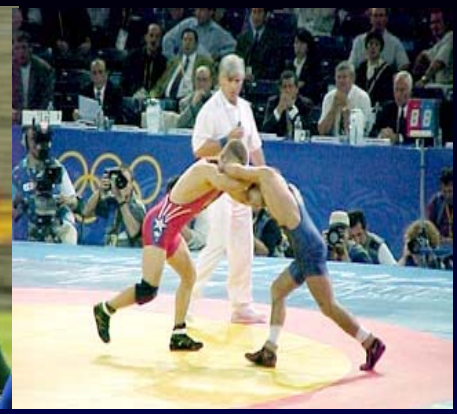


CA-MRSA in Athletics

Sophia V. Kazakova, MD, MPH, PhD

Division of Healthcare Quality Promotion
National Center for Infectious Diseases

Texas Department of State Health Services meeting on CAMRSA Infections

Austin, TX
September 9, 2004

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Objectives

- To present an outbreak investigation of CAMRSA skin infections among members of a professional football team
- To summarize risk factors in football players and other sports participants
- To present infection control and prevention measures in football outreaks

Sports Participation in U.S.

- National Federation of State High School Associations (2003)
  - 6,903,552 (53%)
    - Football 1,032,420 (18%)
    - Basketball 1,002,797 (13%)
    - Wrestling 244, 984 (4%)
- National Collegiate Athletic Association (2002-03)
  - 377,641
    - Football 59,640 (16%)
    - Basketball 30,669 (8%)
    - Wrestling 5,986 (2%)
- Does not account for professional, extramural, club teams (rugby)

Skin Injuries: A Common Risk for Infection

- Most frequent and well recognized skin infections
  - Herpes simplex, *S. aureus, Streptococcus pyogenes*
  - “Scrum pox”, “herpes rugbiorum”, “scrum strep”
- Few reports in the literature
- Few training opportunities in infection control for athletic trainers

First Reports of S. aureus Outbreaks in Football

- New Hampshire 1964[1]
- North Carolina 1977[2]
- Illinois 1979[2]

[1]Pollard JG. The Staphylococcus plagues a football team. College Health 1966;234-238.

[2] Bartlett PC, Martin RJ, Cahill BR. Furunculosis in a high school football team. Amer J Sports Med 1982;10:371-74.

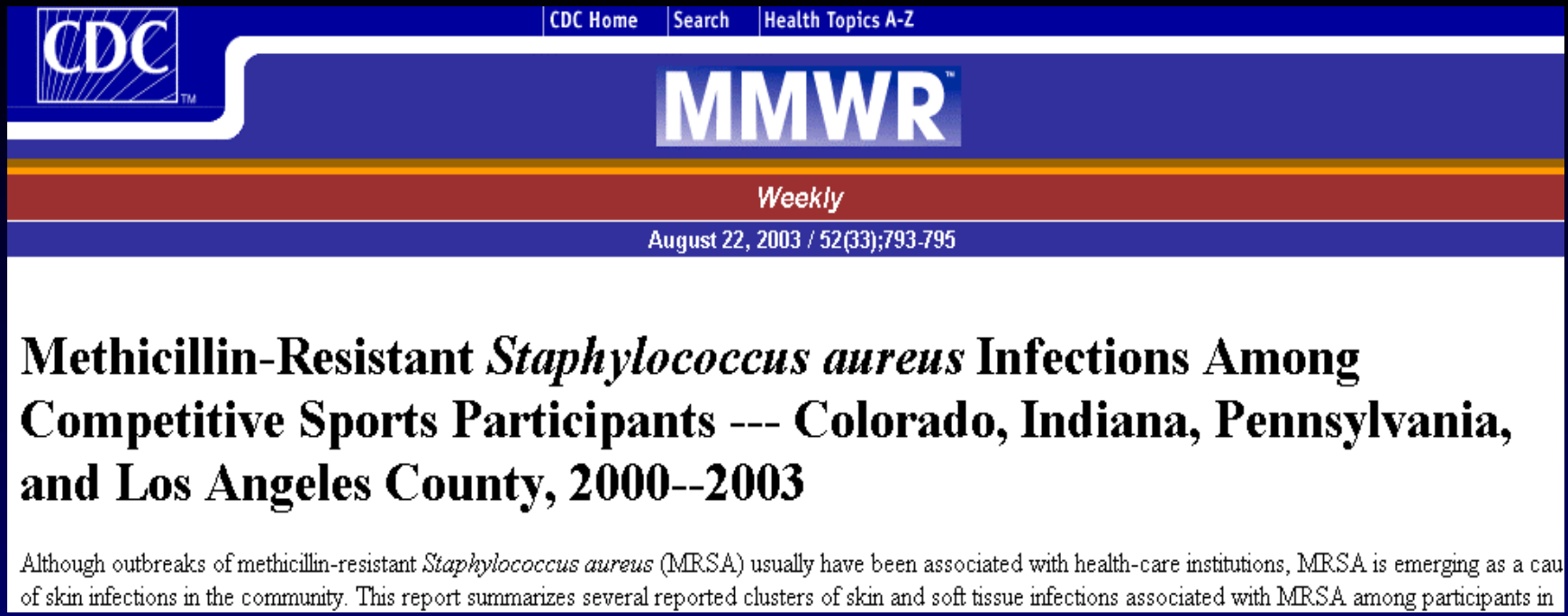
CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

First MRSA Infections in Sports

- 1994: High school wrestling team in Vermont[1]
  - 7 (22%) of 32 had MRSA
  - Follow-up nasal carriage survey of all wrestlers
    - 40% colonized with S. aureus
    - 0% with MRSA
- 1996: England[2]
  - 5 rugby players with MRSA
  - Treated with erythromycin and clarithromycin

[1] Lindenmayer JM, et al. Arch Intern Med 1998;158:895-9.

