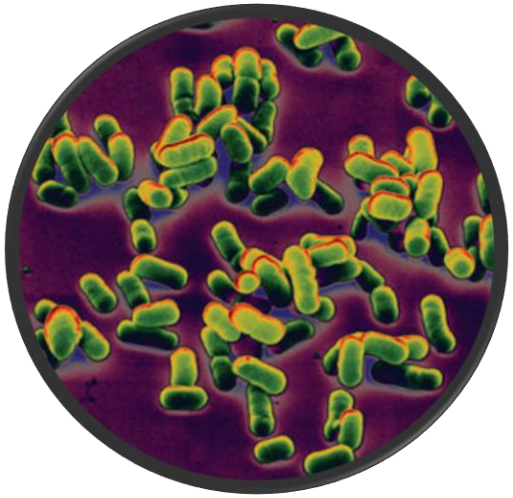
4. **MDRO-04 (Carbapenemase Producing Organisms):** Any Escherichia Coli, Klebsiella Oxytoca, Klebsiella Pneumoniae, or Enterobacter Species cultured from any specimen that tests resistant at least to ONE of the following antibiotics: **Imipenem, Meropenem, Doripenem, Ertapenem.**

2019, www.cdc.gov/nhsn/PDFs/pscManual/12pscMDRO_CDADcurrent.pdf,

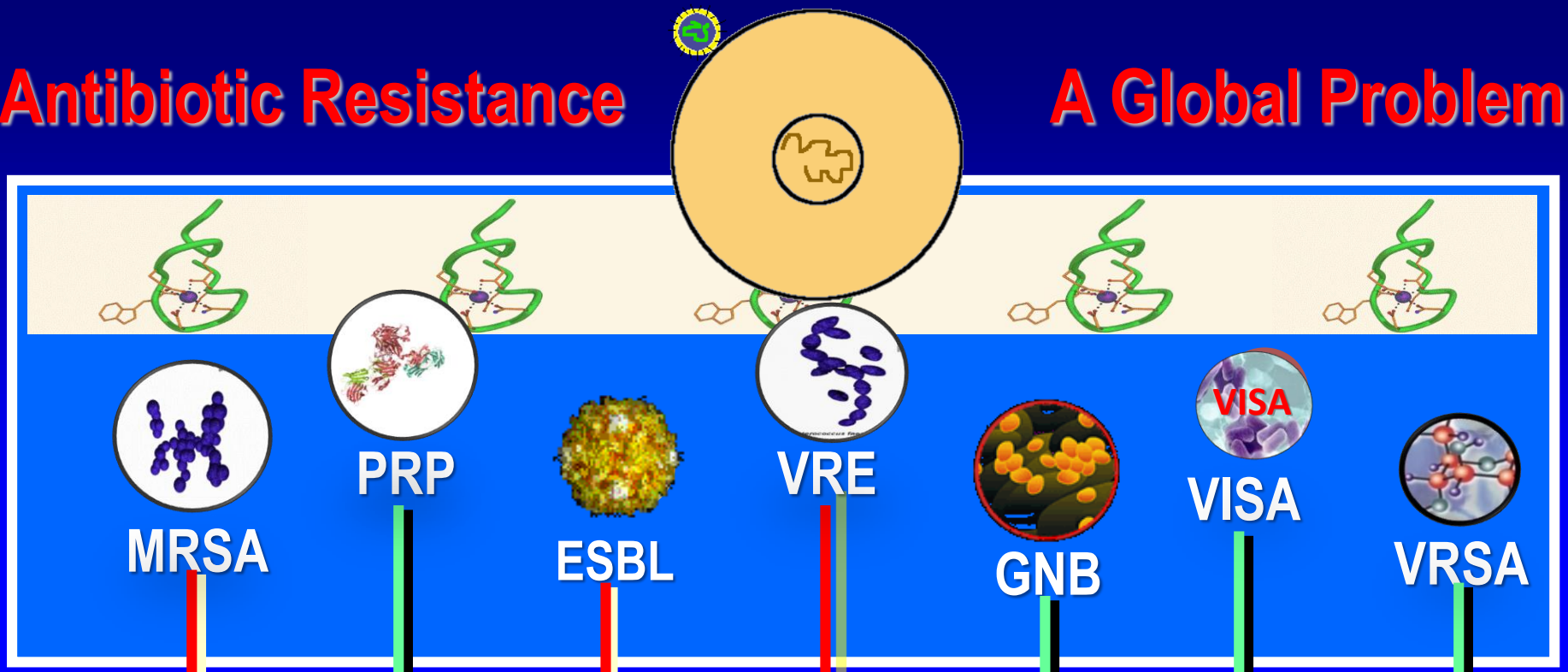
MDRO: Types

Common examples of MDROs of clinical concern include





Antibiotic Resistance A Global Problem



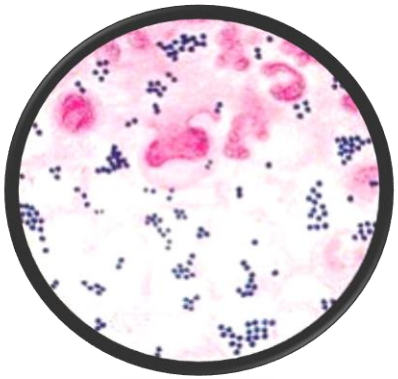
Emergence → Spread

MDRO: Staphylococcus Aureus :

- **Staphylococcus** is a group of bacteria that can cause a number of diseases as a result of infection.

- **Staphylococcus** comes from two Creek wards:
  - **Staphyle** : Meaning a Cluster of Grapes
  - **Kokkos** : Meaning Berry
- **Aureus** : Comes from the Latin word, **meaning** "**gold**

- **Over 30 different types of Staphylococci can infect humans, but most infections are caused by Staphylococcus Aureus**

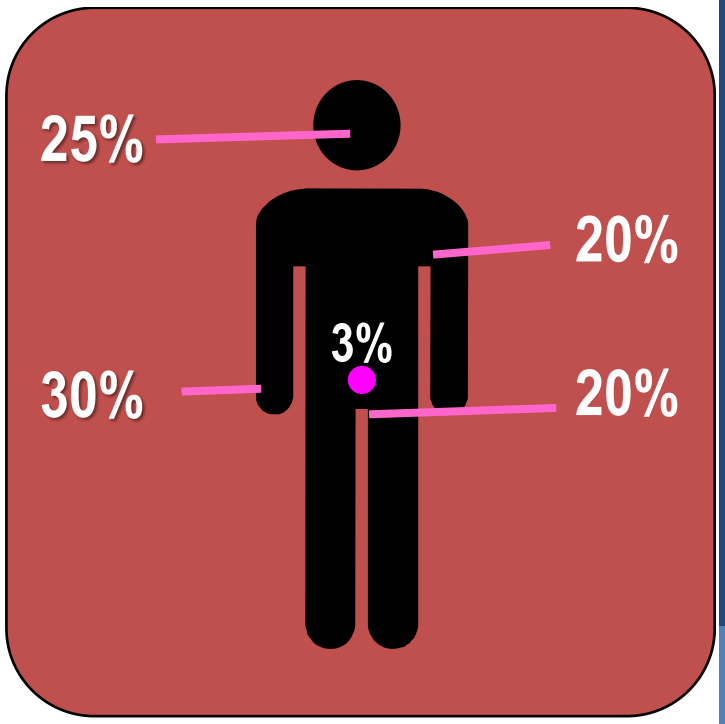


S. Albus,
S. Aureus,
S. Epidermidis,
S. Sapro-phyticus,

What is Staphylococcus Aureus

Sometimes referred to as a "Superbug"

Staphylococcus Aureus (S/A) is a normal flora, which can be found through out the nature & they thrive in moist, warm places & colonizing the anterior nares, hands, throat, axilla, forehead & perineum.

