



# CA-MRSA in Athletics

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**Texas Department of State Health Services  
meeting on CAMRSA Infections**

Austin, TX  
September 9, 2004

# 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 outbreaks

# 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<sup>1</sup>
- North Carolina 1977<sup>2</sup>
- Illinois 1979<sup>2</sup>

<sup>1</sup>Pollard JG. The Staphylococcus plagues a football team. *College Health* 1966;234-238.

<sup>2</sup>Bartlett PC, Martin RJ, Cahill BR. Furunculosis in a high school football team. *Amer J Sports Med* 1982;10:371-74.

# First MRSA Infections in Sports

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

<sup>1</sup> Lindenmayer JM, et al. Arch Intern Med 1998;158:895-9.

<sup>2</sup>Stacey AR, et al. Br J Sports Med. 1998;32;153-154

## **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 cause 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

## **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 cause 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



# The Bigger They Are The Harder They Fall

**CAMRSA Among Professional Football Players - 2003**

# 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

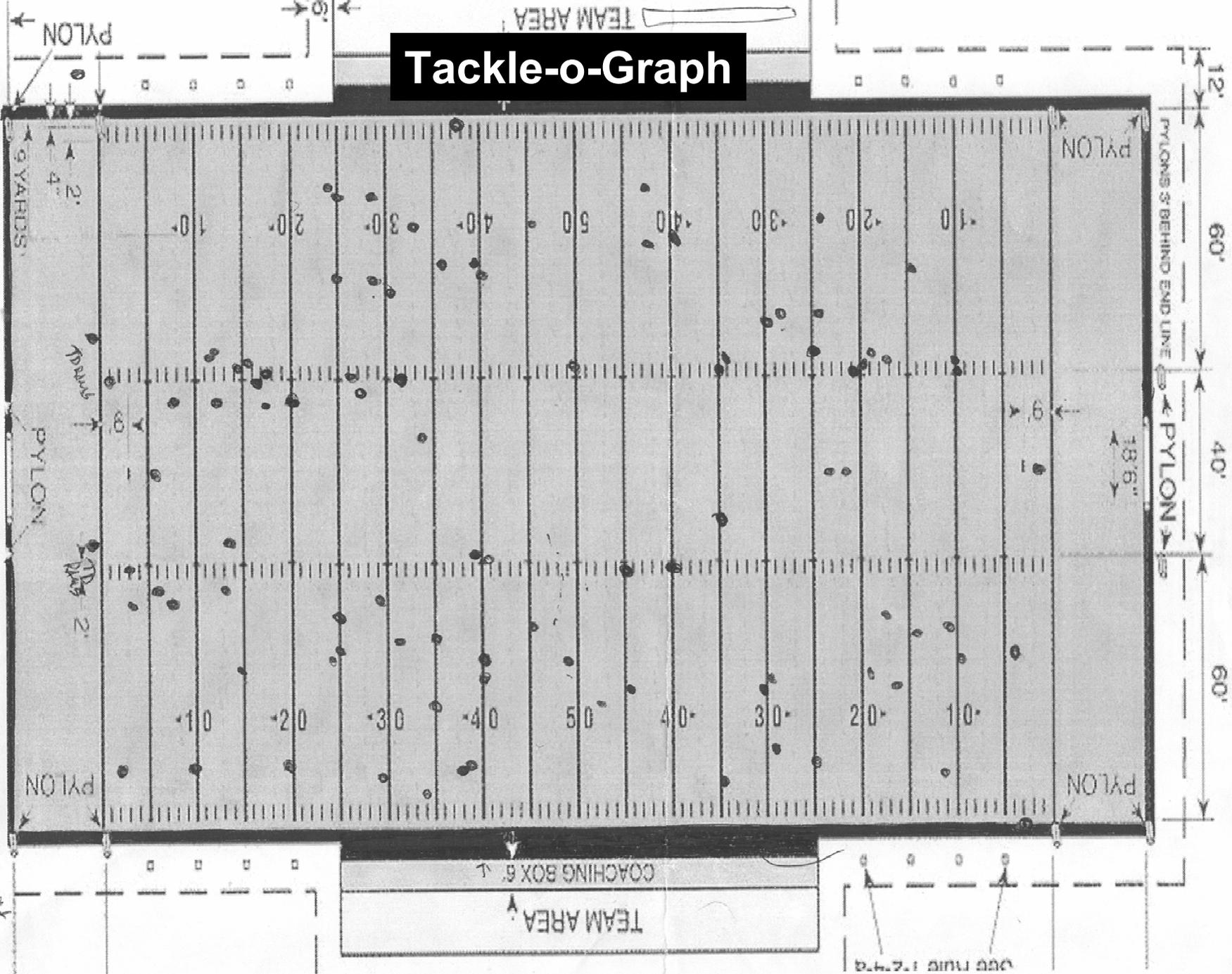
