

**Methicillin-Resistant
Staphylococcus aureus (MRSA)**

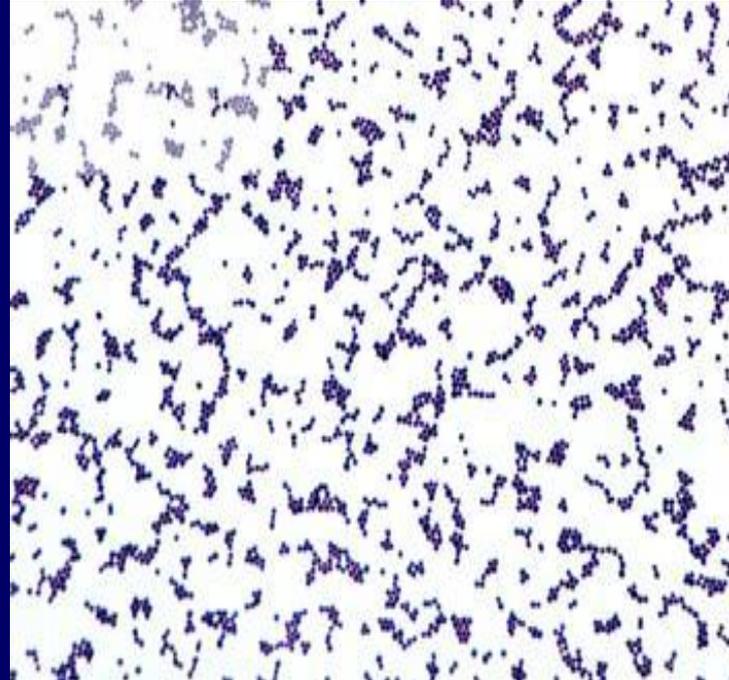
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Learning Objectives

- 1. Recognize the difference between colonization and infection**
- 2. Identify proven routes for transmission of MRSA**
- 3. Locate MRSA control measure information on the NC DPH and CDC websites**

Staphylococcus aureus

- **Bacteria**
- **Resistant to:**
 - Heat
 - Drying
 - High salt concentrations



Methicillin-Resistant *Staphylococcus aureus*

- **What it IS:**

A type of staph that is not killed by methicillin or other commonly-used antibiotics

Methicillin-Resistant *Staphylococcus aureus*

- What it **IS NOT**:

A “super-bug”:

Infections are treatable, usually susceptible to antibiotics that can be taken by mouth

“Flesh-eating bacteria”:

Can cause necrotizing fasciitis in rare cases, but most infections more mild

Public Health Burden

- **Leading identifiable cause of skin and soft tissue infections**
- **CDC: 94,000 invasive infections per year**
 - **85% healthcare**
 - **15% community**
- **~19,000 deaths per year**

Where Did MRSA Come From?

- **Driven by antibiotic use**
- **First seen 1960s**
- **Hospitals: Increase 1970s–1990s**
- **Community: Increase late 1990s–present**
 - **New strains**

MRSA: Where it Lives

- Found in nose
- Other potential sites
 - Skin
 - Intestines
 - Throat

MRSA in the Environment

- Can persist for prolonged periods
- Found on surfaces in many settings



- Person-to-person contact, sharing of contaminated personal items more important

MRSA in Animals

- Human strains transmitted to/from pets
- Other strains present in farm animals
- Farm animal strains rare in humans in the US



Colonization vs. Infection

- Colonization (“carriers”)
 - Bacteria living on or in the body
 - No disease
 - *Most people who are colonized with staph will never develop any illness from it*
- Infection
 - Illness caused by organism

Staph Colonization in the US

- **National Health and Nutrition Examination Survey (NHANES)**
- **Nasal swabs from randomly-selected, non-institutionalized individuals ≥ 1 year of age**
 - 2001–2002
 - 2003–2004
 - >9,000 swabbed per 2 year period

Staph Colonization in the US

	<i>All Staph aureus</i>		MRSA	
	%	Number in US	%	Number in US
2001–02	32.4	89 million	0.8	2.3 million

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More on Colonization...

- **Higher prevalence found in**
 - **Pediatric clinics**
 - **Child care centers**
 - **Prisons**

- **Nasal swabs miss colonization in other areas**

MRSA Infections

- **MRSA penetrates natural barriers**
 - Minor cuts or scrapes
 - Breathing surfaces inflamed from colds or flu
- **Skin & soft tissue infection (SSTI) most common**
- **Less frequently infection of bloodstream, bones, joints, lungs, heart or other organs**

MRSA Skin Lesions



Photos from Texas Department of Health

MRSA Skin Lesions



Photos from CDC/Bruno Coignard, Jeff Hageman

MRSA Transmission: Proven Routes

- Skin-to-skin contact
 - Draining lesions highly infectious
- Shared personal items
 - Razors, towels, sports equipment



MRSA Transmission: Unproven Routes



- **Coughing and sneezing**
- **Contact with non-personal items such as pencils, paper, or books**
- **Being in a room with an infected person**

Who is at risk for MRSA?

- **Outbreaks reported in many groups**
 - Athletes, inmates, military recruits, childcare center attendees, IDU
- **Features in common:**
 - Crowding / sharing personal items
 - High degree of close personal contact
 - High likelihood of getting cuts or scrapes
 - Poor hygiene (+/-)

Steps to Prevent MRSA

- 1. *Wash your hands!***
- 2. Keep cuts and scrapes clean, dry and covered**
- 3. Avoid sharing personal items such as towels or razors**
- 4. Avoid contact with other people's wounds and bandages**

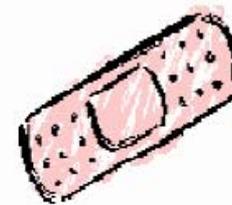
Sharing isn't always caring.



What you didn't learn in kindergarten:
sharing can spread disease.
Avoid sharing personal items (towels,
razors, tweezers, etc.) with others.

It's not
"just a scratch."

*Any break in your skin increases the
risk of bacterial infection.*



Follow the advice of CDC.
Keep your wounds

Clean,

Dry, and

Covered!

MRSA Outbreaks

- 1. Enhance surveillance**
- 2. Refer for testing and treatment**
- 3. Provide wound care education**
- 4. Promote basic hygiene**
- 5. Exclude patients from certain activities if draining lesions that can't be covered**
- 6. Achieve and maintain a clean environment**

MRSA Reporting

- **Cases not individually reportable**
- **Report outbreaks of public health significance**

MRSA Resources

NC Division of Public Health

www.ncpublichealth.com

Centers for Disease Control and Prevention

www.cdc.gov/MRSA

References

- 1. Moran GJ, Krishnadasan A, Gorwitz RJ et al. MRSA among Patients in the Emergency Department. *New Engl J Med.* 2006;355(7):666-74.**
- 2. Klevens, RM, Morrison MA, Nadle J et al. Invasive Methicillin-Resistant *Staphylococcus aureus* Infections in the United States. *JAMA.* 2007;298(15):1763-71.**
- 3. Maree CL, Daum RS, Boyle-Vavra S et al. CA-MRSA Isolates causing Healthcare-associated Infections. *Emerg Infect Dis.* 2007;13(2):236-42.**
- 4. Gorwitz RJ, Kruszon-Moran D, McAllister SK et al. Changes in the Prevalence of Nasal Colonization with *Staphylococcus aureus* in the United States, 2001–2004. *J Infect Dis.* 2008;197:1226-34.**
- 5. Creech CB et al. Increasing Rates of Nasal Carriage of MRSA in Healthy Children. *Pediatr Infect Dis J.* 2005;24:617-21.**