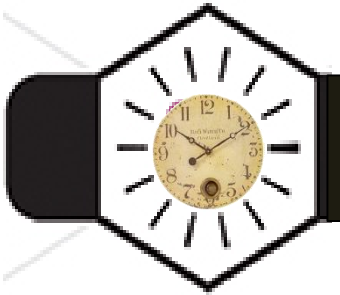


Frequency of Colonization at Various Body Sites

MDRO: Staphylococcus Aureus :

"Spider Bites" or "bug bites"

- S/A is a gm +ve bacterium, Non-Motile, Spherical and well known for its role in hospital acquired infection.
- 25 to 30% of the individuals are permanent carrier of S/A.
- 1% of people are carriers of MRSA
- Health care workers (HCW) have a higher Staphylococcus Aureus nasal carriage rate (50% to 90%) than the general population.

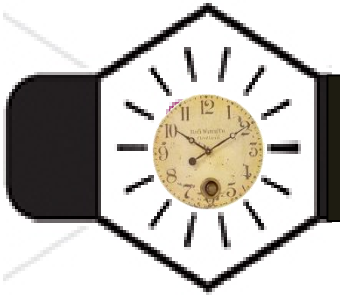


MDRO: History

- In 1880, Staphylococcus aureus was identified for the first time by a surgeon, Alexander Ogston

- In 1896, , Penicillin discovered initially by a French medical student, Ernest Duchesne, in 1896, and then rediscovered by Scottish physician Alexander Fleming in 1928

- In 1940's, Penicillin was introduced for the treatment of Staphylococcus aureus.



MDRO: History Cont'd

- **In 1944,** Resistance to antimicrobial agents has been recorded since 1944 with penicillin resistant Escherichia coli (PREC)

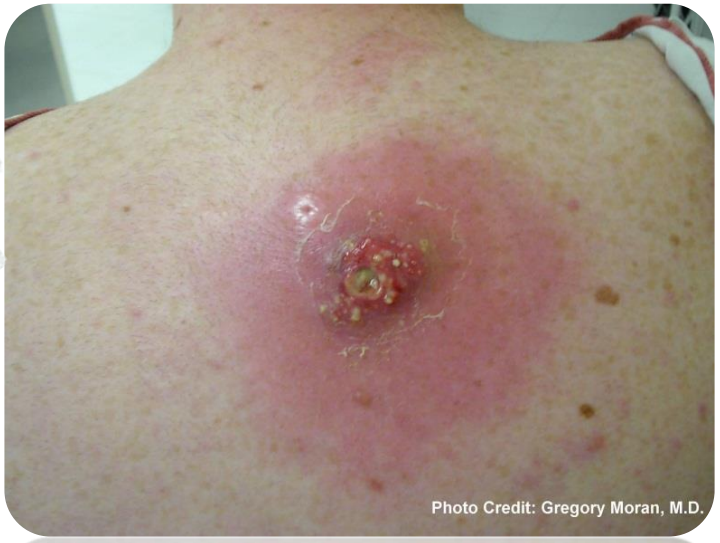
- **By 1950's,** Multi strain of Staph aureus had developed resistant to Penicillin. This resistance was caused by an enzyme called *B-Lactamase* (Pencillinase)

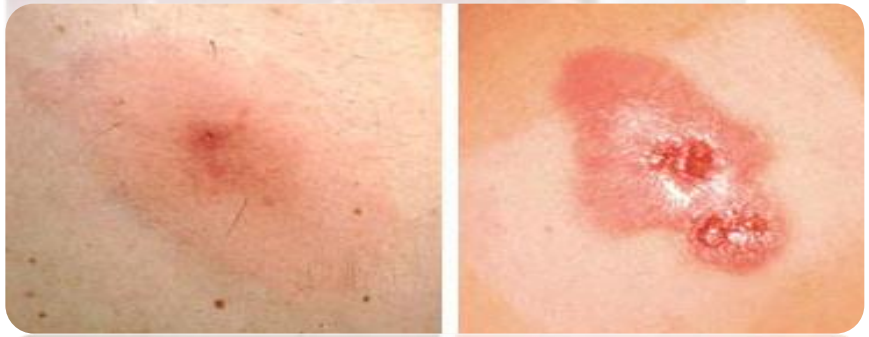
- **In 1959,** Methicillin (a penicillinase stable agent) was introduced for the first time.

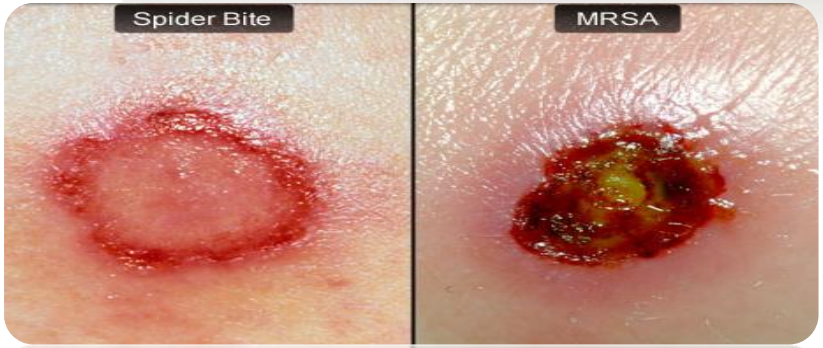
- **By 1961,** The first isolate of MRSA was reported in UK, France, and Denmark.

Diagnosis

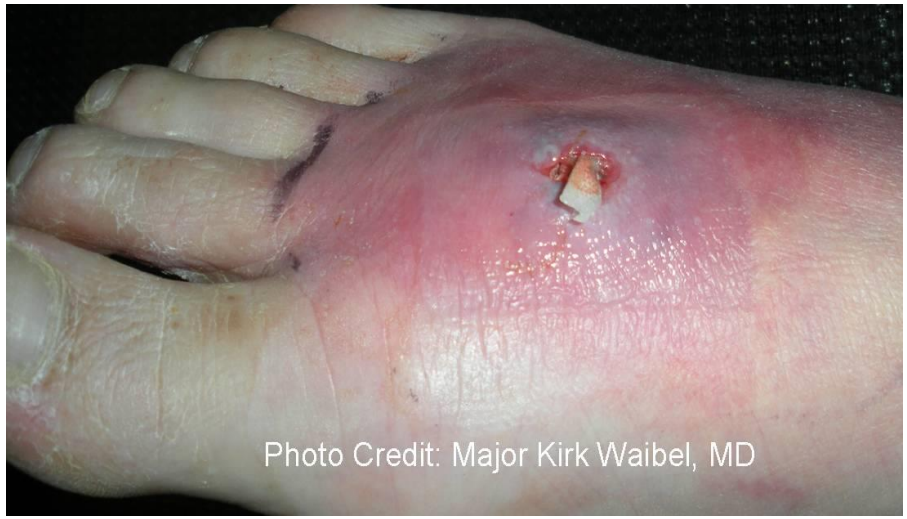
Generally start as small red bumps that resemble pimples, swollen, painful, boils or spider bites or have pus or other drainage