# Environmental Study

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



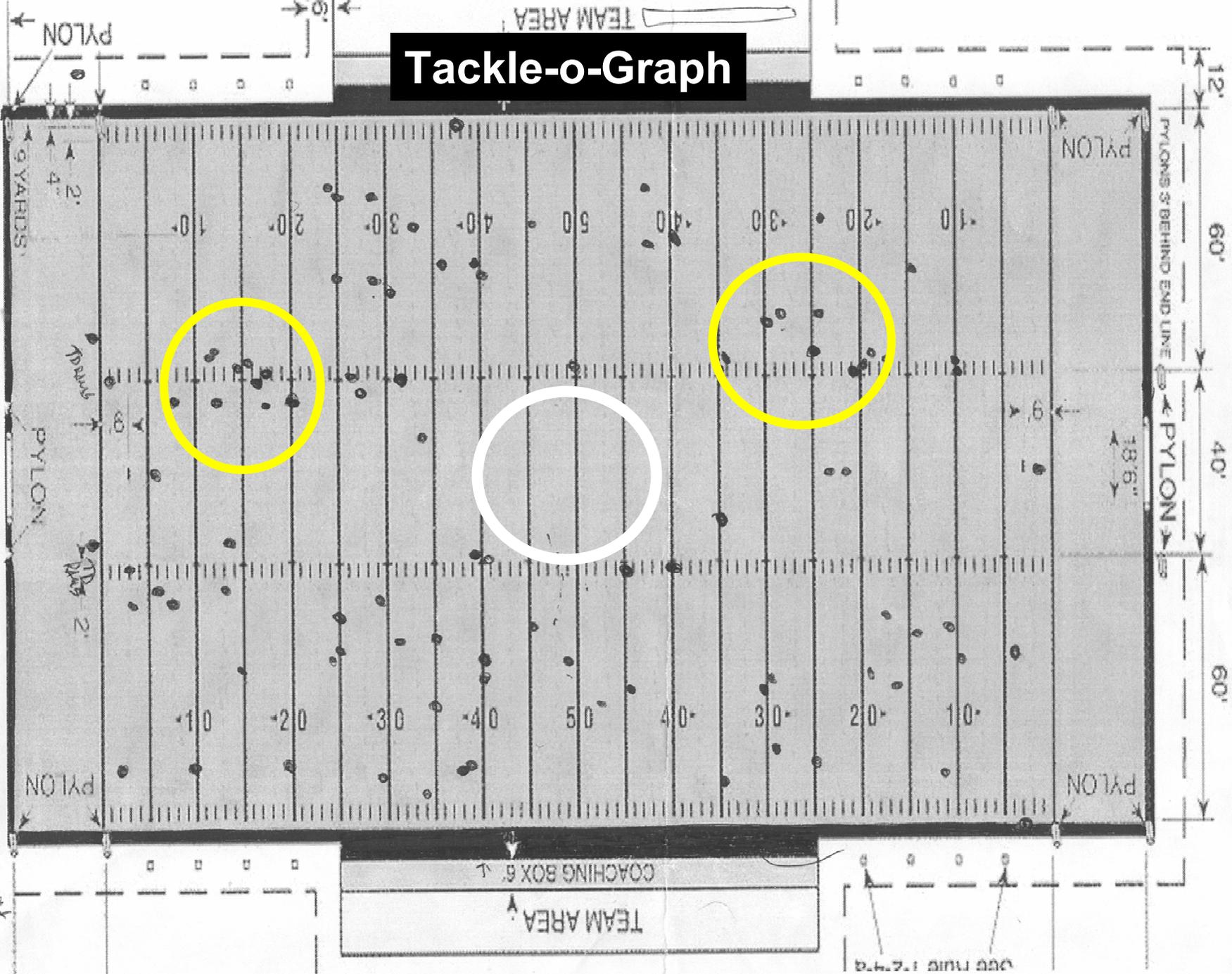
# Tackle-o-Graph

## DIAGRAM OF FIELD



# Tackle-o-Graph

## DIAGRAM OF FIELD



# 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:  $\frac{\text{kg}}{(\text{m})^2}$

# Cases of MRSA Infection in Team X Players, 2003



# Eight MRSA Cases

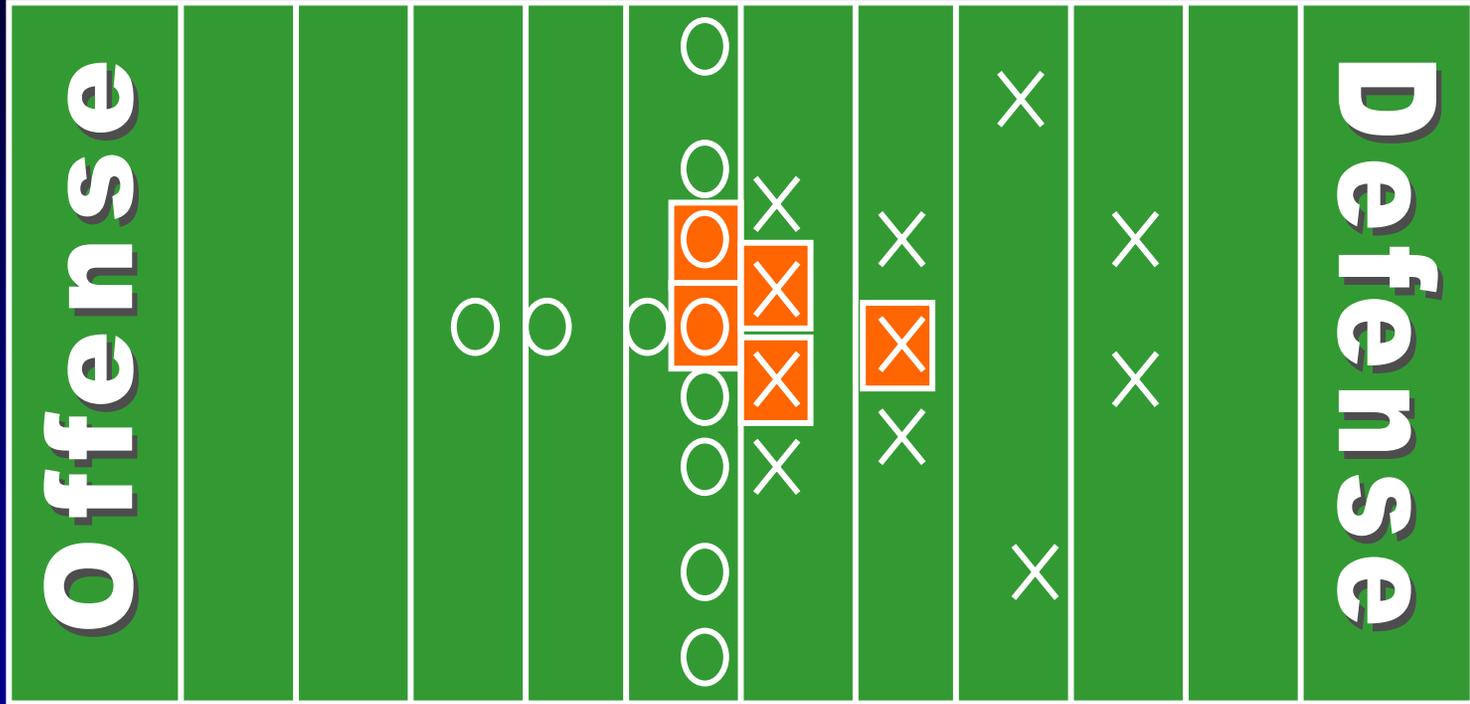
- All infections were:
  - at turf burn sites
  - on elbows, forearms, or knees
- 6 required surgical incision and drainage
- Three first case-players received Keflex
- 2 received IV abx



