



MRSA

WHCRMS

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Colonization vs. Infection

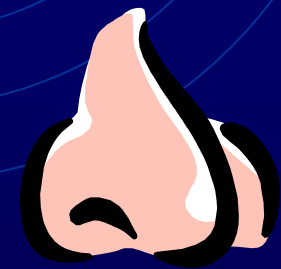
- ▶ Infection: entry and multiplication of microorganisms, with tissue invasion and damage
- ▶ Colonization: entry, multiplication without invasion and damage

**Methicillin Sensitive
Staphylococcus Aureus
(MSSA)**



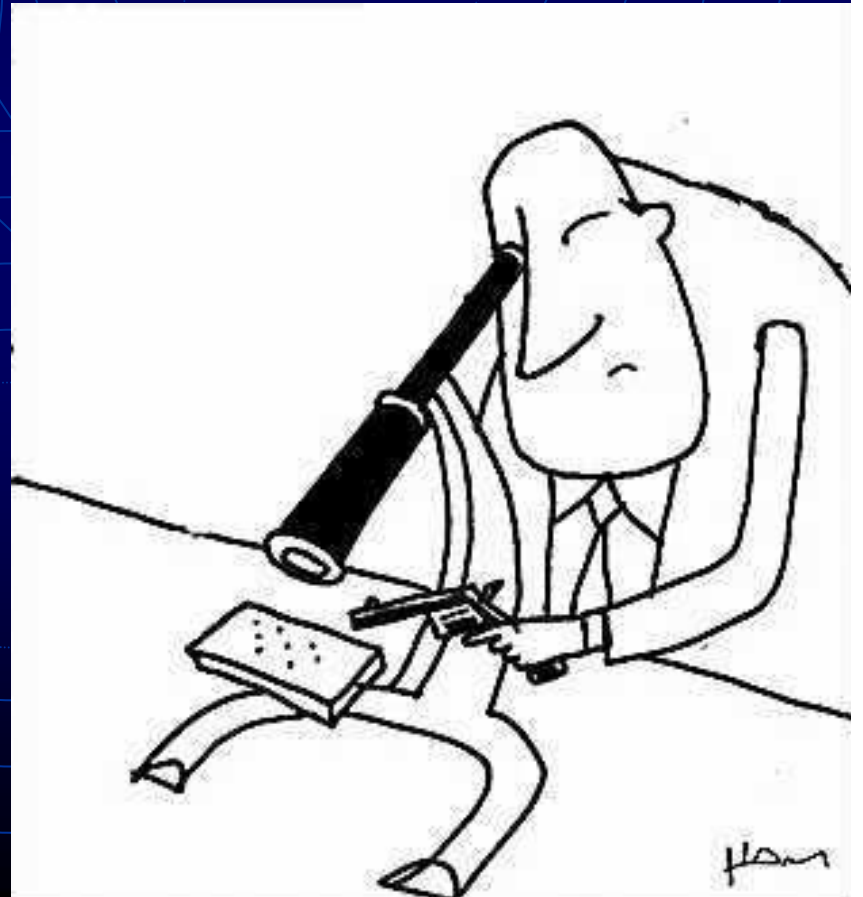
Staphylococcus Aureus

- ▶ Common skin organism
- ▶ 40% HCWs nasal carriage
- ▶ Causes pimples, boils, SSIs
- ▶ Higher rates among dialysis patients, IV drug users, those with eczema, IDDM



MRSA

**Methicillin-Resistant
Staph Aureus**



MRSA

- ▶ Staph aureus resistant to:
 - Methicillin
 - Nafcillin
 - Oxacillin
- ▶ Labs test for ONE of these, usually oxacillin

MRSA

- ▶ Was first seen in the 1960s after the introduction of semisynthetic penicillins (methicillin)
- ▶ Europe, US, world-wide spread
- ▶ Transferred from patient-to-patient, facility-to-facility, city-to-city, country-to-country via patients, ? staff

Epidemiology of MRSA

- ▶ Transmission of MRSA within and between healthcare facilities has been well documented using molecular typing techniques

Community-Acquired MRSA



CA-MRSA

- ▶ Abscesses of skin, deeper, slower to mature
- ▶ Often require I&D
- ▶ Antibiotics only if indicated
- ▶ Admit for systemic illness, multiple wounds
- ▶ Requires practice changes!

Photos: Courtesy of Jon Divine, MD



FIGURE 1. A lesion that tested positive for MRSA on the thigh of a recreational athlete, about 2 days after initiating treatment with warm compresses, NSAIDs, and mupirocin cream (A). The pustule ruptured 3 days into treatment, and painful induration lasted about 10 days. Another MRSA infection, 6 days after initiating treatment, on the knee of a college football player (B) who developed the infection after scraping his knee on artificial turf. Treatment consisted of warm compresses, a drying agent, NSAIDs, and double-strength TMP-SMZ. Once opened, the lesion was treated with silver sulfadiazine cream for an additional week.



