Antimicrobial Resistance and Infection Control: Practical Considerations in Resource-Limited Settings

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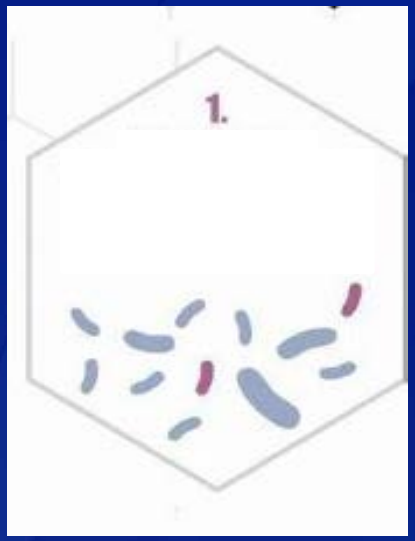
National Center for Emerging and Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion

Outline

- How resistance happens and spreads
- Major antimicrobial resistant (AMR) organisms in healthcare settings
- Prevention and control
- Practical considerations
  - Surveillance
  - Infection control precautions
  - Antimicrobial stewardship
- Summary

How Resistance Happens

- Resistance is accelerated by use of antimicrobials
- Resistant strains survive and multiply



CDC. Antibiotic Resistance Threats in the United States, 2013. Atlanta, GA; 2013

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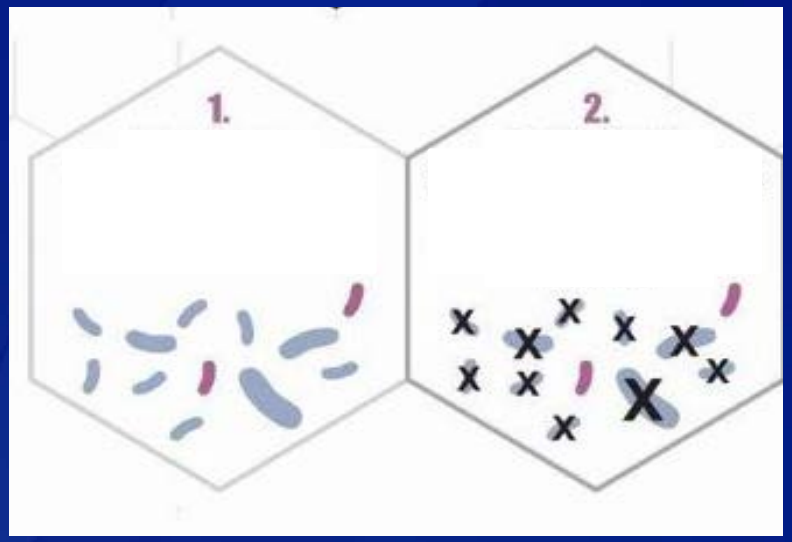

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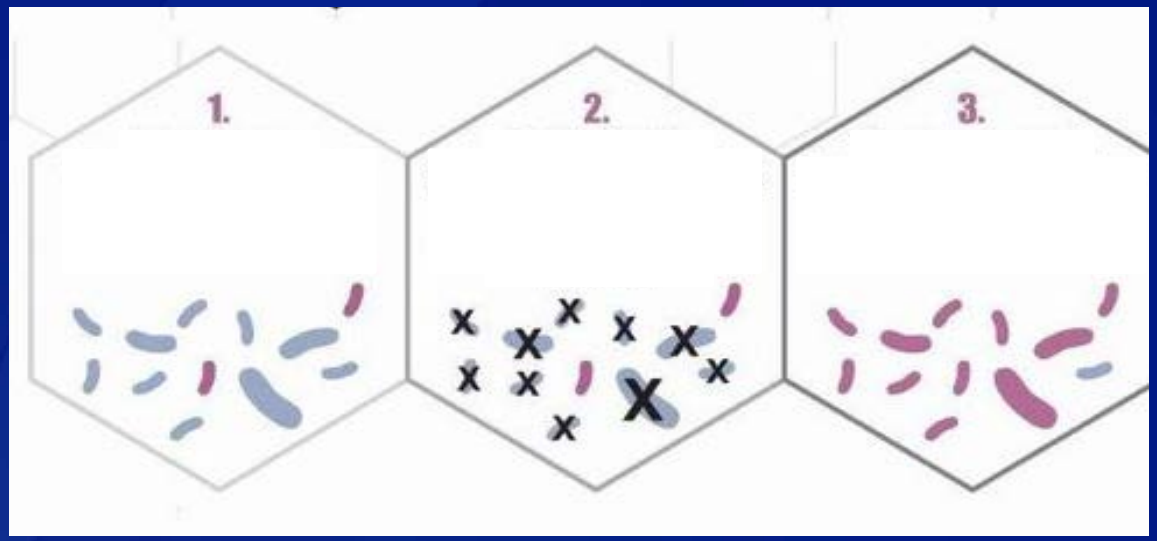