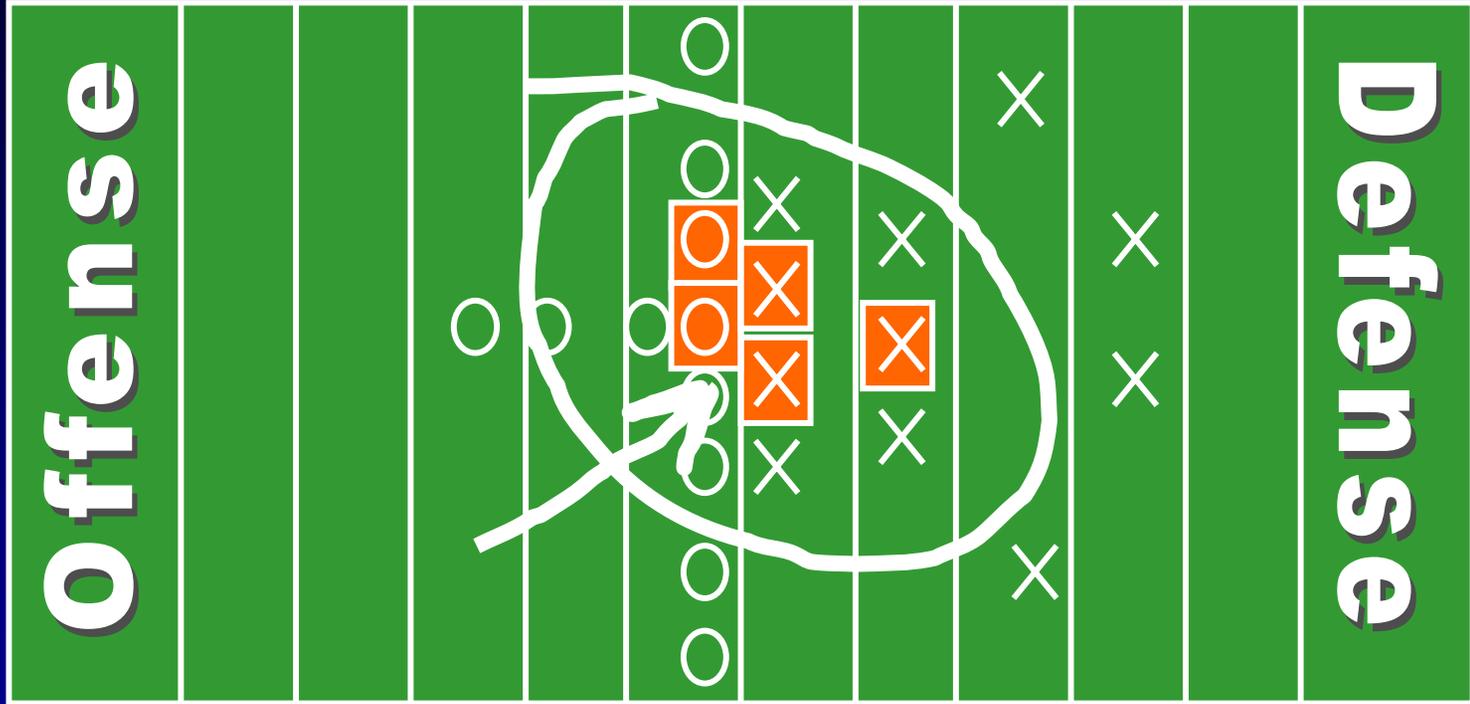
# Cases of MRSA Infection in Team X Players, 2003