[2]Stacey AR, et al. Br J Sports Med. 1998:32;153-154



CDC Home | Search | Health Topics A-Z

MMWR

Weekly

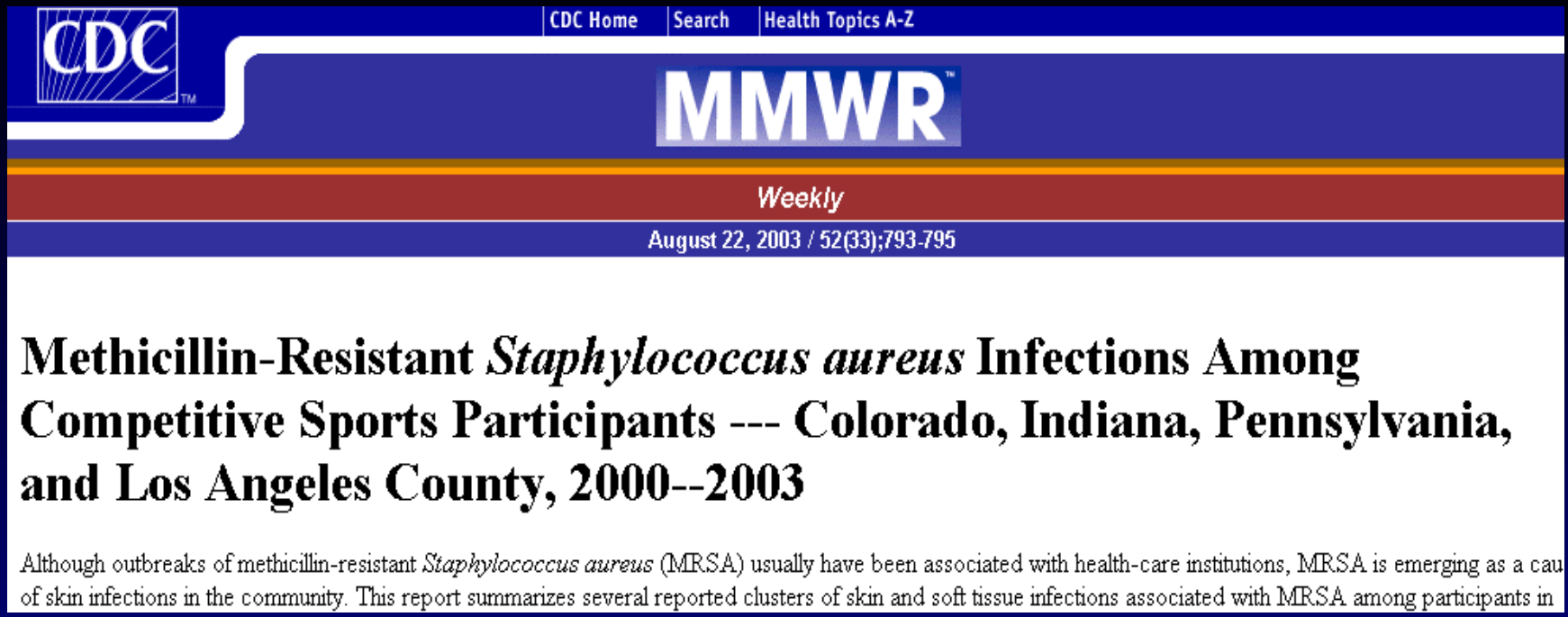
August 22, 2003 / 52(33);793-795

Methicillin-Resistant *Staphylococcus aureus* Infections Among Competitive Sports Participants --- Colorado, Indiana, Pennsylvania, and Los Angeles County, 2000--2003

Although outbreaks of methicillin-resistant *Staphylococcus aureus* (MRSA) usually have been associated with health-care institutions, MRSA is emerging as a cau of skin infections in the community. This report summarizes several reported clusters of skin and soft tissue infections associated with MRSA among participants in

- Contact
- Crowding
- Contaminated items
- Compromised skin
- Cleanliness

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION



CDC Home | Search | Health Topics A-Z

MMWR

Weekly

August 22, 2003 / 52(33);793-795

Methicillin-Resistant *Staphylococcus aureus* Infections Among Competitive Sports Participants --- Colorado, Indiana, Pennsylvania, and Los Angeles County, 2000--2003

Although outbreaks of methicillin-resistant *Staphylococcus aureus* (MRSA) usually have been associated with health-care institutions, MRSA is emerging as a cau of skin infections in the community. This report summarizes several reported clusters of skin and soft tissue infections associated with MRSA among participants in

- November 9, 2003:
  - State DOH and CDC were notified of a cluster of MRSA abscesses among Team X

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

The Bigger They Are The Harder They Fall

CAMRSA Among Professional Football Players - 2003

CDC

CENTERS FOR DISEASE CONTROL AND PREVENTION

Objectives for Investigation

- Determine if skin infections were due to healthcare-associated MRSA or due to community-associated MRSA
- Identify possible sources and risk factors for infection
- Develop recommendations for control of the outbreak

Methods

- **MRSA case**
  - Skin infection in team X player or staff during 2003 football season
  - MRSA on culture
- **Observational studies**
  - Field investigation
  - Training facility
    - Contact
    - Towel sharing
    - Hand washing
    - Other hygiene practices

- **Cohort study**
  - Players' positions
  - Demographic characteristics
  - Healthcare exposures
  - Skin abrasions (turf burns)
  - Personal hygiene
  - Use of saunas, whirlpool spas, training and therapy equipment

S. aureus Colonization Study

- **Nasal Swab Survey**
  - Players
  - Staff
- **Turf Burn Swab Survey**
  - Players

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Environmental Study

- Weight Training
- Physical Therapy
- Game Play
- Whirlpool Spa
- Sauna

Tackle-o-Graph
DIAGRAM OF FIELD
PYLON
TEAM AREA
COACHING BOX 6'
9 YARDS
PYLONS 3' BEHIND END LINE
60'
40'
60'
12'
18'6"
9'
2'
4"