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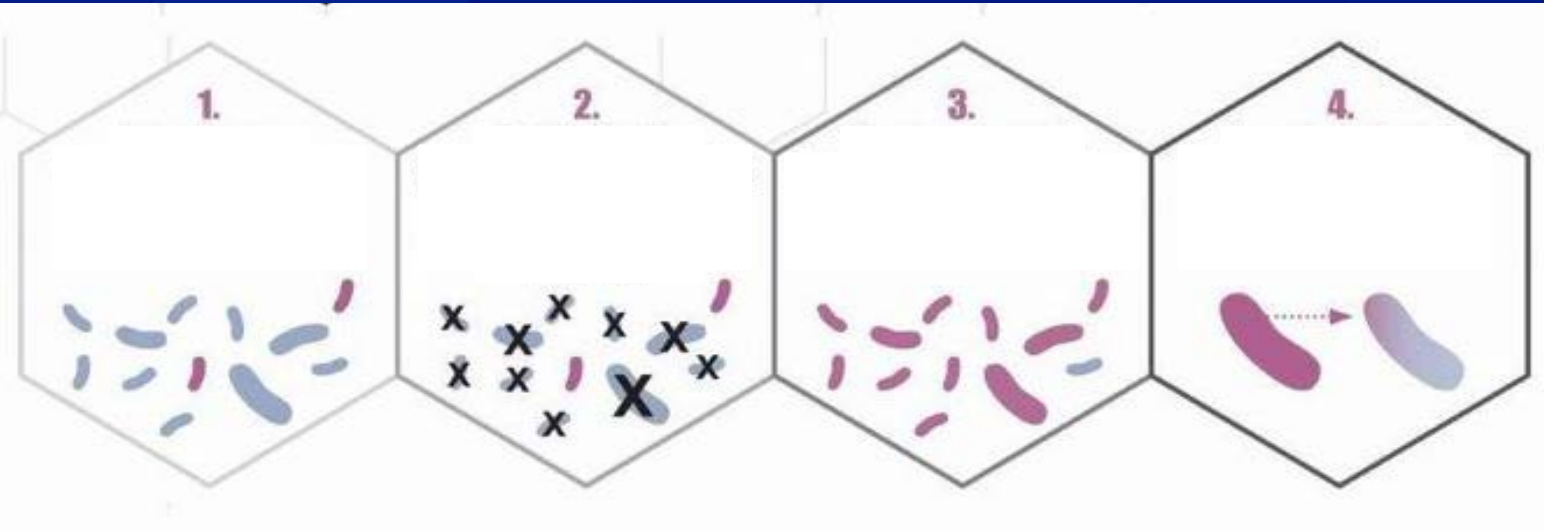
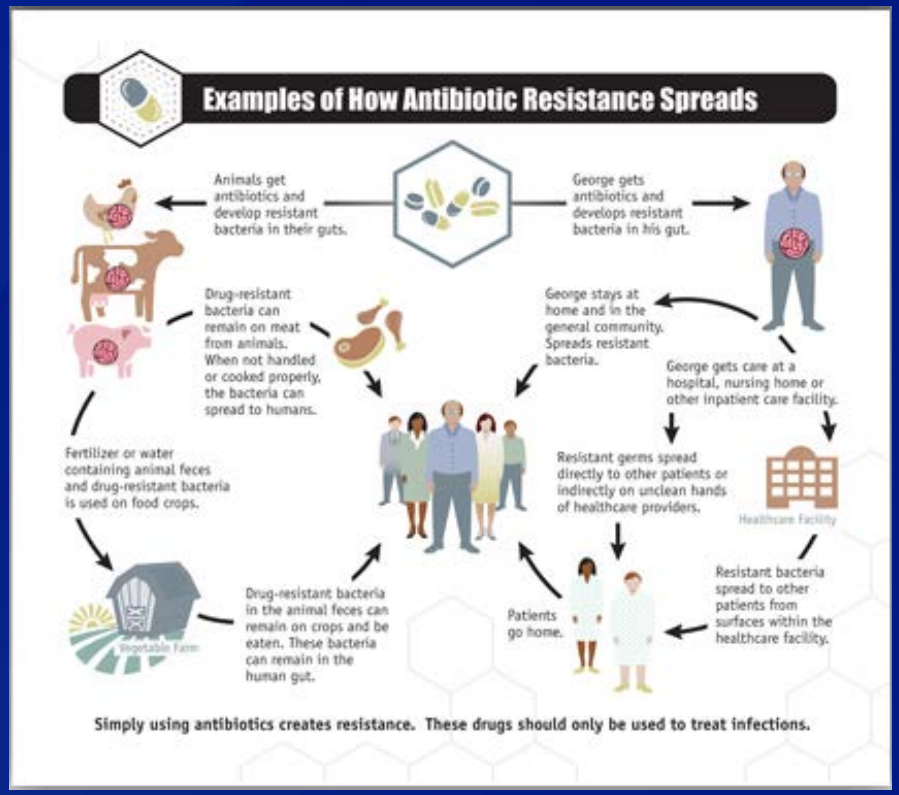


CDC. Antibiotic Resistance Threats in the United States, 2013. Atlanta, GA; 2013

How Resistance Spreads

- **Community—most cases** ⟷ **Healthcare settings—most deaths**



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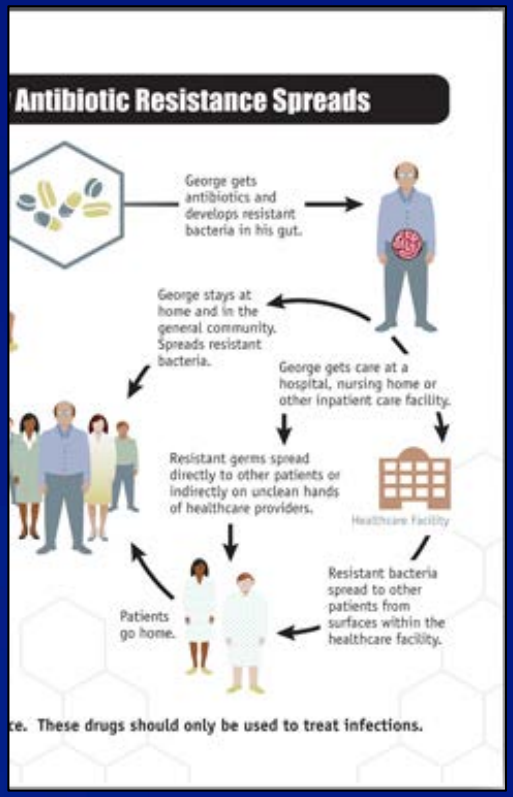
AMR and Infection Prevention and Control (IPC)