MRSA

- ▶ Also some highly virulent cases
 - 7 m with necrotizing pneumonia
 - 28 yo with necrotizing pneumonia
 - 32 yo with necrotizing pneumonia
 - 10 yo with sepsis 2° toe wound, purpura fulminans, SIRS, MODS

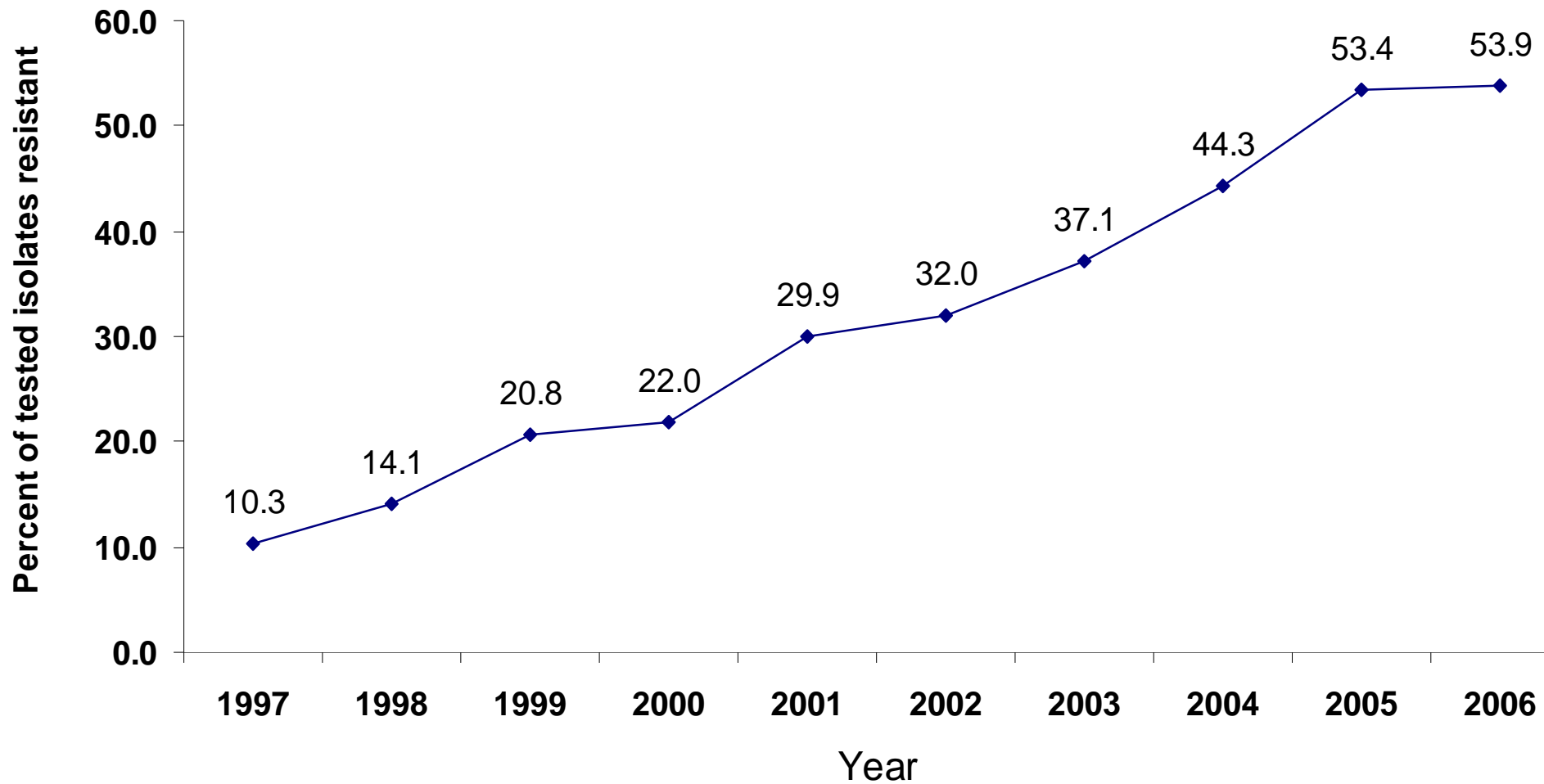