Tackle-o-Graph

Results

Team X Players

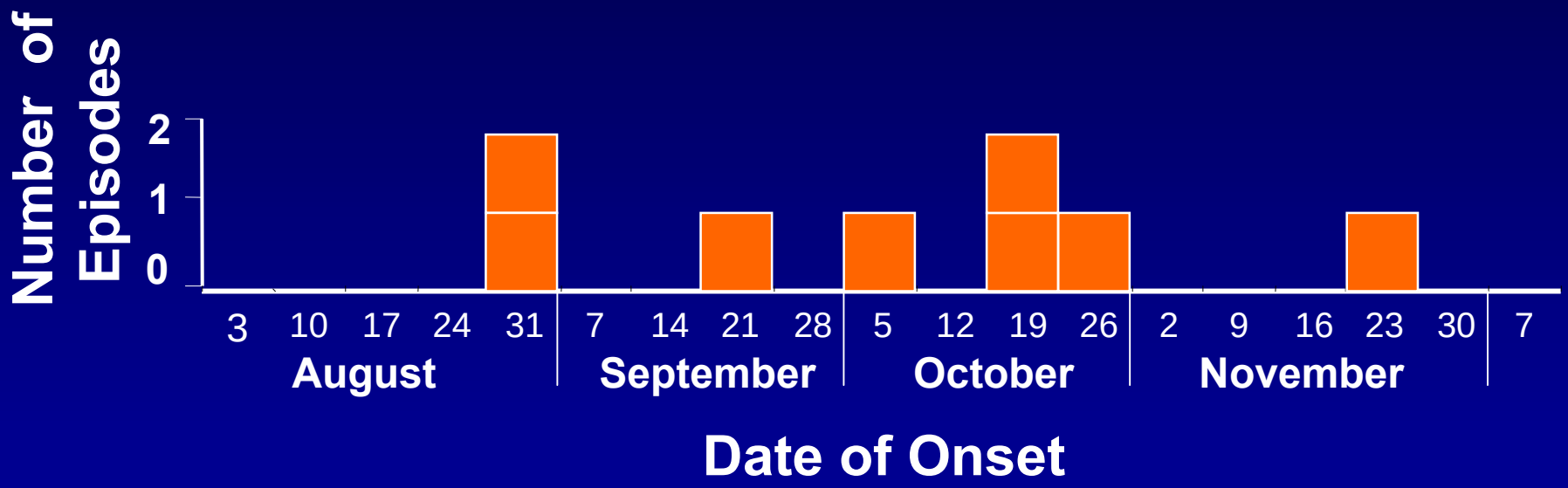
- 58 Players
- Median Age: 26 years (22-41)
- Race: white - 30 (52%)
- Weight group*:

BMI > 30	31 (58.5%)
BMI 25-30	21 (39.6%)
BMI 18.5 – 24 (Normal weight)	1 (1.9%)