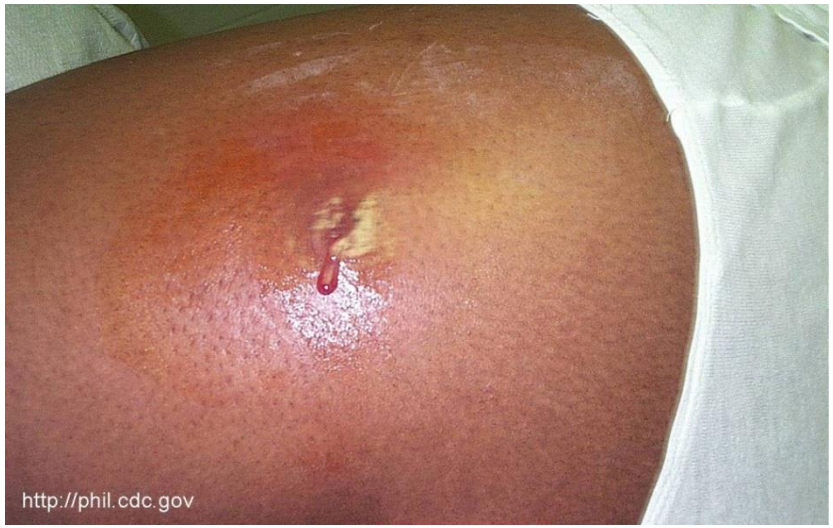


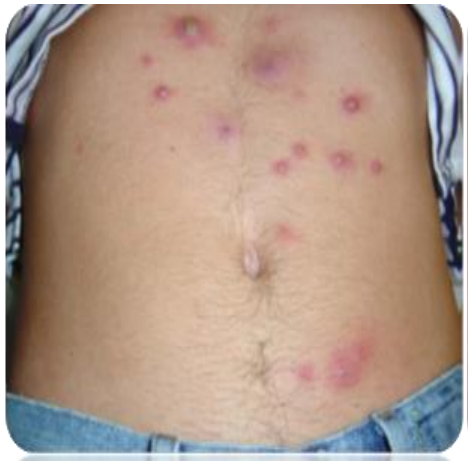


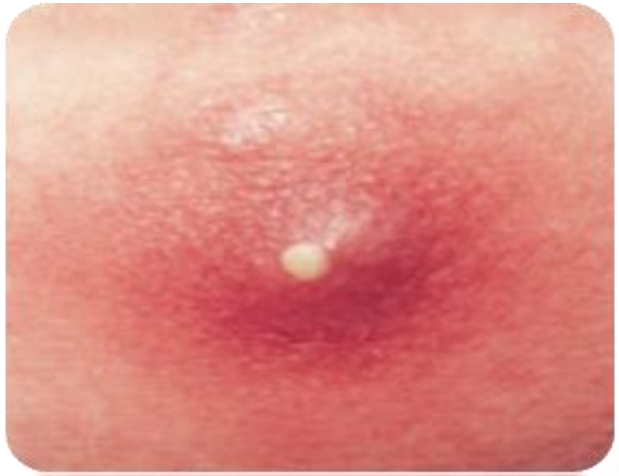


Cutaneous Abscess Caused by MRSA





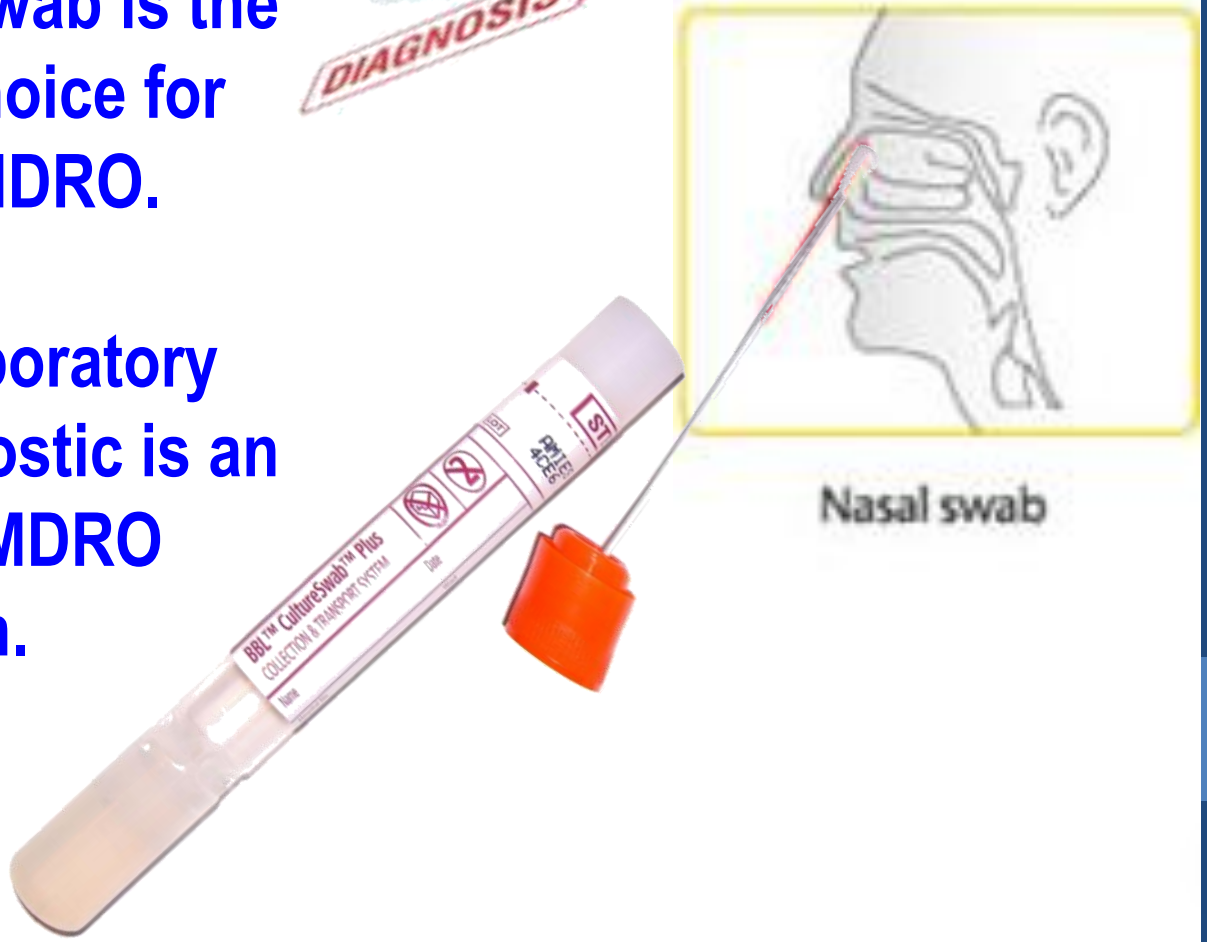




Diagnosis

Nasal \ Wound Swab is the specimen of choice for confirming MDRO.