Necrotic lung tissue

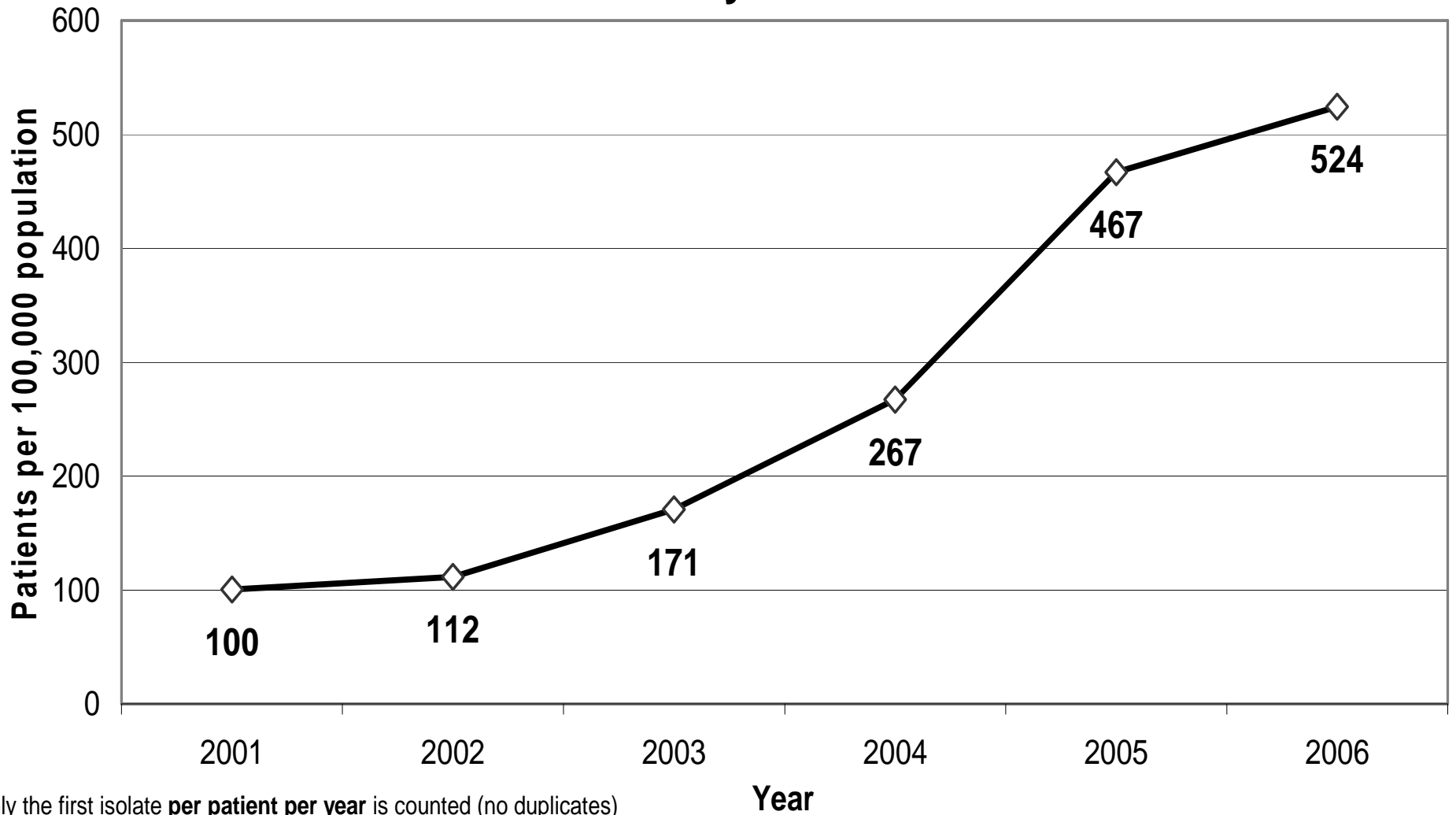
CA-MRSA

- ▶ Huge increase in Community-acquired MRSA
- ▶ Sensitive to Clindamycin, Septra
- ▶ More aggressive
- ▶ Skin and soft tissue infections
- ▶ “Normal” folks, kids
- ▶ It's EVERYWHERE!