- **Healthcare settings**



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AMR in Healthcare Settings

- **Methicillin-resistant *Staphylococcus aureus* (MRSA)**
  - **Infections: blood stream, pneumonia and surgical site**

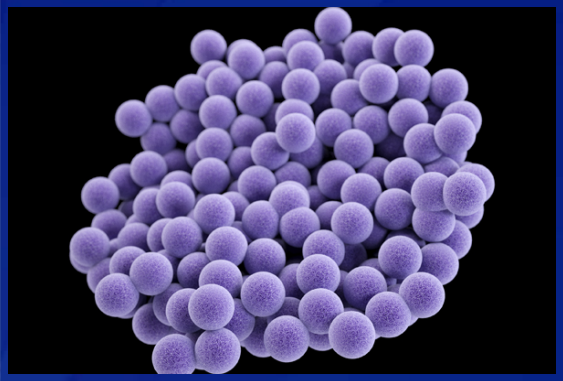
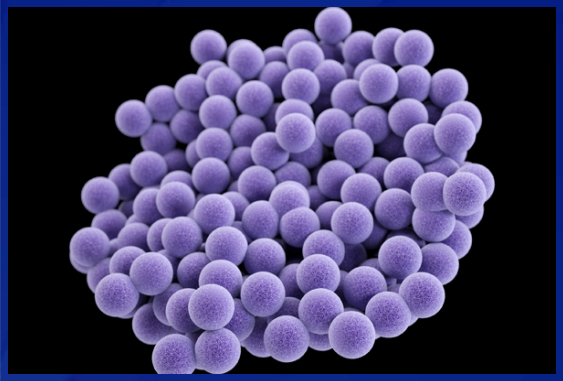
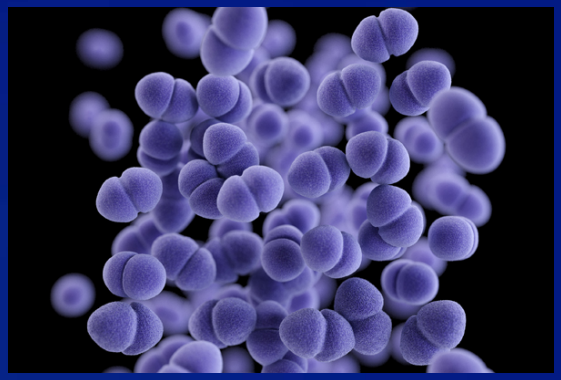


Image: http://www.cdc.gov/media/dpk/2013/dpk-untreatable.html

AMR in Healthcare Settings

- Methicillin-resistant *Staphylococcus aureus* (MRSA)
- Vancomycin-resistant Enterococcus (VRE)
  - Infections: urinary tract, bloodstream, or wound





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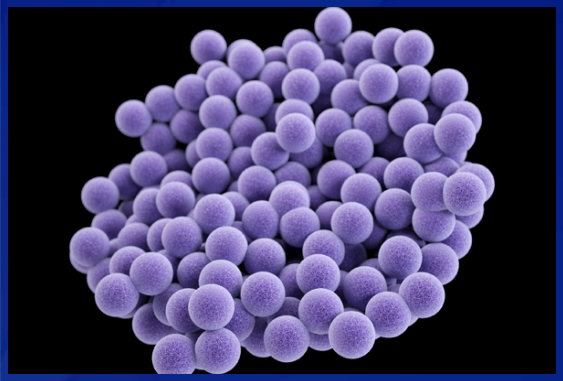
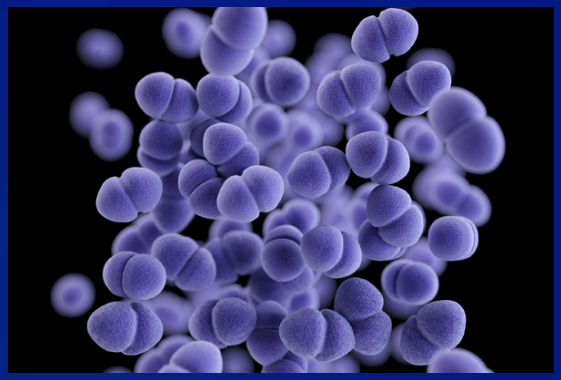
AMR in Healthcare Settings