*NCHS classification

Body Mass Index (BMI) Formula: $\frac{kg}{(m)^2}$

Cases of MRSA Infection in Team X Players, 2003

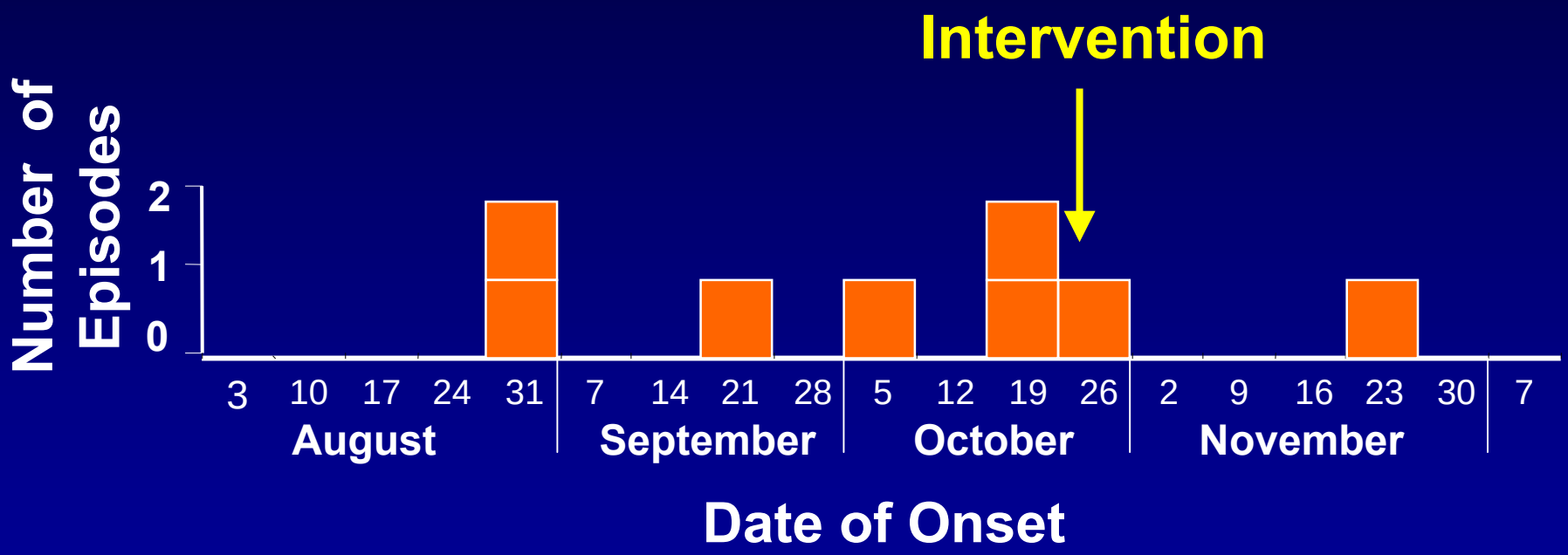


Eight MRSA Cases

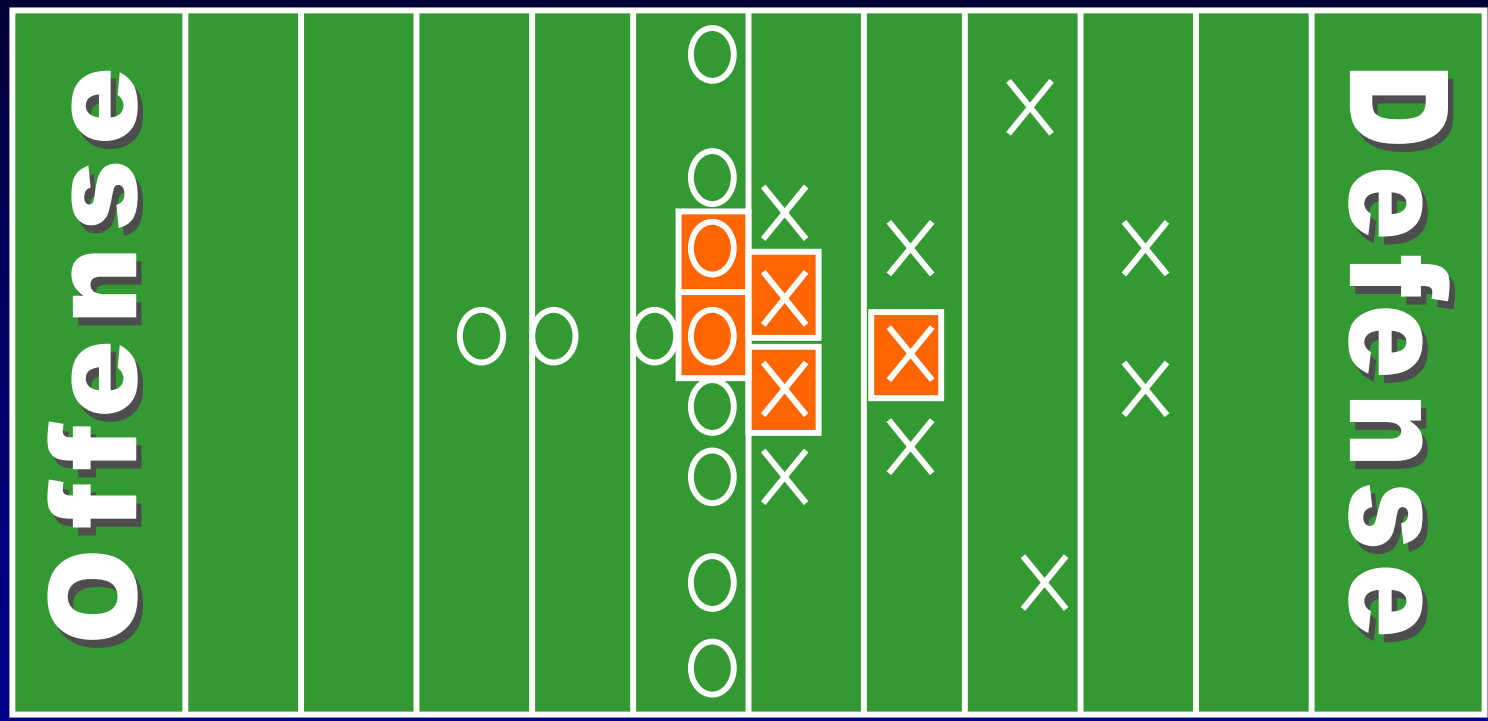
- All infections were:
  - at turf burn sites
  - on elbows, forearms, or knees
- 6 required surgical incision and drainage
- Three first case-players received Keflex
- 2 received IV abx

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

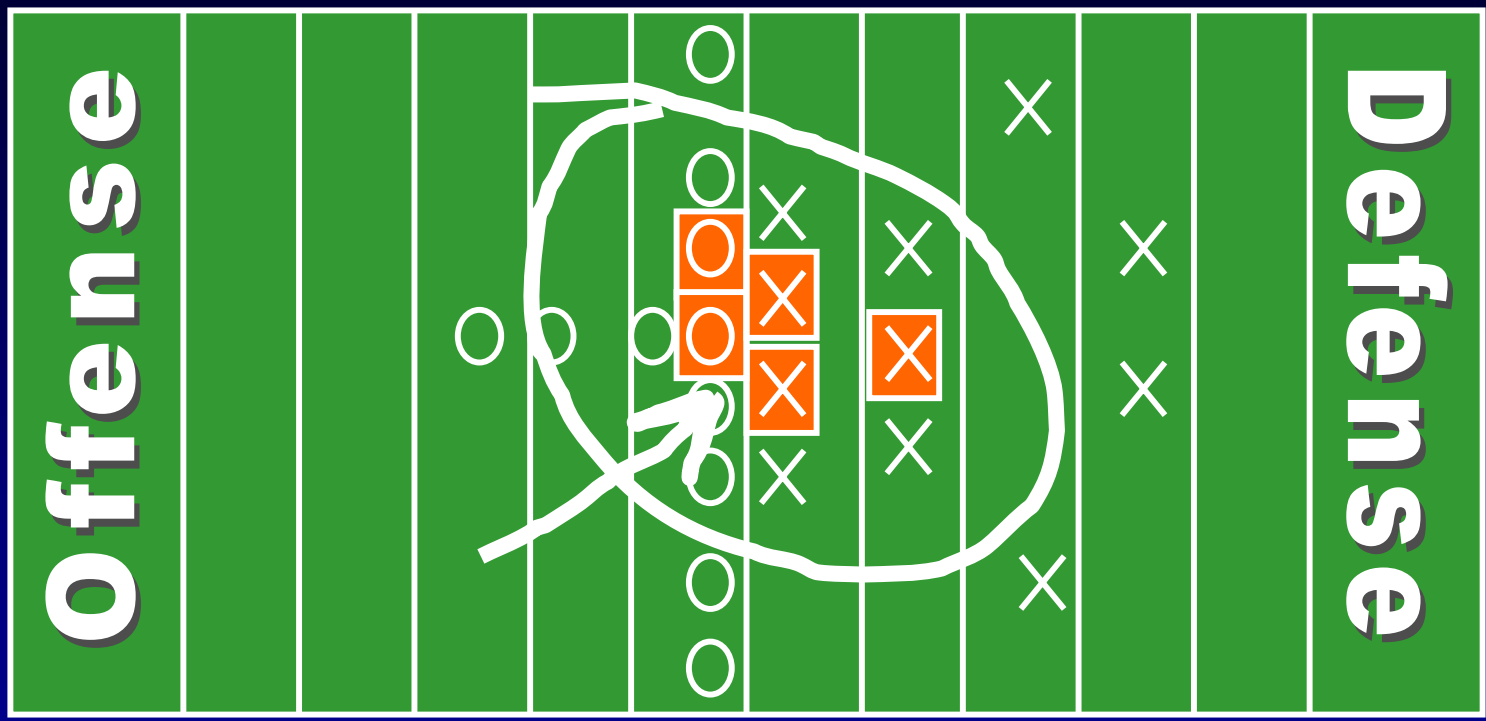
Cases of MRSA Infection in Team X Players, 2003