Oxacillin Resistance Among *S. aureus* Isolates Pierce County, 1997-2006



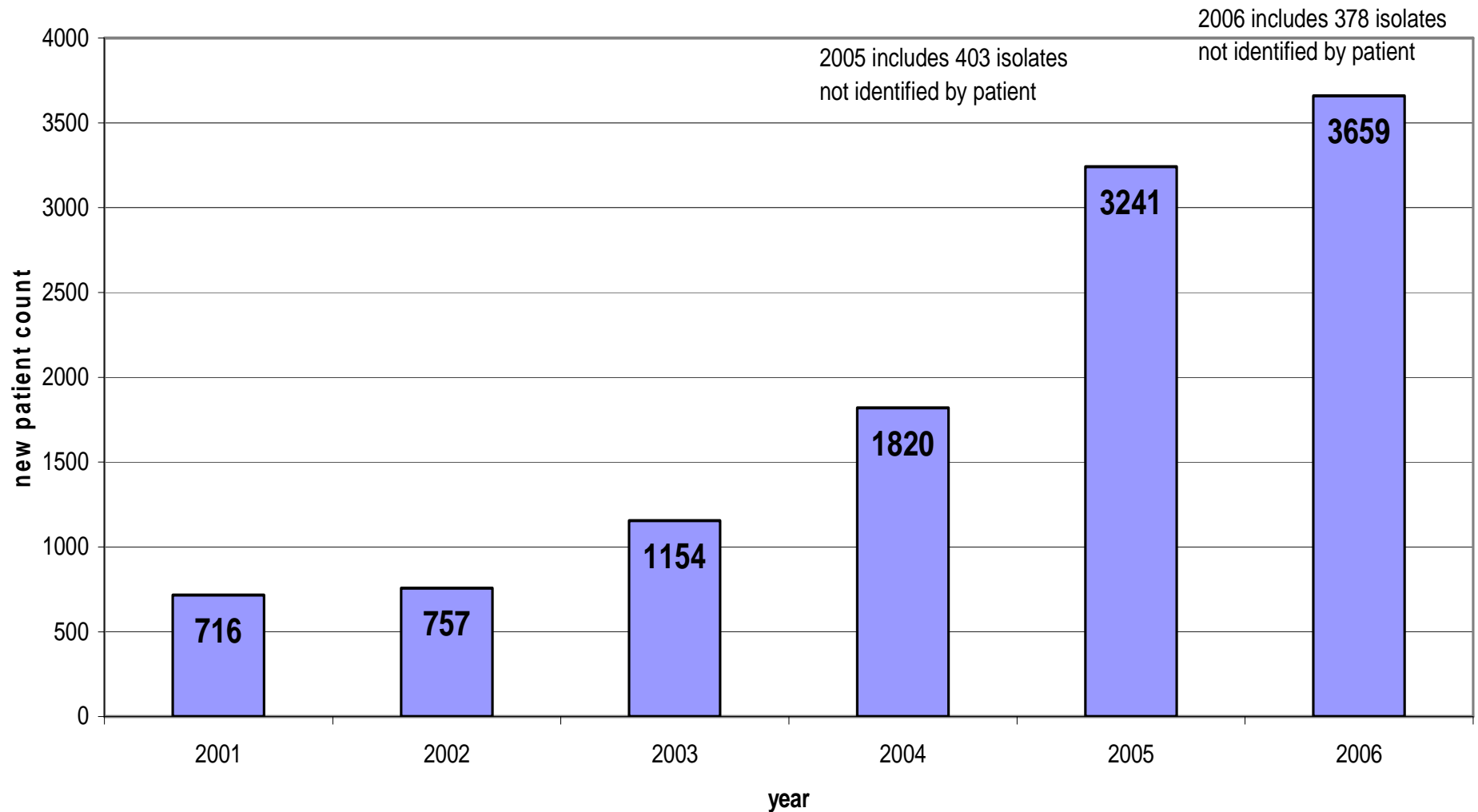
MRSA Incidence Pierce County 2001-2006



Only the first isolate per patient per year is counted (no duplicates)