- Methicillin-resistant *Staphylococcus aureus* (MRSA)
- Vancomycin-resistant Enterococcus (VRE)
- **Multidrug-resistant gram-negative bacilli (MDR-GNB)**
  - **Infections: pneumonia, bloodstream, wound or surgical site, & meningitis**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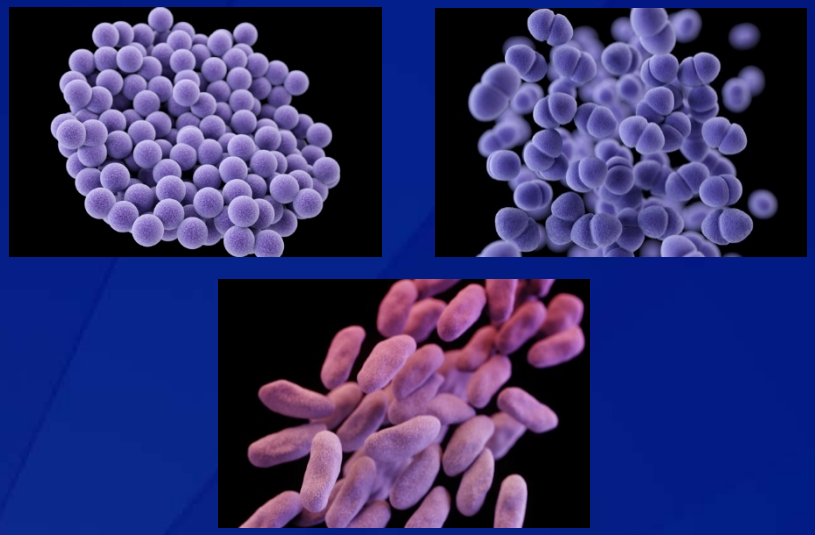
AMR Organism Introduction



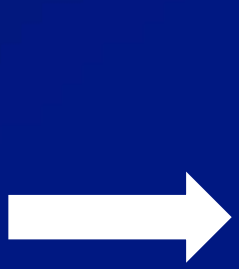


Image: http://www.cdc.gov/media/dpk/2013/dpk-untreatable.html; https://www.discoveryplace.info

Transmission and Persistence

- **Contact transmission**
  - **Direct**
  - **Indirect**

Image: http://www.radiation-therapy-review.com/Infection_Control.html

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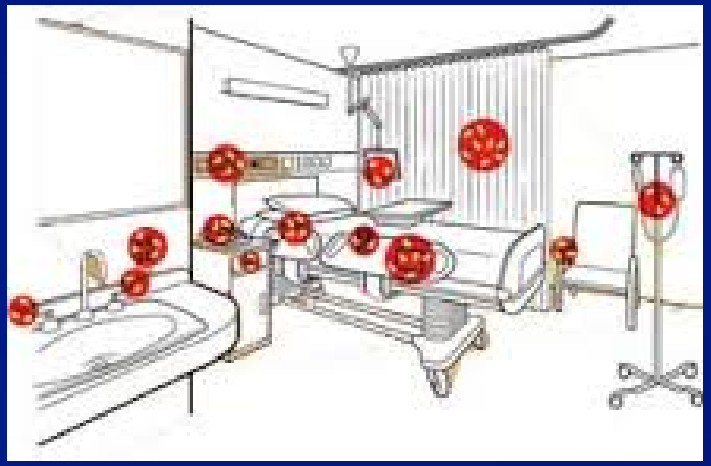

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- Major AMR organisms in healthcare settings
- **Prevention and control**
- Practical considerations
  - Surveillance
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Prevention and Control Recommendations

Image: http://www.guldigroup.com

Prevention and Control Recommendations

- **Administrative measures**

http://www.cdc.gov/hicpac/pdf/MDRO/MDROGuideline2006.pdf
Image: http://www.liberty.edu

Prevention and Control Recommendations

- Administrative measures
- Education & training

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Image: http://www.mavrck.co/social-media-statistics-that-fueled-the-biggest-topics-of-2014/

Prevention and Control Recommendations

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http://www.cdc.gov/hicpac/pdf/MDRO/MDROGuideline2006.pdf
Image: http://hepbblog.org/2011/09/13/infection-prevention-is-everyones-business-that-means-you/

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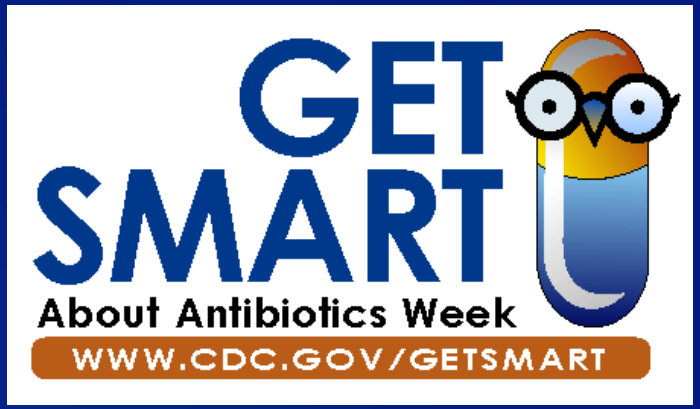

http://www.cdc.gov/hicpac/pdf/MDRO/MDROGuideline2006.pdf
Image: http://www.cdc.gov/getsmart/week/

Prevention and Control Recommendations

- Administrative measures
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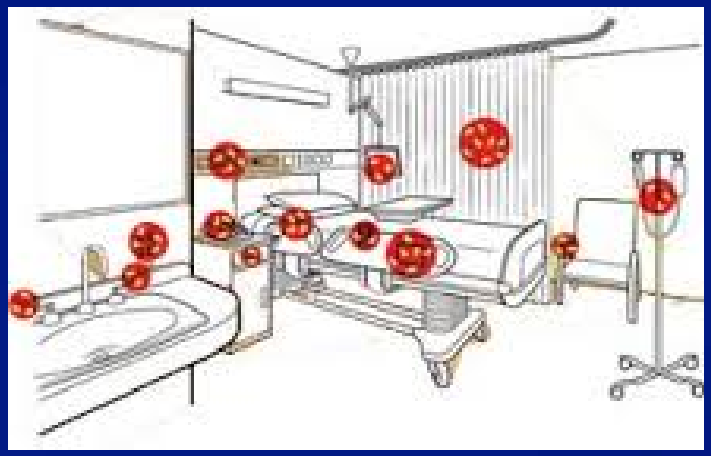
- Environmental measures



http://www.cdc.gov/hicpac/pdf/MDRO/MDROGuideline2006.pdf

Images: http://www.ipacconsulting.com/ and http://www.scientificamerican.com/article/hospitals-bring-janitors-front-lines-of-infection-control/