A case with laboratory confirmed diagnostic is an evidence of MDRO infection.

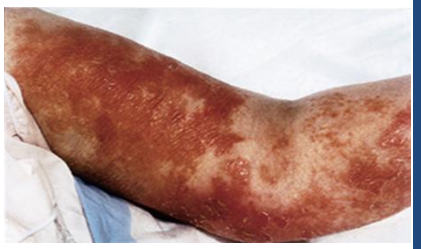


Complications

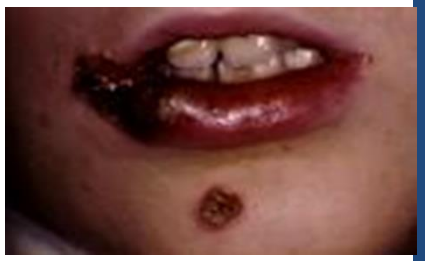
In healthcare facilities, such as a hospital or nursing home, MRSA can cause severe

Pneumonia, Endocarditis, Oesteomylitis, Sepsis, TSS, BSI, SSI

TSS

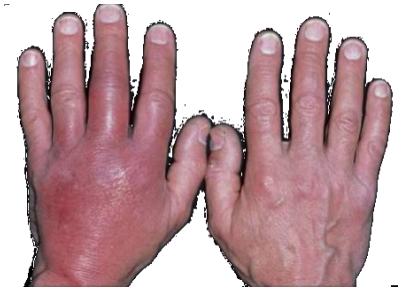


- **Food poisoning (Production of toxin)**



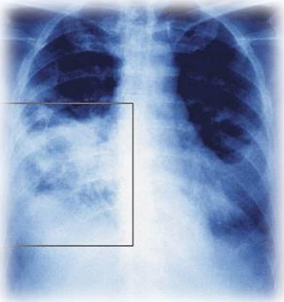
Impetigo

- **Cellulitis**



- **Death**

Pneumonia

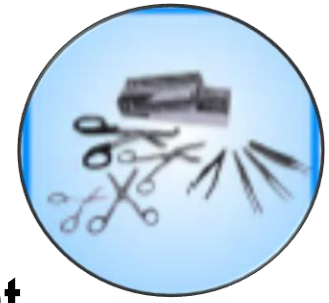


https://www.cdc.gov/mrsa/healthcare/index.html

Transmission Mode

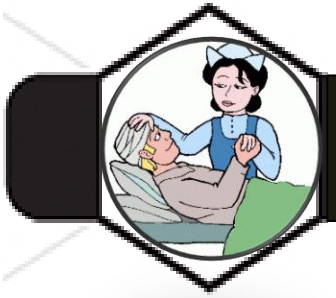
Spread By:

- **Contact**
  - Hands; Contaminated equipment



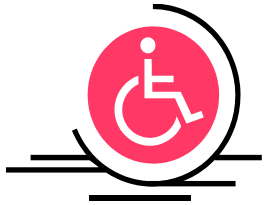
- **Airborne**
  - Skin scales; Dust

- **Ingestion**
  - Contaminated food

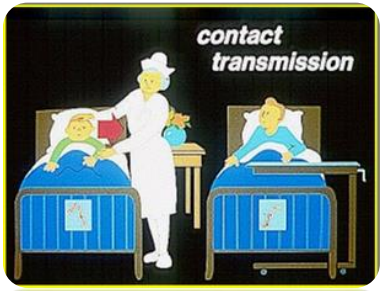


Implication of MDRO

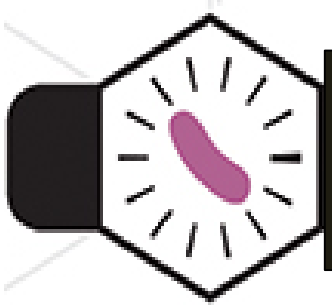
- **Increase hospital stay**
  - Average 3-5 additional days
- **Increase hospital costs**
- **Increase morbidity and mortality**



MDRO: Source/Causes of Infection



- The continuous of Tr. In patients.
- The frequent use of antibiotics.
- Shortage of staff.
- Poor hand washing
- Cleaning process.
- Instrument/Equipment

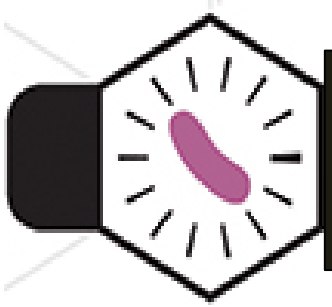


For How Long Can MRSA Survive in Environment

- MRSA can survive on some surfaces for hours, days or even months. Depends on temperature, humidity, the amount of germs present, type of surface, etc.
  - CDC (2008). Environmental Management of Staph and MRSA in Community Settings

- MRSA survived more than 38 weeks on environmental surfaces such as door knobs, keyboards, telephones, even sterile goods packaging.
  - Dietz B, et al Survival of MRSA on sterile goods packaging J Hosp Infect 2001:49 255-261

- Staph recovered for 1-56 days after contamination.
  MRSA survived 9-11 days on plastic patient chart, laminated table-top and cloth curtain.
  - Huang, Mehta, Weed, & Price (2006) ICHE