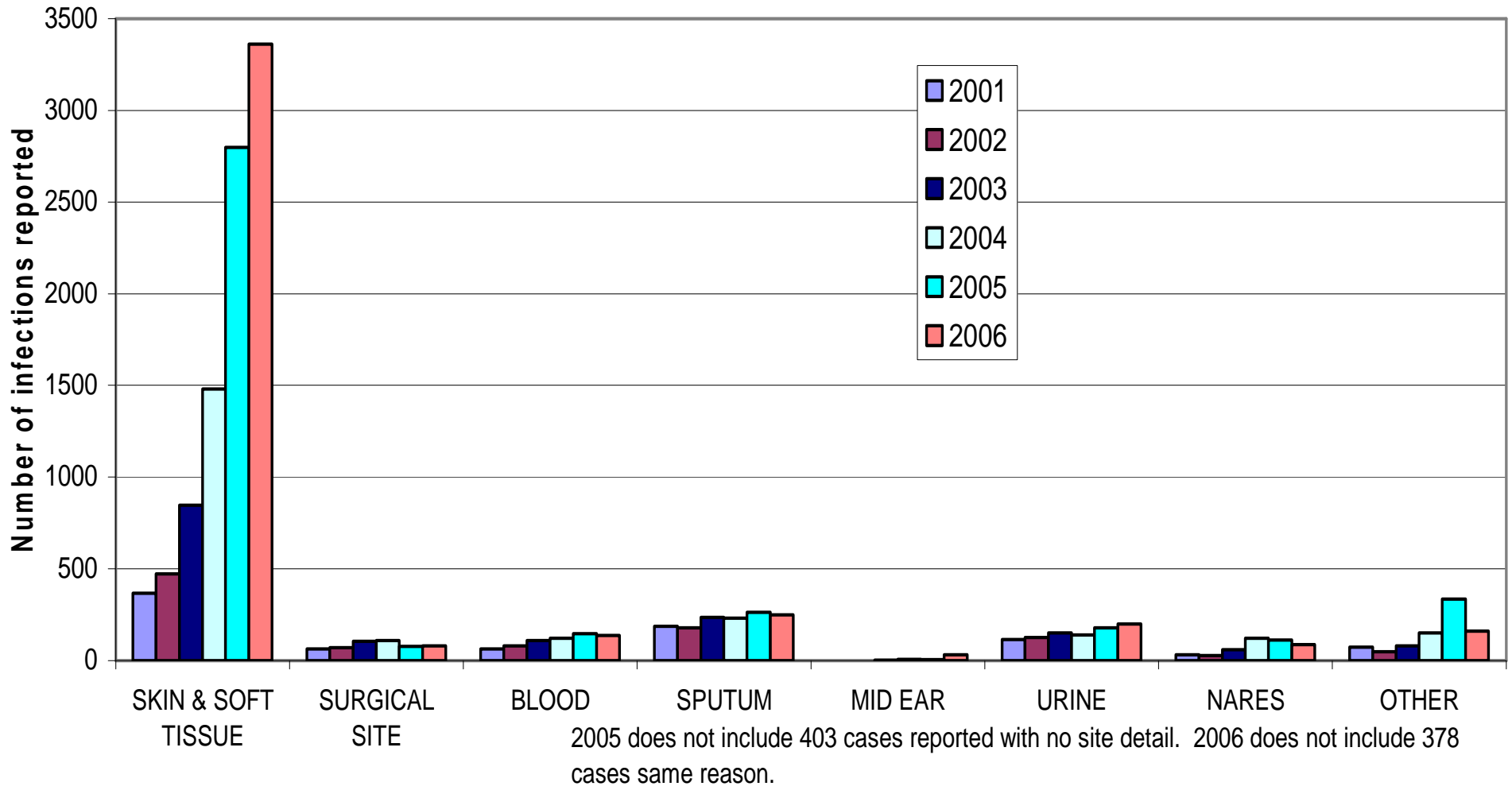
New MRSA Patients 2001-2006

(No duplicates across years)