Prevention and Control Recommendations

- Administrative measures
- Education & training
- Surveillance
- Infection control precautions
- Antimicrobial stewardship
- Environmental measures
- Decolonization

http://www.cdc.gov/hicpac/pdf/MDRO/MDROGuideline2006.pdf

Prevention and Control Recommendations

- Administrative measures
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Surveillance

- Use standardized laboratory methods

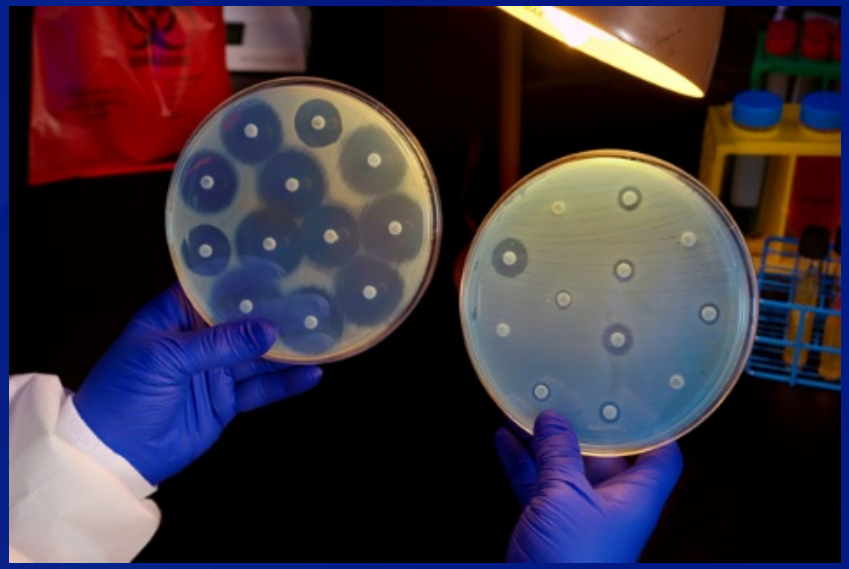

Image: www.cdc.gov

Surveillance

- Use standardized laboratory methods
- **Promptly notify resistance (phone call)**

Images: www.cdc.gov, and http://www.clker.com

Surveillance

- Use standardized laboratory methods
- Promptly notify resistance (phone call)
- **Prepare facility-specific antimicrobial susceptibility test reports**
  - **Monitor trends**
  - **Guide treatment options**

Images: www.cdc.gov, http://www.clker.com, http://jfb-levage.com/tag-computer.html, and https://www.surveymonkey.com

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Infection Control Precautions

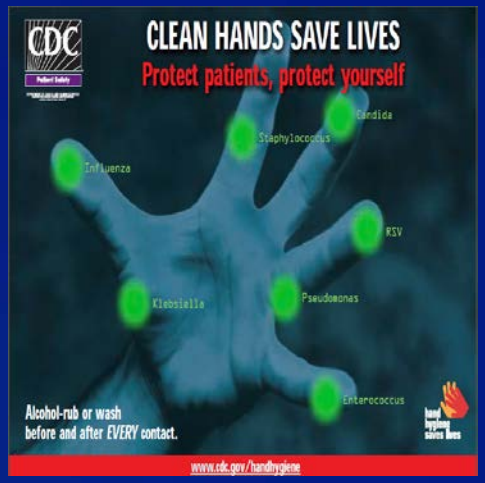
- **Standard precautions**

+

- **Contact precautions**

Infection Control Precautions

- **Hand hygiene**
- PPE (mask, gloves, and gown)
- Patient placement (single room/cohort)
- Equipment/instruments (dedicated equipment)



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Hand Hygiene

- Availability of soap and water and/or alcohol rub
- When and how to wash
- Monitoring adherence

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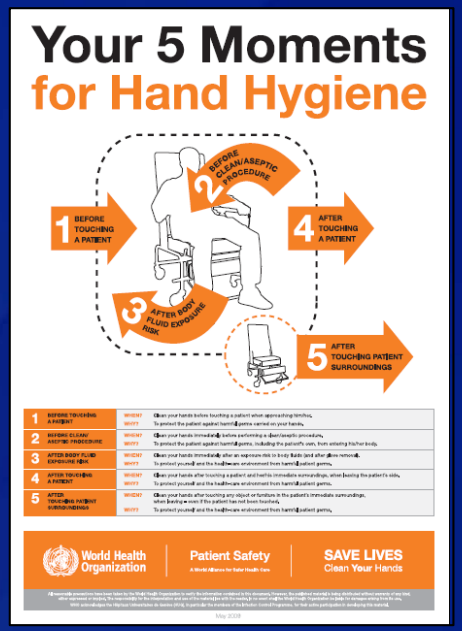
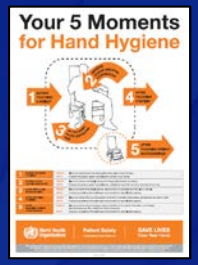
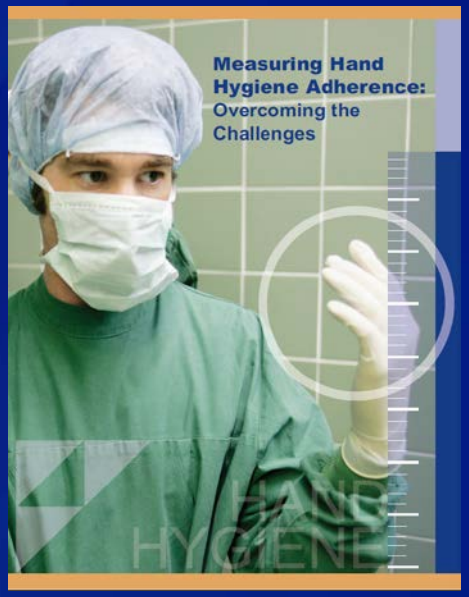