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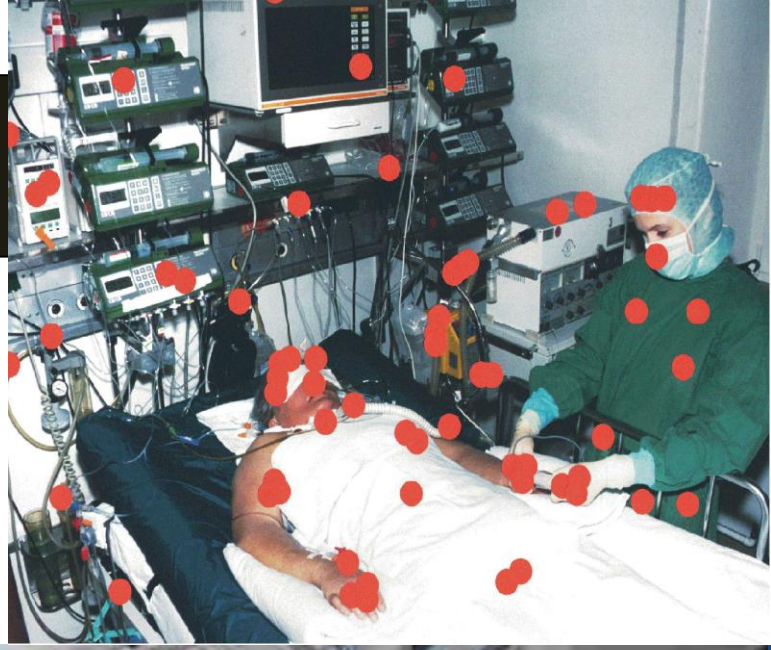
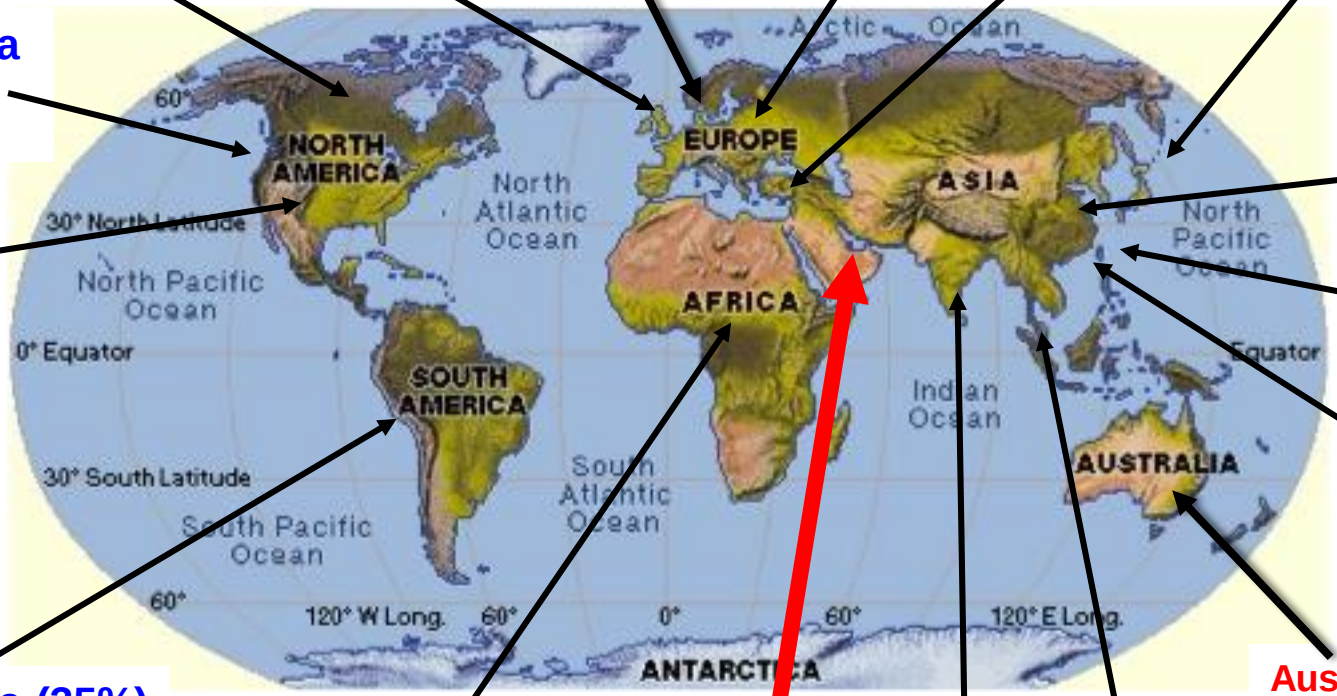
Contaminated hand & surfaces increase cross-transmission



MRSA

Prevalence of Ha-MDRO: World-Wide



Canada (2%)

UK (44%)
(EARSS 05)

(<2%)Denmark
Nertherlands
Sweden
Norway
(EARSS 05)

Europe (29%)
(Sentry 2000)

Turkey (66%)
(2004)

Japan
(74%)

North America
(39%)
(2002 SENTRY)

USA (64%)
(NNISS ICU 03)

China (39%)

Taiwan (61%)

Hong
Kong
(80%)

Australia
(30%)

Singapore
(63%)

India (34%)

Abu Dhabi
(31.2%)

Africa
Nigeria (21%)
Zimbabwe (43%)
South Africa (49%)

Latin America (35%)
(2002 SENTRY)

undated data from pre 2003 papers and EARSS 2005

JCI, MMU.1.1:
Antimicrobial Stewardship Program

NEW!

PCI.6.1

Each hospital has to develop and implement a program for the prudent use of antibiotics based on the principle of antibiotic stewardship.

JCI, MMU.1.1:
Antimicrobial Stewardship Program

What to Have

1. 2017 AMS Program
2. AMS Terms Of Reference
3. P&P ICM-000 Antibiotics Prescribing P
4. P&P ICM-017 Antimicrobial

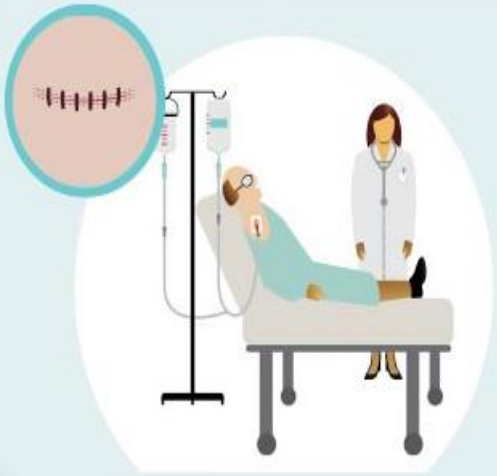
5. Overview of CDC Core Elements

5.1 Core Element 1: Leadership Commitment
5.2 Core Element 2: Accountability
5.3 Core Element 3: Drug Expertise
5.4 Core Element 4: Actions to Support Optimal Antibiotic Use
5.5 Core Element 5: Tracking and Monitoring Antibiotic Prescribing, Use, and Resistance
5.6 Core Element 6: Reporting Information on Improving Antibiotic Use and Resistance
5.7 Core Element 7: Education of Clinicians and Patients and Families

MDRO & Action Plan

- Call for ward meeting & Explain.
- Identify and Isolate the patient.
- Minimize all HCW movement to other units.
- Hand washing
- Use PPE.
- Treatment Protocol.
- Dedicated medical equipment in the patient's room.
- Good disinfection of used instrument.
- Linen (treated as infected materials).
- Clinical waste are discarded in a clinical waste bag
- Visitors were restricted.
- Educate patient and his relatives.
- Notifying other side before transferring of patient.
- Good Terminal Disinfection (T.D.).

How to protect Pts from MDRO Infections?



Surgeries and single-use catheters help treat patients, but they can be pathways for bacteria to enter the body.

Bacteria can be spread when appropriate infection control actions are not taken.

Antibiotics save lives, but poor prescribing practices puts patients at risk.

Combine infection control actions with every patient to prevent infections in health care.

Prevent infections from catheters and after surgery. +

Prevent bacteria from spreading. +

Improve antibiotic use.

SOURCE: CDC Vital Signs, March 2016

Conclusion: MDRO infection is serious and should not be ignored

SHEA Urges Increased Focus on Preventing Superbugs

March 14, 2019

SHEA
The Society for Healthcare Epidemiology of America

Progress against methicillin-resistant Staphylococcus aureus (MRSA) infections has slowed in hospitals, while methicillin-susceptible Staphylococcus aureus (MSSA) is increasing in communities.

