



Uncomplicated Skin and Soft Tissue Infections in the Era of CA-MRSA

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Outline

- History of MRSA
- Trends in SSTI
- Workup and management of SSTIs
 - DHMC guidelines for uncomplicated SSTIs

Case

- **48yo incarcerated male with RA p/t ED complaining of a spider bite to L axilla.**
- **Started 3 days ago**
- **Saw provider the day prior to admit and started doxycycline but erythema spread**
- **History of “spider bites” treated with doxycycline**

Case 1

- Vital signs normal
- LUE: erythema medial aspect of proximal arm to the antecubital fossa with an area of induration 2 inches in diameter in axillary region





What is the Diagnosis?



Uncomplicated SSTIs

- **Typically caused by gram positive bacteria**
 - **Staph and Strep**
- **Purulent SSTIs more likely to be caused by Staph**
- **Strep more often causes non-purulent infection**

Staphylococcus Aureus



- **1800s: Discovered**
- **1940s: Became rapidly resistant to penicillin**
- **1961: Methicillin use began**
- **1961-2: MRSA isolates discovered**

MRSA: The Early Years

- **Nosocomial pathogen**

- **Risk factors**
 - Recent hospitalization**
 - Recent surgery**
 - Dialysis**
 - Resident of NH**
 - Indwelling catheter or other medical device**

MRSA: The Early Years

- **Risk factors – more specific**
 - **Exposure to antibiotics**
 - **ICU admission**
 - **Exposure to another patient with MRSA**
 - **Surgery**
- **Large urban medical centers**



MRSA in the community

- **Various community outbreaks reported throughout the 1980s and 1990s**
 - **Drug users**
 - **Recently hospitalized**



CA-MRSA: Definition

- **MRSA culture positive in outpatient setting or within 48 hours of admission and no identifiable risk factor for HA-MRSA**
 - Surgery**
 - Recent Hospitalization**
 - Hx MRSA**
 - Dialysis**
 - Long-term care facility**
 - Indwelling medical device**

Community-acquired MRSA

- **Review of children hospitalized at University of Chicago Children's Hospital with *S.Aureus* infections from 1988-90 and 1993-95**
 - **Classified patients as “with identified risk” for MRSA or “without identified risk”**
 - **Determined if MRSA was nosocomial or community-acquired**

Results

- **1988-1990**
- **8 of 32 (25%) cases were CA**
- **1 of 8 (12%) had no risk factor**
- **Prevalence of CA-MRSA: 10 per 100,000 admits**
- **1993-1995**
- **35 of 52 (67%) cases were CA**
- **25 of 35 (70%) no risk factor**
- **Prevalence of CA-MRSA: 259 per 100,000 admits**

CA-MRSA Outbreaks

- **Vermont high school wrestling team**
 - **6 of 32 wrestlers – subcutaneous abscesses that cultured MRSA**
 - **12 other members reported having boils**
 - **11 nonwrestlers in the community had MRSA infections**
- **St. Louis Rams football team**
 - **Outbreak during 2003 football season**
- **Other outbreaks reported in prisons, MSM**

Lindenmayer JM. MRSA in a High School Wrestling Team and the Surrounding Community. *Arch Intern Med* 1998;258:895-99

Kazakova SV. A Clone of MRSA among Professional Football Players. *NEJM* 2005;352(5):468-75

MMWR 2003.

CA-MRSA: what makes it different?

■ Unique characteristics

- Genes encoding toxins
- Less antimicrobial resistance
- Gene complex which gives is methicillin-resistance

CA-MRSA

- **Panton-Valentine leukocidin**
 - **Skin necrosis**
 - **Abscess formation**
 - **? Virulence factor**
- **Antibiotic susceptibility profile**
 - **Susceptible to more classes of drugs than HA-MRSA including clindamycin**
- **Methicillin resistance**
 - **Gene complex *SCCmec* IV or V**

Risk factors for CA-MRSA

- Jail
- IVDU
- Exposure to someone with MRSA
- Competitive sports
- Military
- Nasal colonization with MRSA
- Recent antibiotic use
- ?Race
 - Non-white
- Medically underserved
- MSM
- Native Americans
- Pacific Islanders



Factors influencing spread

- **Crowding**
- **Hygiene**
- **Contact**
- **Compromised skin**
- **Contaminated surfaces**
- **Antibiotic use**

CA-MRSA

- **USA300 and 400 clones are predominant strains in US**
- **Predilection for causing skin infections**
- **One study looking at 3 different US communities found 77% of clinical infections from CA-MRSA are SSTIs**
- **MRSA is leading cause of purulent skin and soft tissue infections**
- **CA-MRSA is less likely a cause of invasive infections**

Fridkin, SK. *NEJM* 2005;352(14):1436-44

King, MD. *Ann Intern Med* 2006;144:309-17

How Common?