http://www.who.int/gpsc/5may/Hand_Hygiene_Why_How_and_When_Brochure.pdf?ua=1

Hand Hygiene

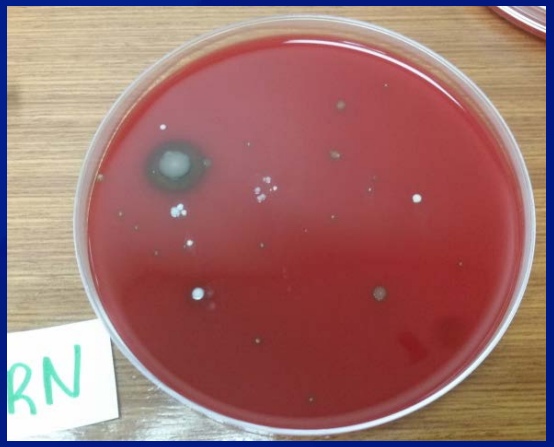
- Availability of soap and water and/or alcohol rub
- When and how to wash
- **Monitoring adherence**





http://www.who.int/gpsc/5may/Hand_Hygiene_Why_How_and_When_Brochure.pdf?ua=1
http://www.jointcommission.org/assets/1/18/hh_monograph.pdf

Monitoring Adherence



- **Normal transient skin bacteria, but can cause:**
  - **Pneumonia**
  - **Sepsis**
  - **Urinary tract infections**
  - **Surgical site infections**

Image: Acknowledgments to S.J. hospital IPC program

Infection Control Precautions

- Hand hygiene
- **Personal Protective Equipment (PPE)**
- Patient placement (single room/cohort)
- Equipment/instruments (dedicated equipment)

http://www.cdc.gov/hicpac/pdf/MDRO/MDROGuideline2006.pdf
http://www.who.int/csr/resources/publications/EPR_AM2_E7.pdf?ua=1

PPE

- Gowns
- Gloves
- Mask

Image: http://www.123rf.com

PPE

- “Contact precautions” sign
- Don before entering and doff before exiting

Image: Acknowledgments to S.J. hospital IPC program

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Patient Placement

- **Single rooms**

Image: https://http://well.blogs.nytimes.com/2010/12/16/a-hospital-room-with-a-view/?_r=0

Patient Placement

- Single rooms
- If not possible, cohort

Image: http://www.maxlite.com/applications/healthcare

Patient Placement

- Single rooms
- If not possible, cohort
- If not possible, place in rooms
  - Low risk and
  - Short-length stay patients

Image: https://http://well.blogs.nytimes.com/2010/12/16/a-hospital-room-with-a-view/?_r=0
Image: http://www.maxlite.com/applications/healthcare

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Image: http://www.cliparthut.com

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- Review antimicrobial utilization
- Review local antibiograms (susceptibility pattern)

Antimicrobials Stewardship

- Review antimicrobial utilization
- Review local antibiograms (susceptibility pattern)
- Foster appropriate antimicrobial use
  - Order laboratory tests
  - Record indication, dose and duration
  - Re-assess within 48 hours

http://www.cdc.gov/features/antibioticresistance/charts.html

Antibiotic “Time Out”

- Antibiotics are started empirically
- Providers don’t revisit
- More clinical and laboratory data become available

TIME OUT within 48 hours

http://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html#_ENREF_26
Image: http://www.basketballhow.com/information/rules/time-outs/

Antibiotic “Time Out”

- Antibiotics are started empirically
- Providers don’t revisit
- More clinical and laboratory data become available

  TIME OUT within 48 hours

- Patient has infection to respond to antibiotics
- Right antibiotic, dose, duration, and route of administration
- Can a more targeted antibiotic be used