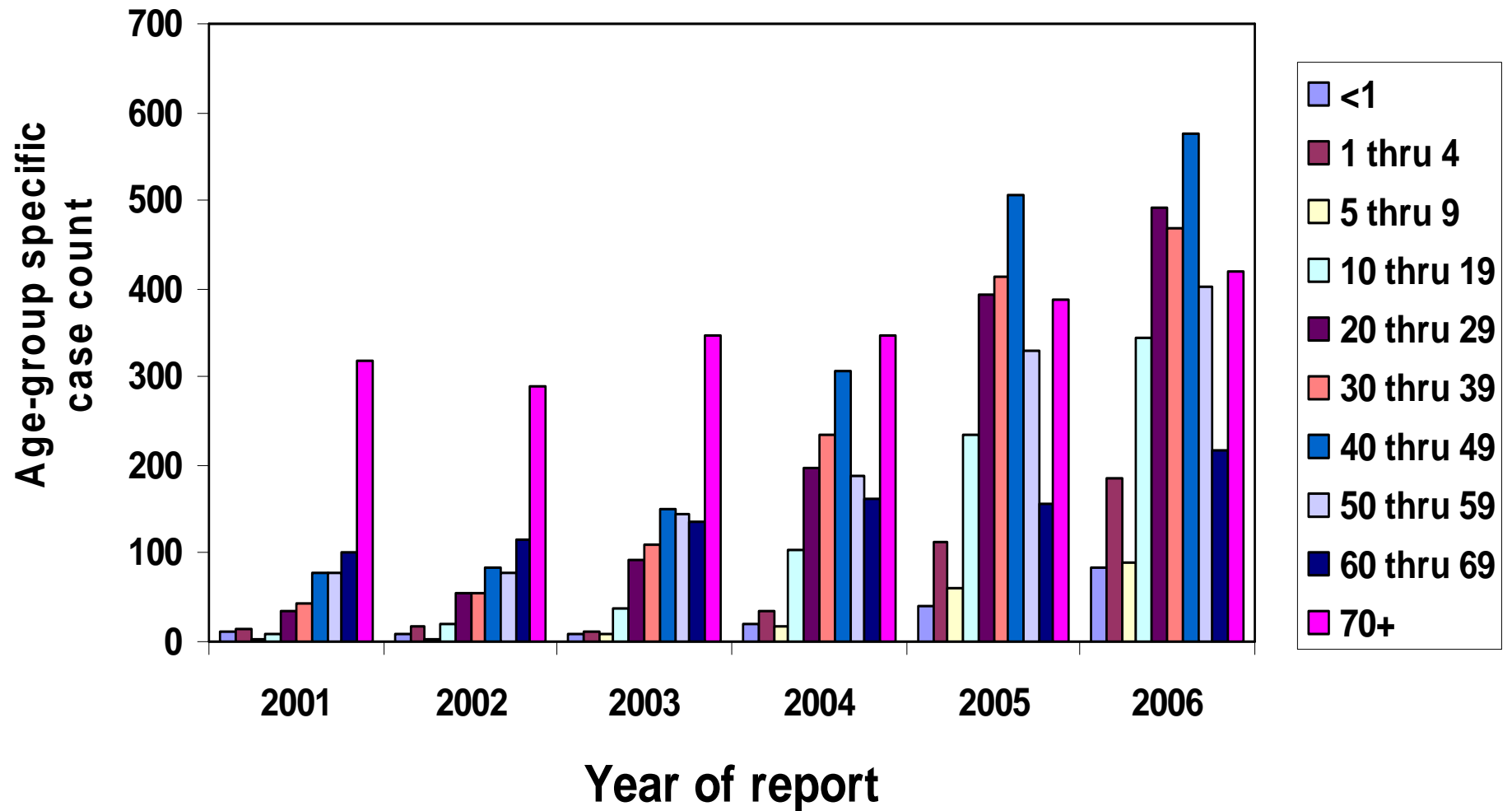
MRSA Cases Pierce County, 2001-2006

Number of Cases by Site



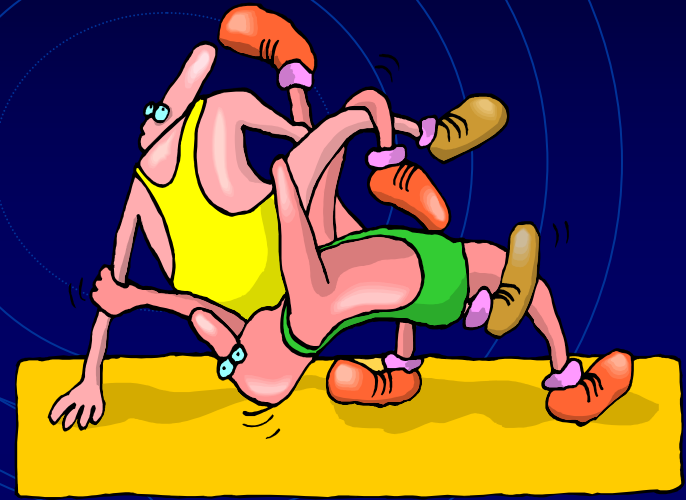
May include duplicates by patient (patients can have multiple sites of infection or multiple episodes)

Incident MRSA Case Counts by Age Group, Pierce County, 2001-2006



CA-MRSA Sources

- ▶ Just about anywhere
- ▶ Schools
- ▶ Gyms, pools
- ▶ Shared PE equipment, towels, wrestling mats, Astroturf, etc.
- ▶ Pens, pencils ?



Transmission Considerations





Epidemiology of MRSA

- ▶ One study found a median duration of carriage among patients colonized with MRSA to be 40 months
- ▶ Once MRSA, always MRSA... in most cases

The image features a dark blue background with a pattern of overlapping, concentric circles in a lighter blue color. The circles are arranged in a way that they overlap each other, creating a complex, layered effect. In the center of the image, the words "Hospital Transmission" are written in a bold, yellow, sans-serif font. The text is centered horizontally and vertically, and its bright yellow color stands out prominently against the dark blue background.

Hospital Transmission

Contaminated Hands

- ▶ In multiple studies, multidrug-resistant organisms like MRSA or VRE were isolated from the hands, gloves, or both of HCWs involved in the care of infected or colonized patients

HCW Clothing

- ▶ 40% HCWs' gowns contaminated after care of patients colonized with MRSA or VRE
- ▶ Gowns reliably prevented contamination of the clothing beneath them

HCW Clothing



- ▶ Boyce et al. 65% of HCWs' gowns or uniforms contaminated with MRSA after performing routine "morning care" for patients with MRSA in a wound or urine
- ▶ Zachary: 37% HCWs' gowns contaminated with VRE after care of a patient with VRE

HCW Clothing

- ▶ White coats (worn instead of gowns) became contaminated 69% of the time with VRE or MRSA after examining patient
- ▶ Contaminating organisms transferred to hands of HCWs 27% of the time after touching the white coats