SHEA's recommendations to prevent the spread of HAIs include:

- Conduct an MRSA risk assessment
- Implement an MRSA monitoring program and track rates
- Ensure compliance with hand hygiene recommendations
- Ensure proper cleaning and disinfection of equipment and the environment
- Educate healthcare personnel, patients, and families about MRSA
- Implement an alert system

https://www.psqh.com/news/shea-urges-increased-focus-on-preventing-superbugs/

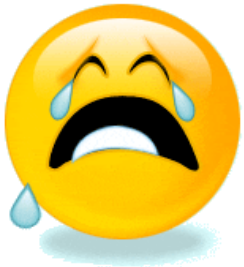
Finally

Hospital

+

Pathogen

=



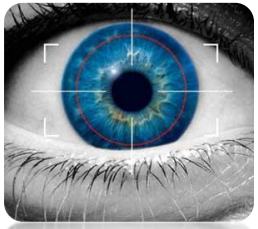
HAI & Un-Happy patients

+

Un-Happy Director

Hospital

+



Surveillance

=

No Infection & Happy Patients

+

Happy Director

MRSA

References

1. 1996, UAE, Policy, Procedures And Guidelines For The Detection, Control And Management Of MRSA In The UAE. MOH, UAE. 1996.

2. 2006, (Edited 2017) CDC Management of Multi Drug Resistant Organisms In the Healthcare Setting. https://www.cdc.gov/infectioncontrol/pdf/guidelines/mdro-guidelines.pd

3. 2007, CDC Guidelines for MDRO prevention in long-term care. Hospital Infection Control https://www.cdc.gov/infectioncontrol/guidelines/mdro/prevention-control.html

5. 2008, CDC, Environmental Management of Staph and MRSA in Community Settings. http://www.cdc.gov/ncidod/dhqp/ar_mrsa_Enviro_Manage.html 5/14/2010

6. 2019, NHSN of CDC System, Medication-associated Module “Chapter No.: 12, MDRO & CDI. https://www.cdc.gov/nhsn/PDFs/pscManual/12pscMDRO_CDADcurrent.pdf

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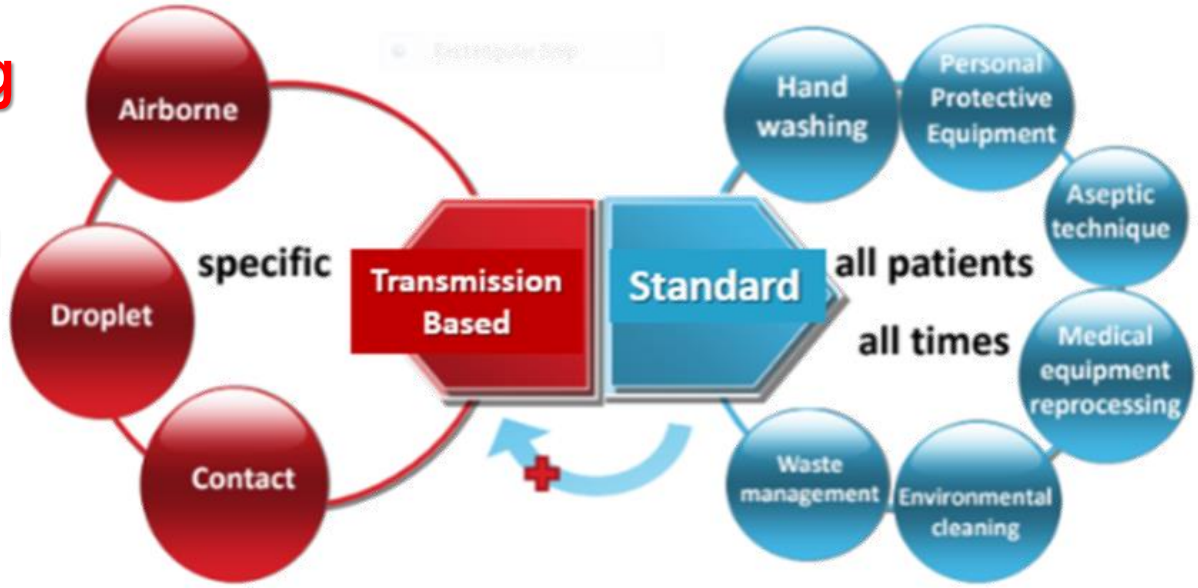
Screening Guidelines:

Nasal and wound swabs from: All risk factor group, as well as from the nasal and hands of all those in contact with positive MRSA patients, Transferred In Patients, Staff who have visited an outside hospital where known to have an outbreak of MRSA recently, **by using Peptone-water moist-ended swabs**.

Isolation: Private Room or Cohort

Isolating and caring for all positives cases of MRSA in single rooms by implementing Contact Precautions:



1. Gloves & Gown to enter patient room.
2. Mask to be used if MRSA isolated from the sputum or/& the patient is coughing or has tracheostomy.
3. Isolate on Re-admission.

Treatment Protocol:

- A daily **bath** / shower.
- **Dressing** to be done last.
- Usage of **Antibiotic**:

A. Topically → (Fucidin , Bactroban)

B. Systemically → [Vancomycin, OR Teichoplanin,

OR

Linezolid
(Zyvox 600 mg BD x 10-14 Days)
OR
Daptomycin (Cubicin)]

PENICILLINS

A. **Aqueous Penicillin G,** Procaine Penicillin G, Penicillin V (oral) and Benzathine Penicillin G (long acting).

B. **Penicellinase Resistant Penicillins:** Oxacillin, Nafcillin, Methicillin, Cloxacillin & Dicloxacillin

C. **Broad Spectrum or Second Generation Penicillins:** Ampicillin and Amoxicillin.

D. **Third Generation Penicillins:** Carbenicillin and Ticarcillin.

E. **Fourth Generation Penicillins:** Piperacillin and Azlocillin.

F. **Combined Penicillin and Anti *B*-lactam Agent:** Augmentin and Tazocin.

Cephalosporins

A. **First Generation Cephalosporin:** Cephalothin (keflin), Cefazolin (kefzol), Cephradine (Velosef), Cephapirin (Cefadyl) And Cephalexin (Keflex).

B. **Second Generation Cephalosporin:** Cefaclor (Ceclor), Cefoxitin [a Cephamycin similar to Cephalosporin (Mefoxin)] & Cefuroxime (Zinacef or Zinat).

C. **Third Generation Cephalosporin:** Cefotaxime (*Claforan*), Ceftriaxone (*Rocephin*), Ceftazidime (Fortum) and Cefixime (Suprax).

D. **Fourth Generation Cephalosporin :** Cefipime (Maxipime)

Carbapenems

Broad spectrum agents

Imipenem/Cilastatin (Teinam), Meropenem (Meronem), Doripenem, Ertapenem.

OTHER ANTIMICROBIAL

1. **Aminoglycosides** (Amikin, Genta.).

2. **Quinolones** (Cipro., Levo., Moxi-floxacin).

3. **Macrolides** (Erythromicin).