  RE-ADJUST if necessary

http://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html#_ENREF_26

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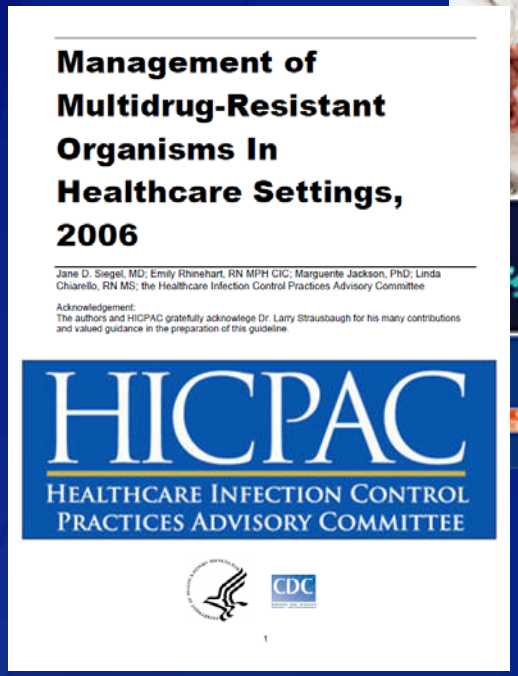
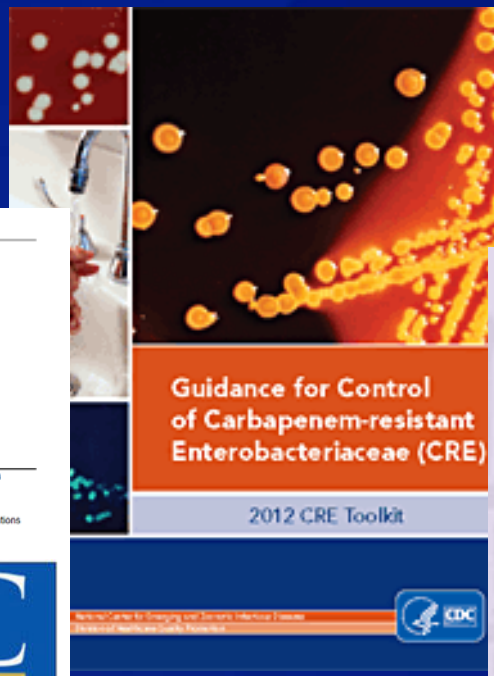
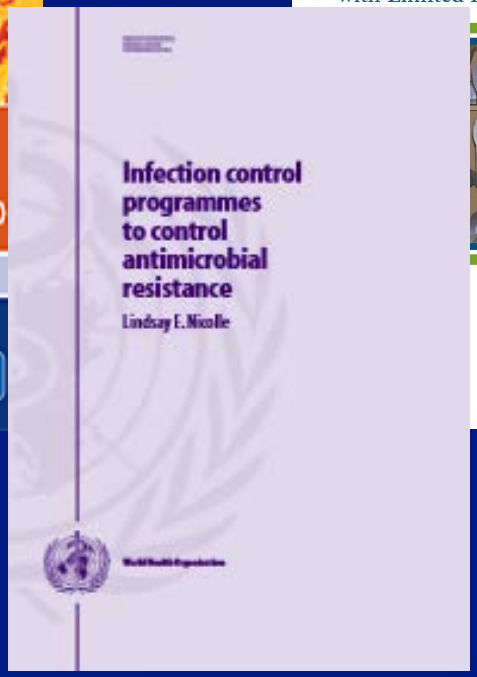
Summary

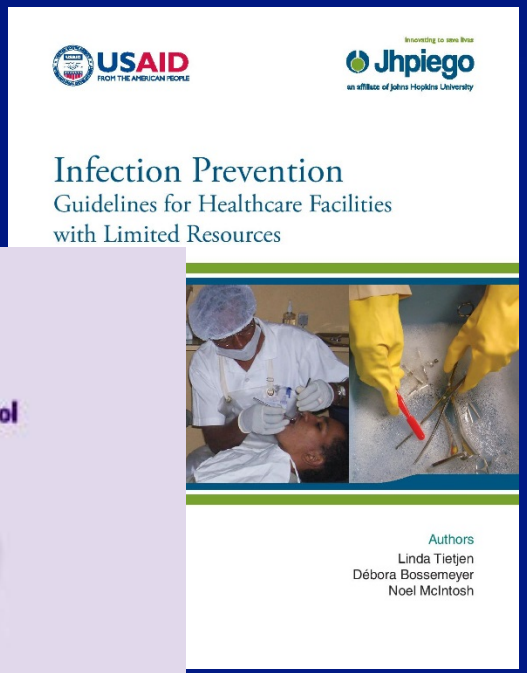
- Resistance is accelerated by use of antimicrobials
- Prevention and control has many components
- Three overlapping programs are essential
  - Surveillance systems
  - Infection control precautions
  - Antimicrobial stewardship

Resources


Management of Multidrug-Resistant Organisms In Healthcare Settings, 2006
Jane D. Siegel, MD; Emily Rhinehart, RN MPH CIC; Marguerite Jackson, PhD; Linda Chiarello, RN MS; the Healthcare Infection Control Practices Advisory Committee
Acknowledgement:
The authors and HICPAC gratefully acknowlege Dr. Larry Strausbaugh for his many contributions and valued guidance in the preparation of this guideline.
HICPAC
Healthcare Infection Control Practices Advisory Committee
CDC


Guidance for Control of Carbapenem-resistant Enterobacteriaceae (CRE)
2012 CRE Toolkit
CDC


Infection control programmes to control antimicrobial resistance
Lindsay E. Nicolle


USAID
FROM THE AMERICAN PEOPLE
Jhpiego
an affiliate of Johns Hopkins University
Infection Prevention
Guidelines for Healthcare Facilities with Limited Resources
Authors
Linda Tietjen
Débora Bossemeyer
Noel McIntosh

Thank You!