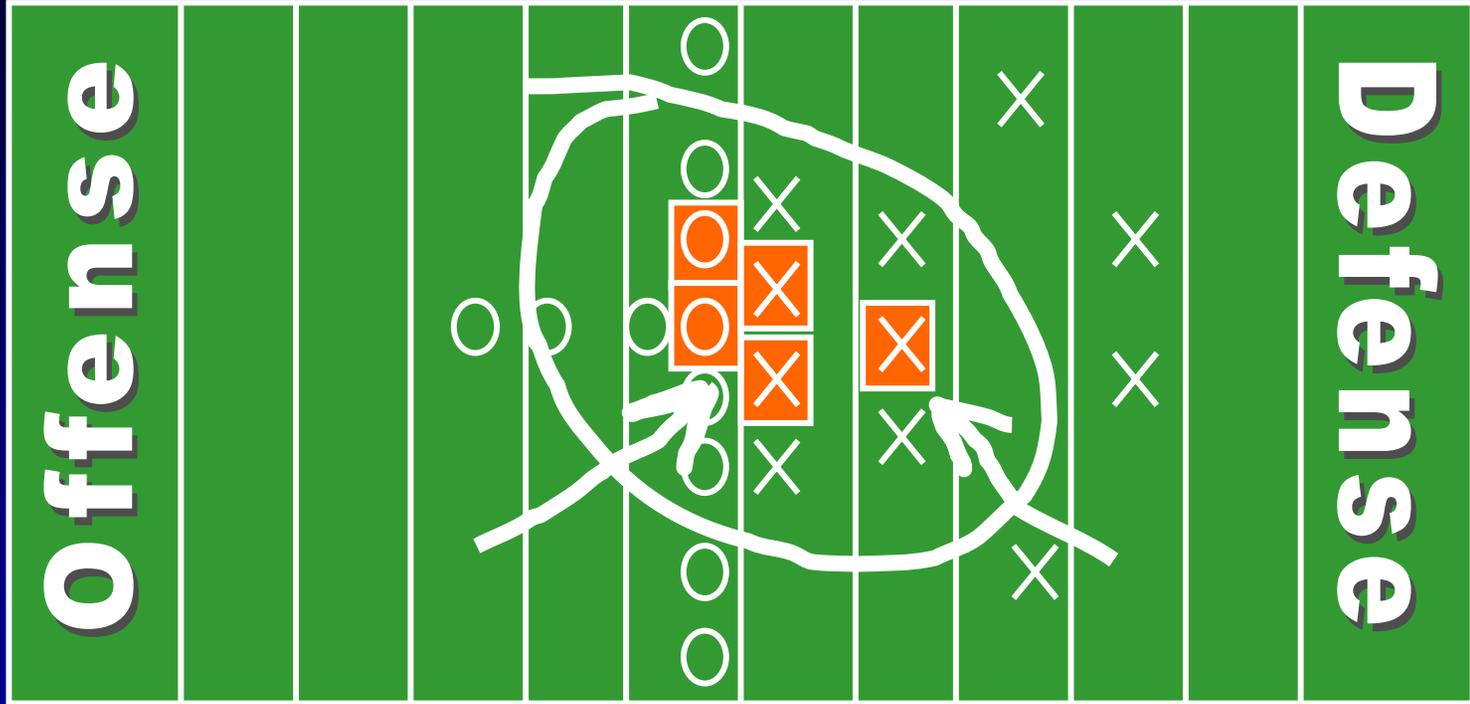
# Case Player Position



# Case Player Position



# Case Player Position



# Cohort Study

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

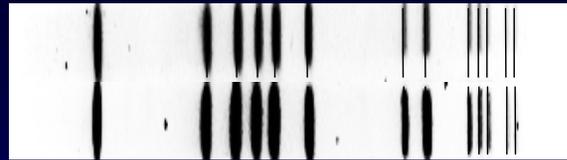
# ***S. aureus* Colonization and Environmental Study**

	<b># Samples</b>	<b>MRSA</b>	<b>MSSA # samples (%)</b>
<b>Nasal Swabs</b>			
Players	58	None	23 (40%)
Staff	26	None	12 (46%)
<b>Uninfected Turf Burns</b>	2	None	2 (100%)
<b>Environmental</b>	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<sup>®</sup> software
  - PCR for typing resistance gene (SCC*mec*)