4. **Clindamycin.**

Terminal Disinfection

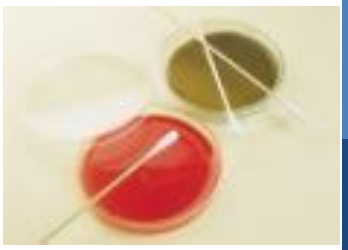
1. Must be done after discharging any MRSA case.

2. Clean all surfaces thoroughly with 1% Chlorine (Achti-chlor or Presept) or Quaternary Ammonium (DDSH) or with Peroxygen Compounds Surfactant (Virkon).

3. Curtains and bedding should be laundered.

4. Check the room for removal of all dust and dirt visibly and bacteriologically.

By using Peptone-water moist-ended swabs.



WHAT IS GNB?

The first isolate of GNB was reported in USA in 1988.

COLIFORMS

Ther are approx. 24 genera of coliforms belonging to the family of Entrobacteriaceae,

Such as:

Klebsiella, E. Coli, Enterobacter, Citrobacter, Morganella, Serritia, Proteus, Salmonella, Shigella, Yersinia,

and Providencia

PSEUDOMONAS

(Non-Fermenters)

Ther are approx. 17 genera which belonging to the family of PSEUDOMONAS

Such as:

Xanthomonas (Stenotrophomonas Maltophilia) , Acinetobacter, Alcaligenes, Agrobacterium, Flavobacterium, Pseudomonas, Ralstonia Pikettii and Burkholderia Cepacia

WHAT IS VISA & VRSA?

Staphylococcus Aureus bacteria are classified as VISA or VRSA based on special laboratory tests,

which will see how much of Vancomycine treatment will take to hold back the growth of the organism.

VISA

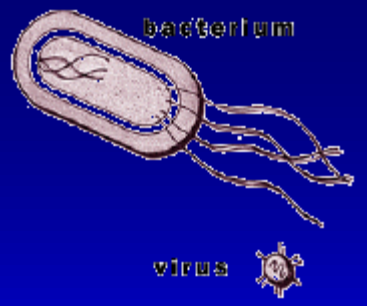
S/A bacteria can be classified as VISA if the MIC for Vancomycin is 8–16ug/m

- **VISA Means: Vancomycine Intermediate Staphylococcus Aureus.**
- **It is also termed GISA (glycopeptide-intermediate *Staphylococcus aureus*)**
- **The first VISA strains appeared in 1996, in Japan.**

VRSA

S/A bacteria can beclassified as VRSA if the MIC for Vancomycin is = > 32ug/m

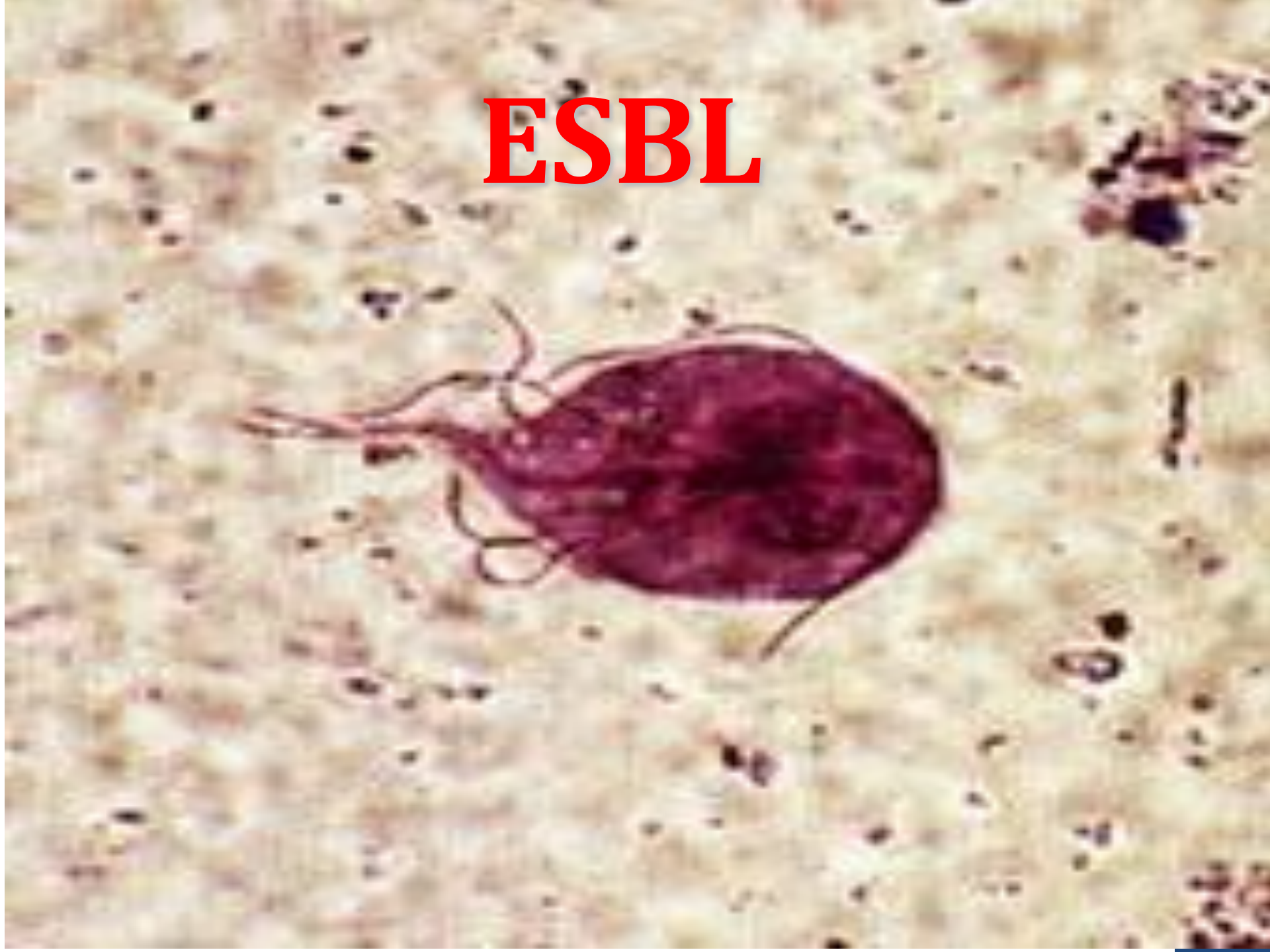
- **VRSA Means: Vancomycine Resistant Staphylococcus Aureus.**
- **It is also termed GRSA (glycopeptide-Resistant *Staphylococcus aureus*)**
- **The first VRSA strains appeared in 2002, in USA.**



PRP

- PRP Means: Pencillin Resistant Pneumococci
- *Streptococcus pneumoniae* is one of the major pathogens causing invasive disease and respiratory tract infections worldwide.
- Risk groups for pneumococcal infections are young children, the elderly, and immunodeficient patients.
- Nasopharyngeal colonization with pneumococci is common
- Morbidity and mortality due to pneumococcal disease is high
- The first PRP strains appeared in 1967, in Papua New Guinea .

ESBL



WHAT IS ESBL?

ESBL means: Extended Spectrum Beta Lactamase,

which are enzymes that have developed a resistance to antibiotics like penicillin.