For more information please contact Centers for Disease Control and Prevention

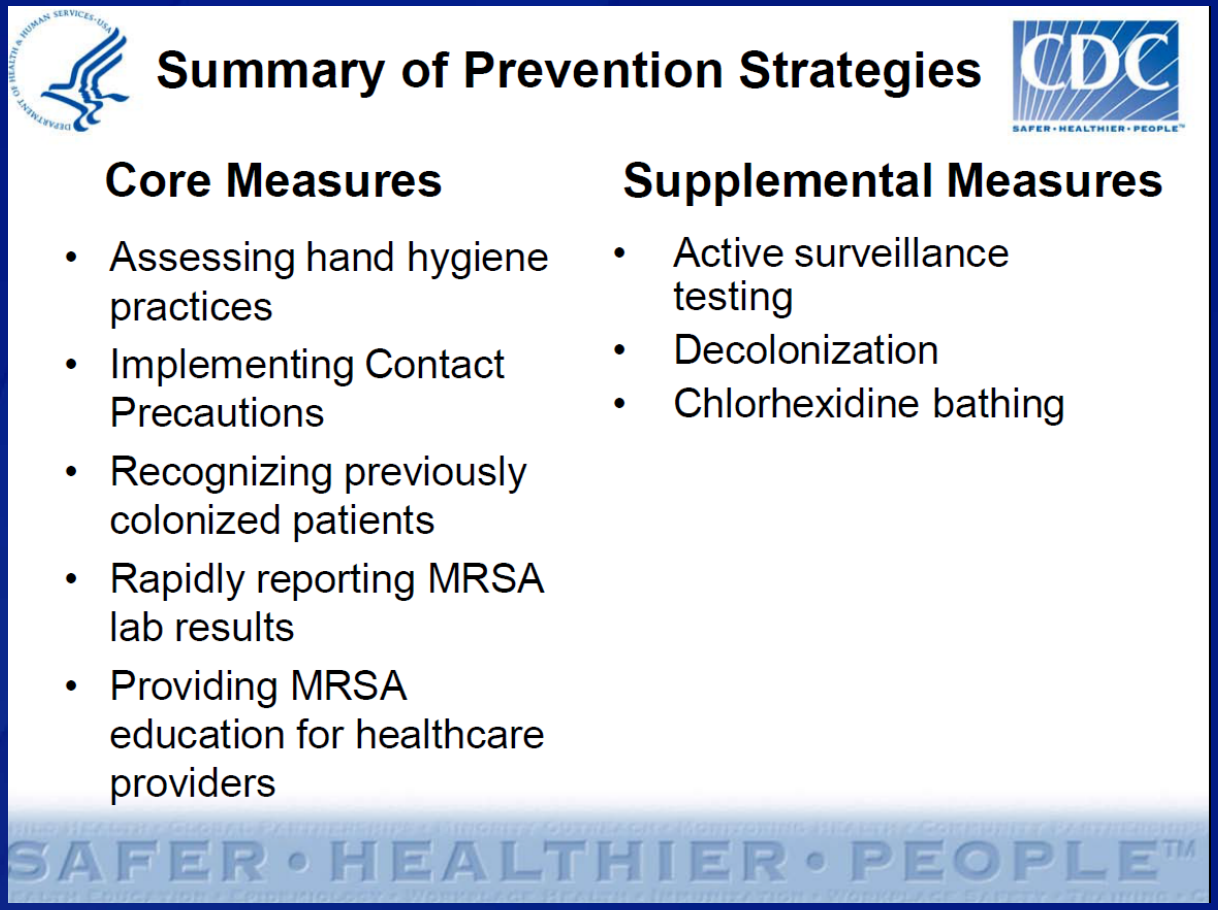
1600 Clifton Road NE, Atlanta, GA 30333
Telephone, 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
E-mail: cdcinfo@cdc.gov **Web: www.cdc.gov**

CRE Interventions

- **Core**
  - Hand hygiene
  - Contact Precautions
  - HCP education
  - Minimizing device use
  - Patient and staff cohorting
  - Laboratory notification
  - Antimicrobial stewardship
  - CRE screening
- **Supplemental**
  - Active surveillance cultures
  - Chlorhexidine bathing

Alex presentation \\cdc.gov\project\NCEZID_DHQP_INTL_HAI\2015 EIS Orientation\Slides\Day 4\CRE epi and prevention

MRSA



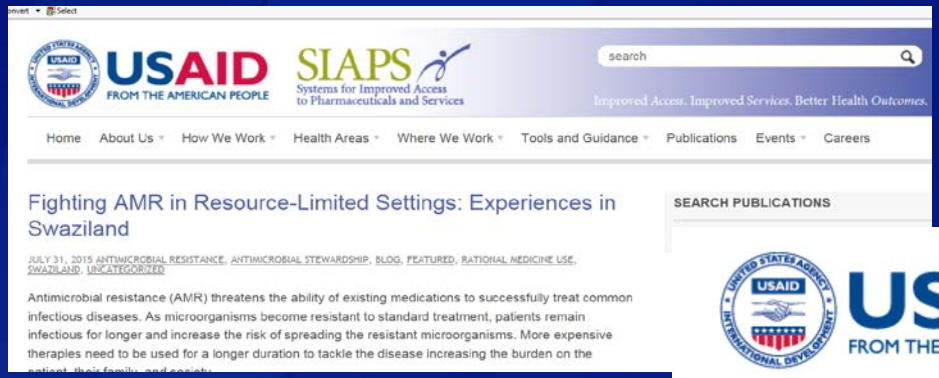
http://www.cdc.gov/hai/pdfs/toolkits/MRSA_toolkit_white_020910_v2.pdf

Intensified Surveillance

- Implement active surveillance culture (ASC)
  - Target AMR organism
  - Population at risk
- Conduct culture surveys to assess interventions
  - Point prevalence culture surveys
- If necessary, obtain cultures from healthcare providers

Antimicrobials Stewardship

- **Collaborate with existing programs/networks**
  - **USAID program—Systems for Improved Access to Pharmaceuticals and Services (SIAP)**



http://siapsprogram.org/2015/07/31/fighting-amr-in-resource-limited-settings/
http://siapsprogram.org/2015/05/21/using-a-health-systems-strengthening-approach-to-contain-amr-a-south-african-experience/