# Team X MRSA Abscess Isolates



MRSA: Abscess

MRSA: Abscess

resistant

- o methicillin and all other  $\beta$ -lactams

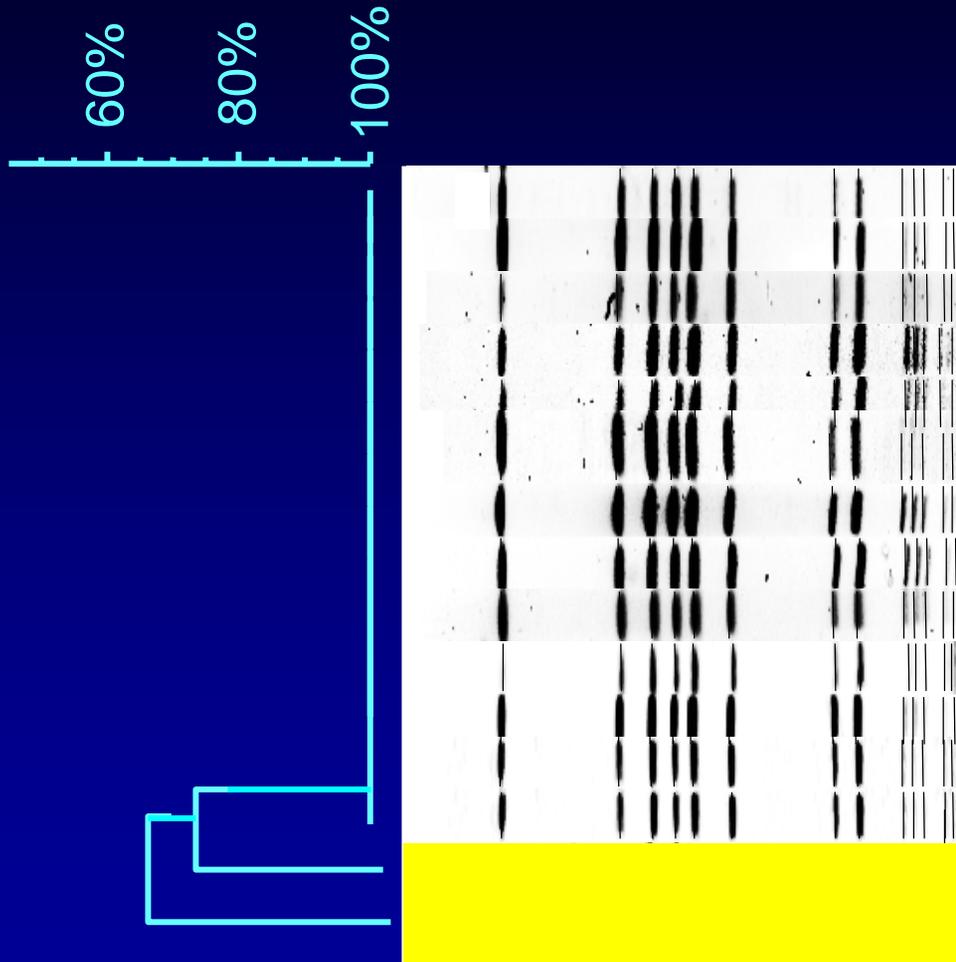
- o erythromycin

produce Pantone-Valentine leukocidin

# Team X MRSA Compared to Community Strains



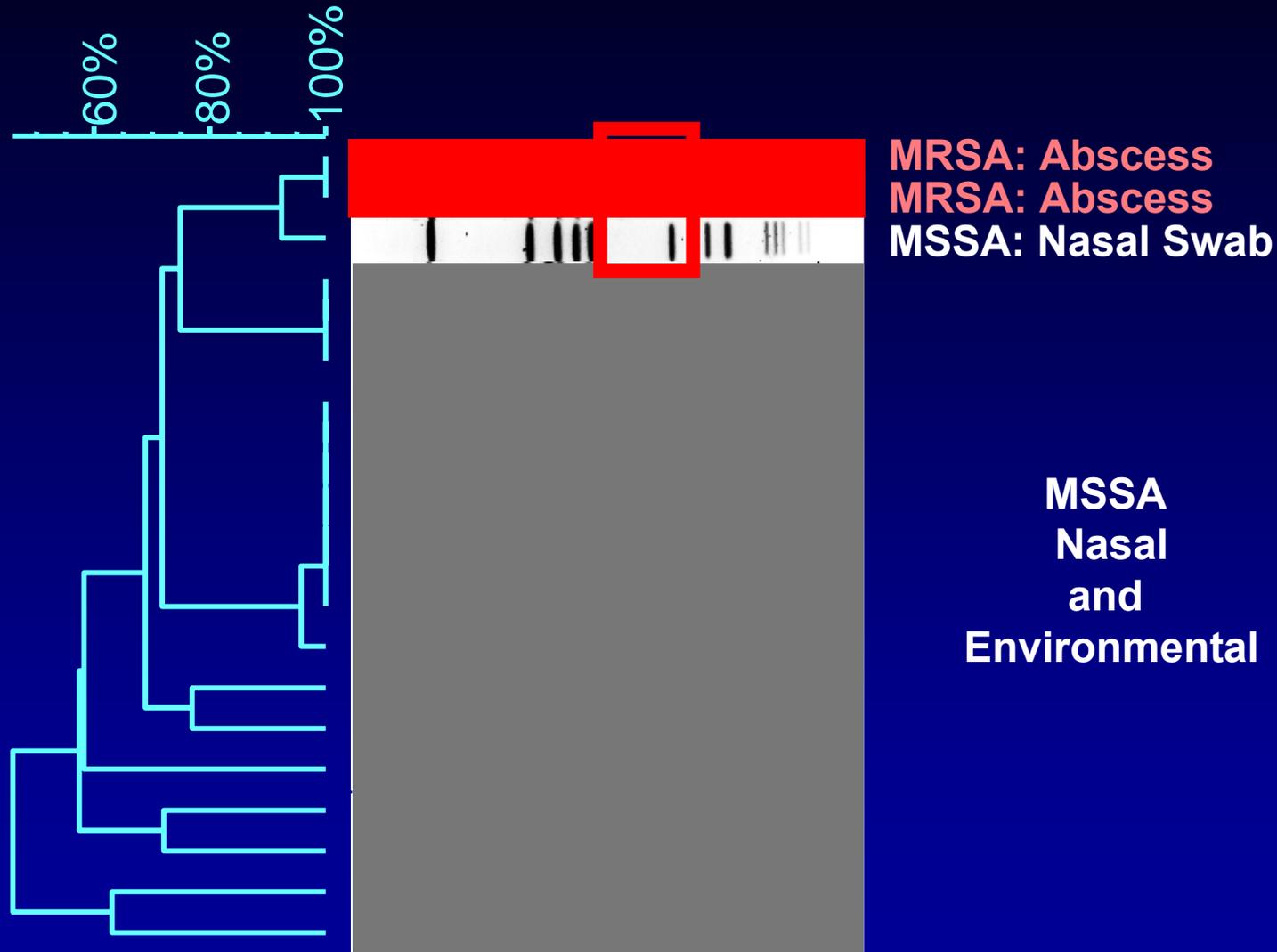
# Community-Associated MRSA Compared to Hospital MRSA



**Team X**  
 NFL Team Y  
 California  
 Pennsylvania  
 Colorado  
 Mississippi  
 Texas  
 Georgia  
 Tennessee  
 Texas  
 Missouri  
 California  
 USA300  
 USA100  
 USA200

**Abscess**  
 College Football  
 College Football  
 Fencer  
 Prison  
 Jail  
 Prison  
 Children  
 Children  
 Children  
 Children  
 Community  
 Hospital Strain  
 Hospital Strain

# Team X MRSA and MSSA Isolates



# Summary

## Community

### CA-MRSA

- Stable Clone
- $\beta$ -lactam resistant
- PVL+

## Football Team X

### Players

- Turf burns
- Close contact
- Poor hygiene

### Team

- Increased antimicrobial use
- Contaminated environment
- Inadequate cleaning

Skin  
Abscess  
cluster

```
graph LR; A[CA-MRSA  
• Stable Clone  
• β-lactam resistant  
• PVL+] --> B[Football Team X  
Players  
• Turf burns  
• Close contact  
• Poor hygiene  
Team  
• Increased antimicrobial use  
• Contaminated environment  
• Inadequate cleaning]; B --> C((Skin Abscess cluster));
```

# 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!)

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