Contaminated Hands

- ▶ MRSA on hospital computer keyboards used only by clinicians, implying that the clinicians carried these microbes from room to room in the hospital on their hands



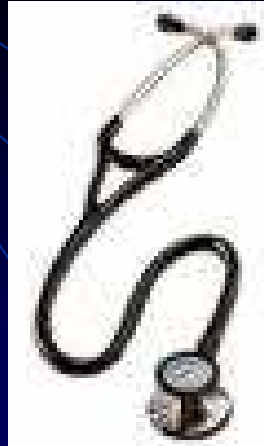
Contaminated Hands

- ▶ Documented presence of MRSA or VRE on a variety of other environmental surfaces and equipment, implying hand contamination may derive in part from touching contaminated surfaces or equipment

Contaminated Hands

- ▶ 42% of nurses' gloves became contaminated with MRSA when they touched surfaces in the room of a patient with MRSA without touching the patient

Contaminated Environment



Staph aureus is found on:

- ▶ Stethoscopes, pagers, over bed tables, BP cuffs, floors, charts, furniture, dry mops, & hydrotherapy tanks
- ▶ 73% hospital rooms with patients infected with MRSA and 69% of rooms with patients colonized with MRSA had environmental contamination

Environmental Contamination

MRSA:

- ▶ Can survive hours, days, weeks, months on surfaces
- ▶ Survives on external surface of sterile goods packages for > 38 weeks

SORBSAN 10x15cm
Sterile Calcium Alginate Wound Dressing
with Absorbent Viscose Secondary Layer

PLUS

Epidemiology of MRSA

- ▶ A recent cohort study found that the proportion of patients colonized with MRSA was the most important predictor that new patients would acquire MRSA in an ICU

Controlling MRSA

Success in controlling MRSA greatest in countries that:

- ▶ Adhere to rigorous transmission-based control policies, including surveillance cultures to identify colonized patients
- ▶ Strict application of barrier precautions for patients colonized or infected with MRSA

Controlling MRSA

- ▶ In several N. European countries, the prevalence of MRSA is low despite repeated introductions
- ▶ Denmark: prevalence of MRSA blood isolates peaked at 33% in 1960s
- ▶ Declined steadily after introduction of a policy to control transmission
- ▶ Maintained at $< 1\%$ for 25 years

Control of MRSA

- ▶ Hand hygiene- Partners in Your Care
- ▶ Contact Precautions, infected/colonized
- ▶ **Active Surveillance Cultures to identify carriers (rapid test- PCR)**
- ▶ Enhanced environmental cleaning
- ▶ Education, education, education!!

Hand Hygiene Monitoring

- ▶ Handwashing:
 - 30 seconds
 - Soap, water, friction
 - Rinse, pat dry
 - Turn off water with paper towel
- ▶ Alcohol gel
 - 15 seconds (one full “squirt”)
 - Briskly rub all hand surfaces

Hand Hygiene

- ▶ Compliance ~ 40%
- ▶ Same for past 25+ years
- ▶ Some units ~10%
- ▶ Hand hygiene studies ongoing
- ▶ Discouraging, disgusting

Reduce Resistant Bugs?

- ▶ Compliance, compliance, compliance
- ▶ Hand hygiene
- ▶ Isolation- post sign, follow it!
- ▶ Aseptic technique
- ▶ Environmental cleaning
- ▶ Equipment cleaning between patients
- ▶ Control antibiotic use

So, What to Do!

- ▶ Written policies to isolate patients
- ▶ Colonized or infected with MRSA
- ▶ Patients flagged for re-admission
- ▶ Isolate pts with suspected or hx MRSA
- ▶ Isolation signs, carts with supplies
- ▶ Consistent following of isolation
- ▶ Culture change!