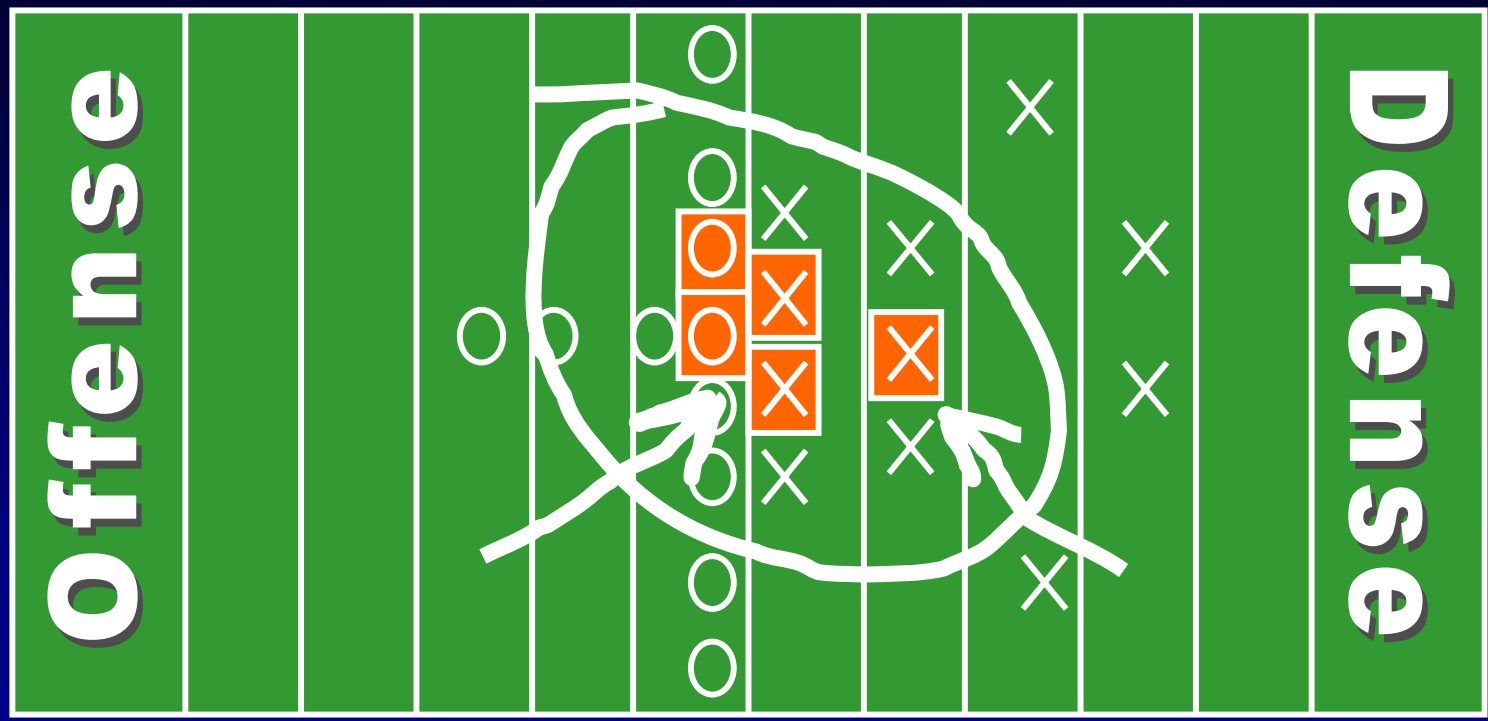
Case Player Position



Case Player Position



Case Player Position



Cohort Study

Risk Factor		Total Number	Cases	Attack Rate	RR	P Value*
Lineman/ Linebacker						
	Yes	27 (51%)	5	19%	10.6	0.021
	No	26 (49%)	0			
BMI >30						
	Yes	31 (58%)	5	16%	7.9	0.048
	No	22 (42%)	0			
Antimicrobials in last year						
	Yes	30 (59%)	5	17%	7.8	0.049
	No	21 (41%)	0			

* Chi-Square with $\alpha = 0.05$

Observational Study

- Turf burns
  - ~3/player/week
  - Frequently not covered
  - Trainers had poor hand hygiene
- Personal hygiene
  - Frequent towel sharing
  - Skipping showers before using spas
- Close contact
  - Lineman and linebackers
  - Team meetings
  - Adjacent lockers