- **According to the Clinical Laboratory Standards Institute (CLSI), the only two bacteria – Escherichia coli (E. coli) and Klebsiella pneumonia have been recognized as ESBL producers.**
- **An infection caused by an ESBL-producing bacterium is often referred to as "ESBL infection". It can be completely harmless in the healthy, but cause infection in the immunocompromised.**
- **The first ESBL strains appeared in 1983, in USA.**


VRE

WHAT IS ENTEROCOCCI?

⇨ **VRE means:**

Vancomycine Resistant Enterococci Feacalis

Enterococci are a group of gm +ve bacterium and closely related to *Staphylococcus* species, but they are less virulent than SA.

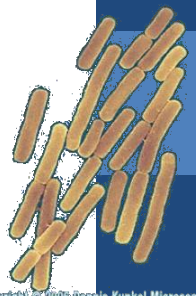
WHAT IS VRE?

- **Normal flora that may cause disease especially in vulnerable populations:**
  - Eg elderly, children and immunocompromised patients.
- **The first VRE strains appeared in 1986 in England and France and then another in 1988 in the USA.**
- **Currently about 25 percent of Enterococci isolated in U.S. hospitals are VRE & most of them are in ICU.**
- **Present in human body such as urinary tract and GI tract**
- **VRE can live on surfaces for up to 7 days!!!**

PSG No. 5: Reduce Risk of HAI

Clostridium difficile

- *Clostridium difficile* (*C. diff*) is a gram positive bacteria of the clostridium genus.
- Contagious- especially in hospitals through contact
- Responsible for Clostridium difficile Infection (CDI)
  - Infections include:
    - Uncomplicated diarrhea (CDAD)
    - Toxic megacolon
    - Pseudomembranous colitis
- These diseases can lead to fulminant sepsis and death



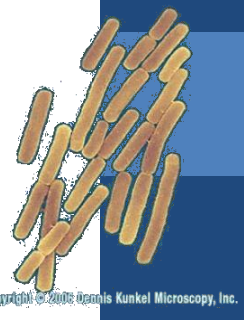
C. Diff is a gram positive rod of clostridium species

ridium difficile

- **3-4%of population is colonized with C.diff in their GI tract**
- **15-70%of healthy neonates (<1yo) are colonized w/ C.diff**
- **20-30%hospitalized patients are colonized**

Positive Environmental Cultures

- Hospital rooms w/o recent *C. diffpatients* ***2.6% to 8% of surfaces***
- Rooms where there have been patients with asymptomatic *C. diffcolonization****7% to 29% of surfaces***
- Rooms where the patient has active diarrhea**20% to almost 50% of surfaces**



Other Drug Resistant Diseases

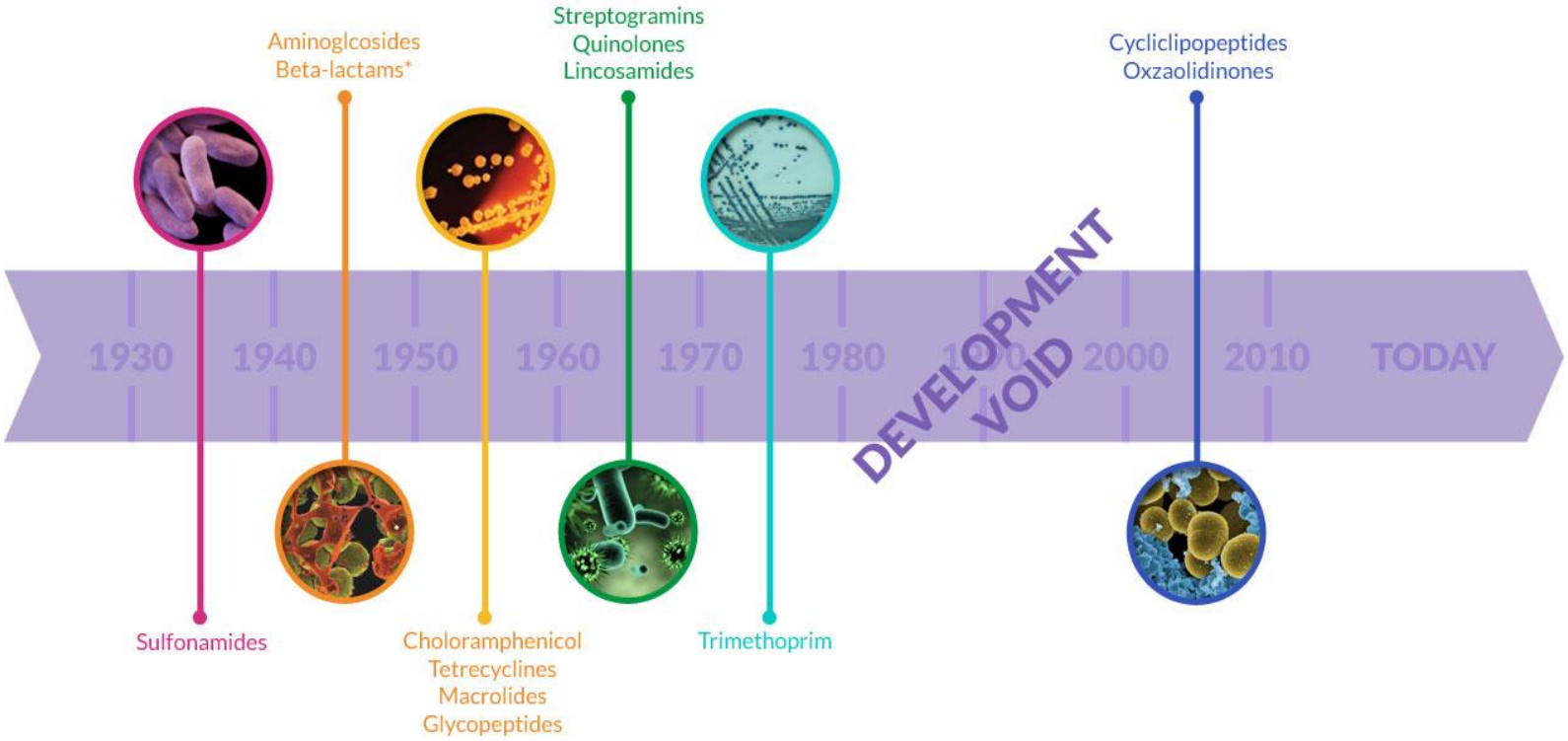
- **Extensively-Drug Resistant Tuberculosis (XDR-TB)**
  - This is a TB causing organism that is resistant to almost all drugs that are used to treat TB.
    - Isoniazid
    - Rifampin
    - Fluoroquinolones
    - At least one of: Amikacin, kanamycin, capreomycin
  - The main cuasitive organism is M*ycobacterium tuberculosis*[3]
  - *Contagious through droplets but slower than viral infection such as flu*

Beta-Lactamases: What are they ?

- Enzymes produced by certain bacteria that provide resistance to certain antibiotics
- Produced by both gram positive and gram negative bacteria
- Found on both chromosomes and plasmids

Beta-lactamases

- Are primary mode of resistance to beta-lactam antibiotics
- Produced by some gram positive bacteria and virtually all gram negative bacteria



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