Summary

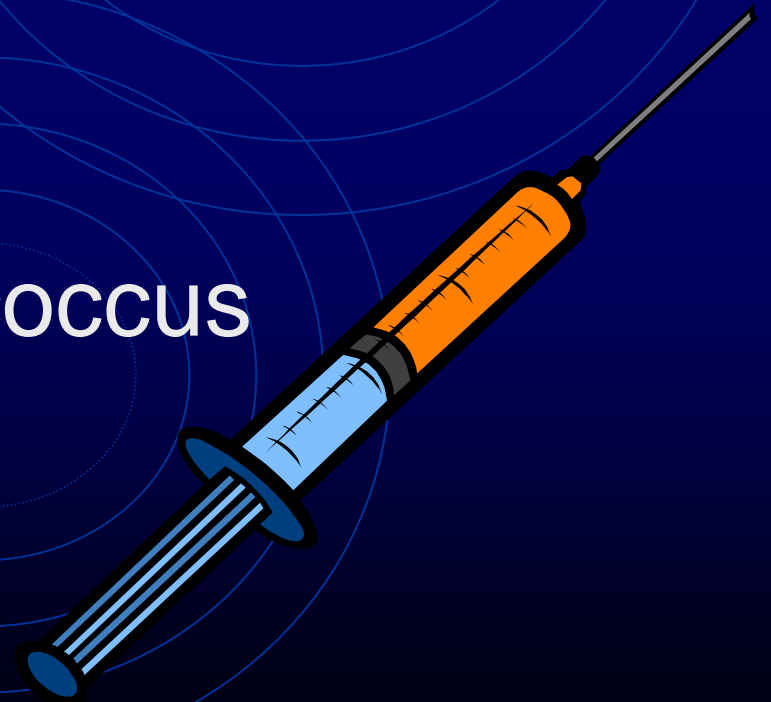
- ▶ We owe our patients, visitors and co-workers a safe environment
- ▶ There is no acceptable excuse for failure to wash/gel, aseptic technique, thorough cleaning
- ▶ How would you feel if you got MRSA as a result of someone else's bad practice?

MRSA and Staff

- ▶ If on hands, arms, face, neck, off work until healed, we pay salary.
- ▶ If elsewhere, drainage contained in a dressing for the shift, may work
- ▶ OR, surgical areas more stringent
- ▶ Don't screen HCWs unless outbreak

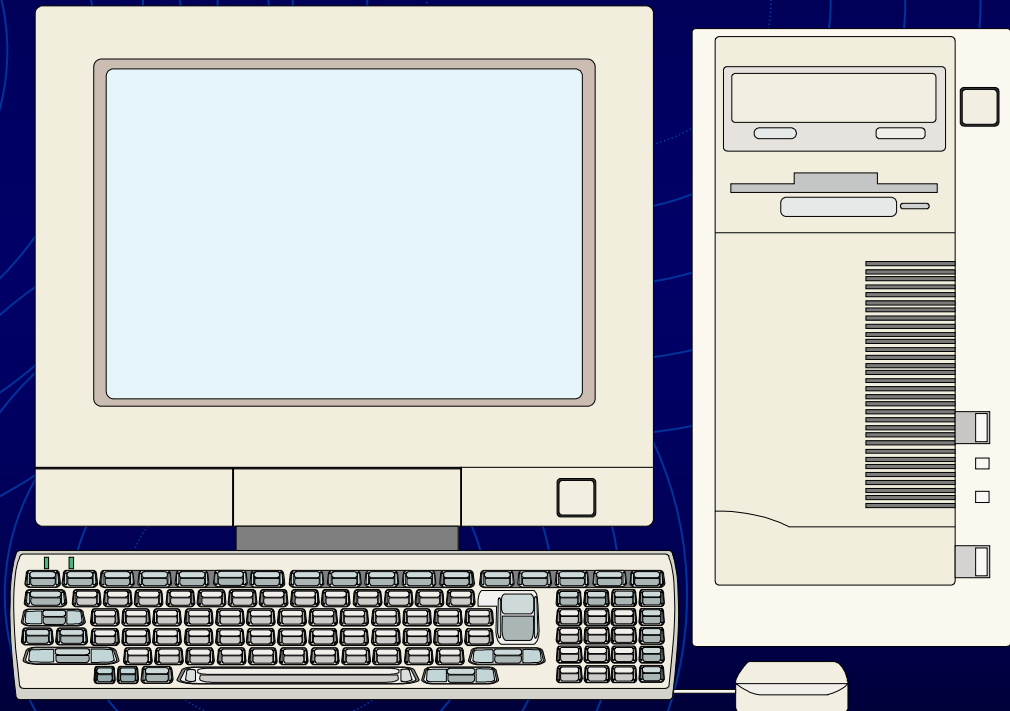
Vaccine-Preventable Diseases

- ▶ Hepatitis A, Hepatitis B
- ▶ Mumps, measles, rubella
- ▶ Chickenpox
- ▶ Tetanus, diphtheria
- ▶ Hib, polio, pneumococcus
- ▶ Pertussis (Adacel)
- ▶ **Influenza**



<http://www.>

- ▶ cdc.gov
- ▶ who.org
- ▶ apic.org
- ▶ tpchd.org
 - MRSA
 - “Living with MRSA”



References

- ▶ Management of Multidrug-Resistant Organisms in Healthcare Settings, 2006
<http://www.cdc.gov/ncidod/dhqp/pdf/ar/mdroGuideline2006.pdf>
- ▶ APIC Guide to the Elimination of MRSA Transmission in Hospital Settings, 2007
http://www.apic.org/scriptcontent/custom/secure/mrsa_elim_guide.cfm