Observational Study

- Training facility
  - Equipment not cleaned
  - No guidelines for cleaning of spas, sauna, and steam room
- Onsite Pharmacy for distributing antimicrobials

Review of Antimicrobial Use

Prescriptions/Person/Year

Team X	General Population*	P-Value
2.6	0.2	$p < 0.001$

*NHANES/NAMCS data for males aged 22-41 years, 2002

CDC
Centers for Disease Control and Prevention

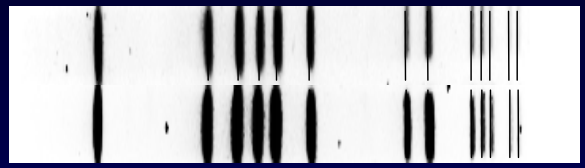
S. aureus Colonization and Environmental Study

	# Samples	MRSA	MSSA # samples (%)
Nasal Swabs			
Players	58	None	23 (40%)
Staff	26	None	12 (46%)
Uninfected Turf Burns	2	None	2 (100%)
Environmental	20	None	
Spa Water	6		3 (50%)
Taping Gel	1		1 (100%)

Laboratory Methods and Characterization of *S. aureus*

- *S. aureus* isolates
  - **2 MRSA abscess isolates**
  - **41 MSSA isolates**
- Methods
  - **Antimicrobial susceptibility testing**
  - **Toxin testing (PVL, A-E, H, TSST)**
  - **Pulsed-Field Gel Electrophoresis (PFGE) and BIONUMERICS® software**
  - **PCR for typing resistance gene (SCC*mec*)**

Team X MRSA Abscess Isolates



MRSA: Abscess

MRSA: Abscess

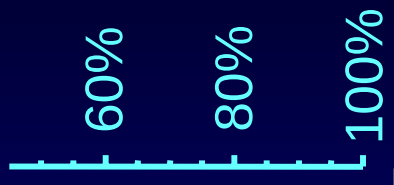
esistant

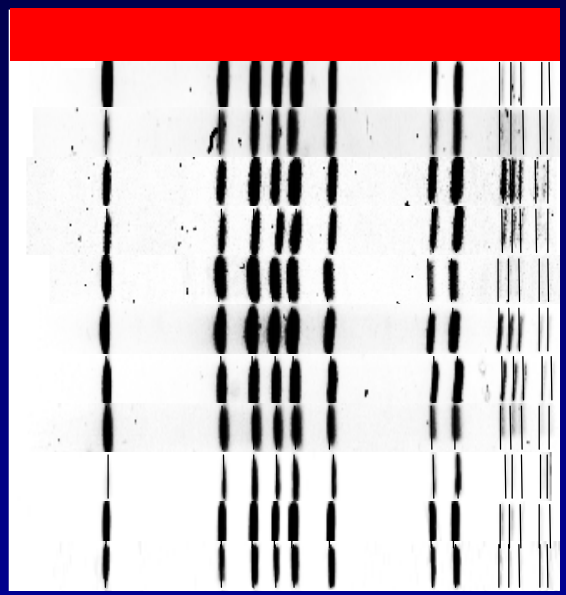
- **o methicillin and all other β-lactams**
- **o erythromycin**

roduce Panton-Valentine leukocidin

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

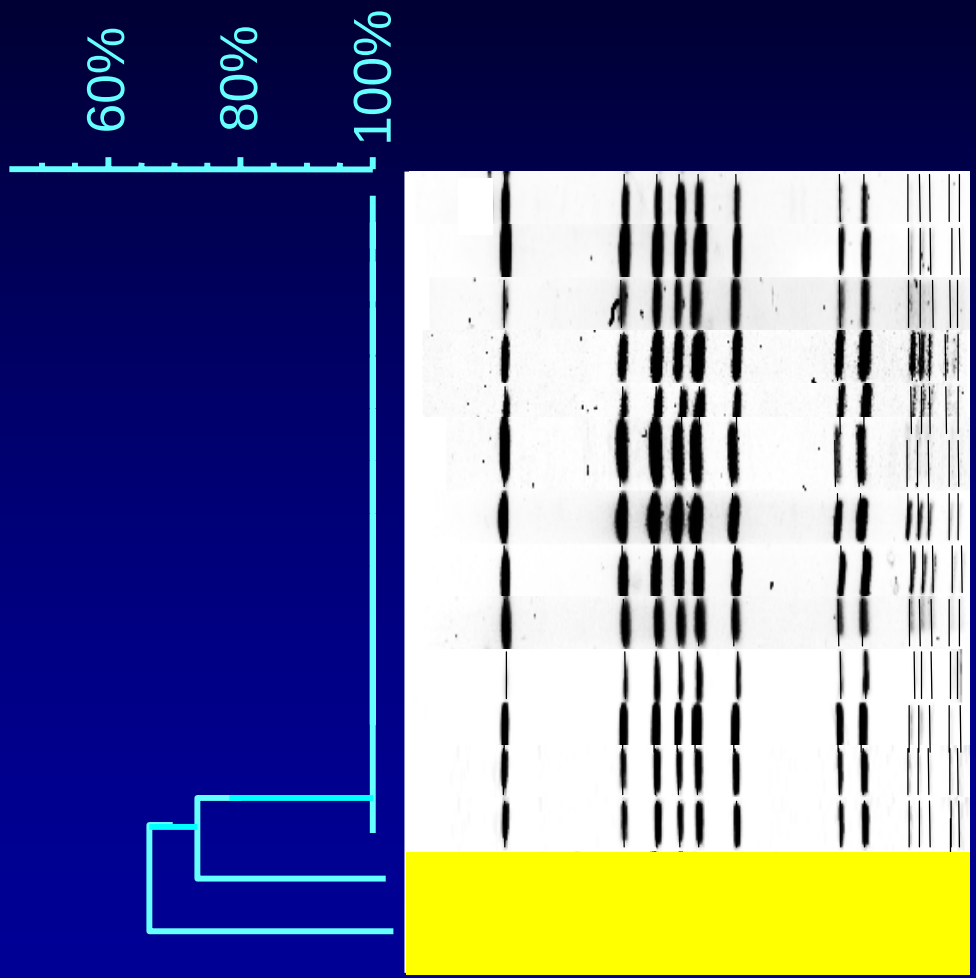
Team X MRSA Compared to Community Strains





NFL Team *X*	Abscess
NFL Team Y	Abscess
California	College Football
Pennsylvania	College Football
Colorado	Fencer
Mississippi	Prison
Texas	Jail
Georgia	Prison
Tennessee	Children
Texas	Children
Missouri	Children
California	Children

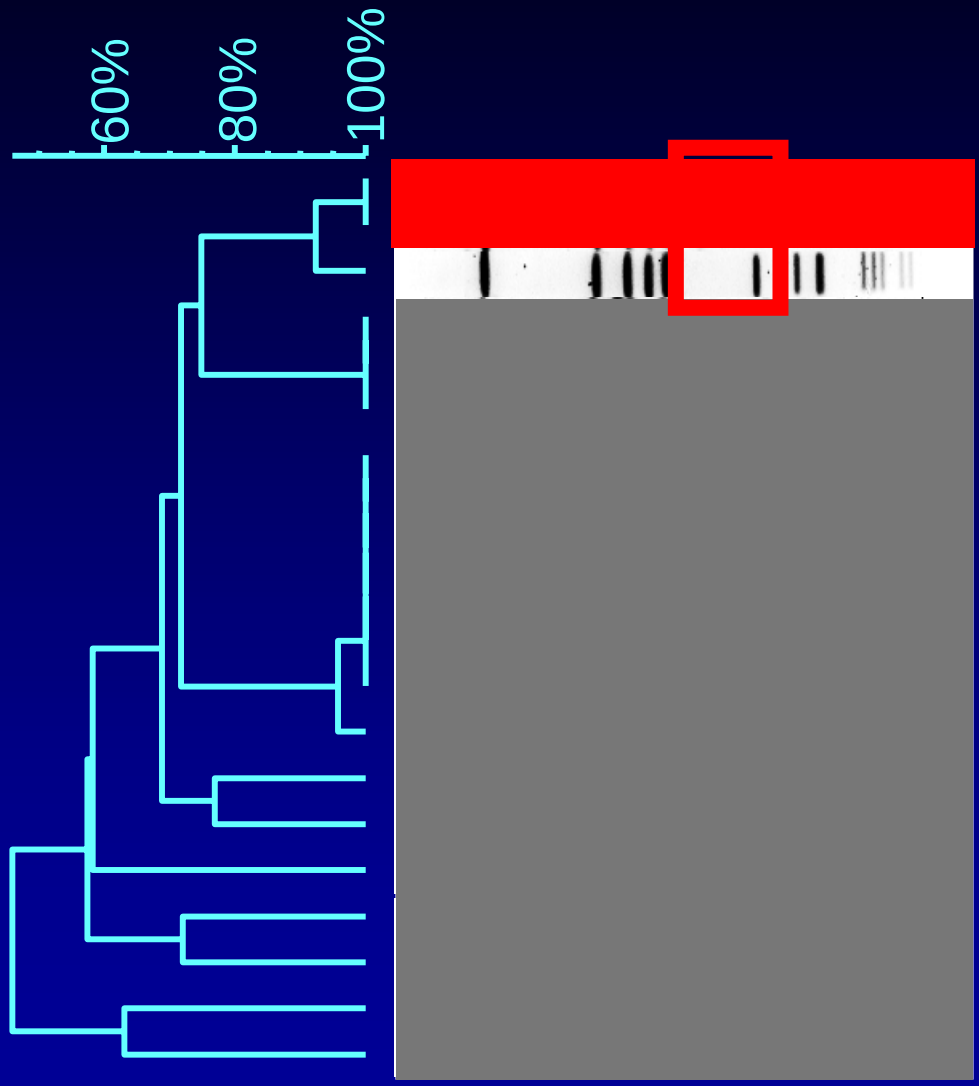
Community-Associated MRSA Compared to Hospital MRSA



Team *X*	Abscess
NFL Team Y	
California	College Football
Pennsylvania	College Football
Colorado	Fencer
Mississippi	Prison
Texas	Jail
Georgia	Prison
Tennessee	Children
Texas	Children
Missouri	Children
California	Children
USA300	Community
USA100	Hospital Strain
USA200	Hospital Strain

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

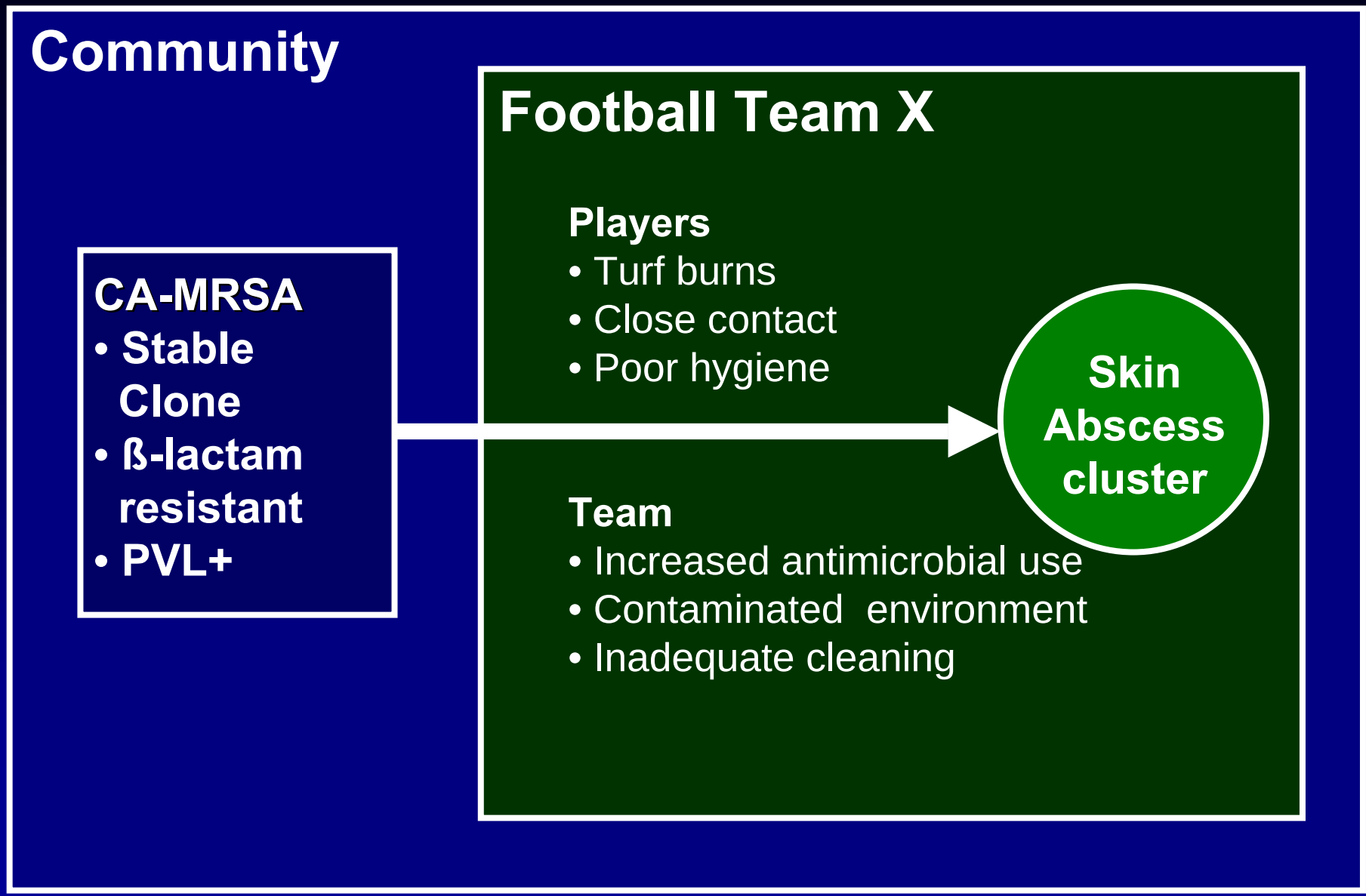
Team X MRSA and MSSA Isolates



MRSA: Abscess
MRSA: Abscess
MSSA: Nasal Swab

MSSA
Nasal
and
Environmental

Summary


Community
Football Team X
CA-MRSA
• Stable Clone
• ß-lactam resistant
• PVL+
Players
• Turf burns
• Close contact
• Poor hygiene
Skin Abscess cluster
Team
• Increased antimicrobial use
• Contaminated environment
• Inadequate cleaning

CA-MRSA Outbreak Interventions

- Enhanced disease surveillance among members of the cohort
  - Systematic and routine examination of skin
  - Reporting of skin abrasions and infections by players
- Infection treatment and containment
  - Drainage and culture of abscesses
  - Targeted antimicrobial therapy
  - Improved wound care

CA-MRSA Outbreak Interventions

- Temporary exclusion from competition/practice
  - If contamination from the wound can not be prevented
- Improved hand and personal hygiene
  - Access to sinks and alcohol hand gels
  - Single use towels
  - Wall soap dispensers
- Enhanced environmental cleaning
  - Multiuse training equipment
  - Whirlpool spa

CA-MRSA Outbreak Interventions

- Decolonization
  - Regimens
    - Chlorhexidine washes (pulse or single use)
    - Intranasal mupirocin
  - Data for decolonization in outbreak prevention are limited
  - A reasonable approach includes
    - In a closely-associated cohort
    - In an individual patient with recurrent disease

СПАСИБО! (Thank You!)

Acknowledgements

- CDC Lab
  - Sigrid McAllister
  - Bette Jensen
  - David Lonsway
  - Linda McDougal
  - Jean Patel
  - Mathew Arduino
  - George Killgore
  - Fred Tenover
  - Roberta Carey
- CDC Epi
  - Thomas Boo
  - Jeff Hageman
  - Dan Jernigan
  - Arjun Srinivasan
  - Michele Pearson
  - Jerry Tokars
  - Monina Klevens
  - Lisa Panlilio
  - Denise Cardo
- Professional Football Team X
- Missouri State Health Department
  - Larry Phelan
  - Doug Dodson
- Barnes Hospital
  - Victoria Fraser
- Santa Clara County Health Department
  - Sarah Cody

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION


DOUGLAS
45
HOLLOWAY

2003 Football Season Investigations

- Connecticut College (Begier, EIS ‘03)
  - 13 infections, 2 players hospitalized
  - Risk factors for infection:
    - turf burns
    - body shaving
    - whirlpool use
- Los Angeles College (Nguyen, EIS ’03)
  - 10 infections, 4 players hospitalized
  - Risk factors for infection:
    - Skin abrasions
    - Linemen position
    - Towel and soap sharing

DHQP

2003 Football Season Investigations

Team	# Infections	Risk Factors	Intervention
Connecticut College (Begier, EIS '03)	13 infections, 2 hospitalized	▪ turf burns ▪ body shaving ▪ whirlpool use	▪ Hexachlorophene soap, ▪ enhanced personal hygiene ▪ skin abrasion management
Los Angeles College (Nguyen, EIS '03)	10 infections, 4 hospitalized	▪ skin abrasions ▪ linemen ▪ towel and soap sharing	▪ Hexachlorophene soap and showers ▪ Decolonization (mupirocin)