- Study of 11 EDs at University Affiliated Hospitals (Aug 2004)
- 422 patients diagnosed with purulent SSTI
 - 76% of SSTIs caused by *S. Aureus*
 - 78% of *S. Aureus* isolates were methicillin-resistant
- 59% of all SSTIs caused by MRSA
 - 97% - USA300 isolates

Table 1. Bacterial Isolates from Purulent Skin and Soft-Tissue Infections in 11 U.S. Emergency Departments.*

Site	No. of Patients Enrolled (N=422)	MRSA (N=249) [†]	MSSA (N=71)	Other Bacteria (N=64) [‡]		No Bacterial Growth (N=38)
				number	(percent)	
Albuquerque	42	25 (60)	10 (24)	3	(7)	4 (10)
Atlanta	32	23 (72)	4 (12)	3	(9)	2 (6)
Charlotte, N.C.	25	17 (68)	0	4	(16)	4 (16)
Kansas City, Mo.	58	43 (74)	6 (10)	4	(7)	5 (9)
Los Angeles	47	24 (51)	6 (13)	8	(17)	9 (19)
Minneapolis	28	11 (39)	4 (14)	9	(32)	4 (14)
New Orleans	69	46 (67)	11 (16)	9	(13)	3 (4)
New York	20	3 (15)	8 (40)	5	(25)	4 (20)
Philadelphia	58	32 (55)	12 (21)	12	(21)	2 (3)
Phoenix, Ariz.	30	18 (60)	8 (27)	4	(13)	0
Portland, Oreg.	13	7 (54)	2 (15)	3	(23)	1 (8)

* A total of 31 cultures, including 10 cultures from which MRSA was isolated, were polymicrobial. Because of rounding, percentages may not total 100. MSSA denotes methicillin-resistant *Staphylococcus aureus*.

[†] P<0.001 for the test for homogeneity of MRSA prevalence across sites.

[‡] Other bacteria isolated were as follows: MSSA (17 percent), streptococcus species (7 percent), coagulase-negative staphylococci (3 percent), and *Proteus mirabilis* (1 percent).

ED visits for SSTI

- **1993-2005 NHAMCS data**
- **1993**
 - **1.2 million ED visits for SSTIs**
 - **1.35% of ED visits for SSTI**
- **2005**
 - **3.4 million ED visits for SSTIs**
 - **2.98% of ED visits for SSTIs**

ED Visits for SSTI

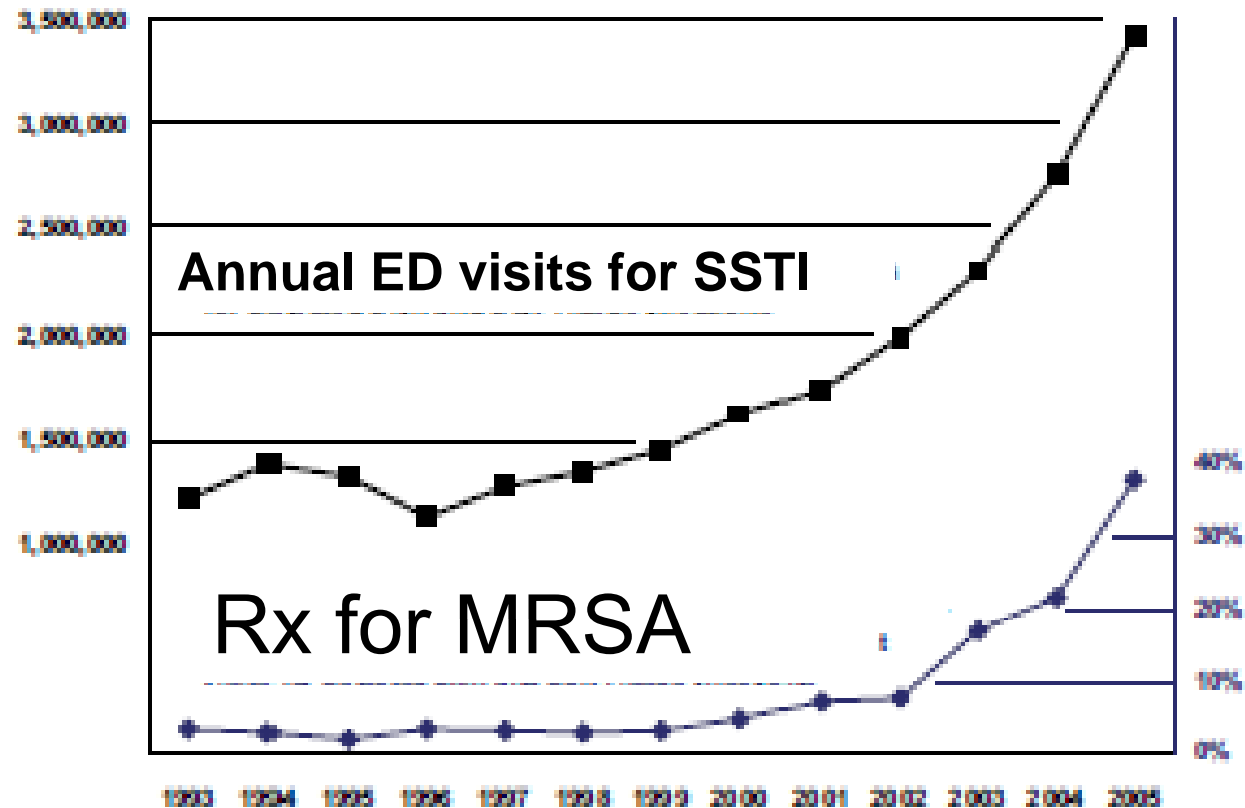
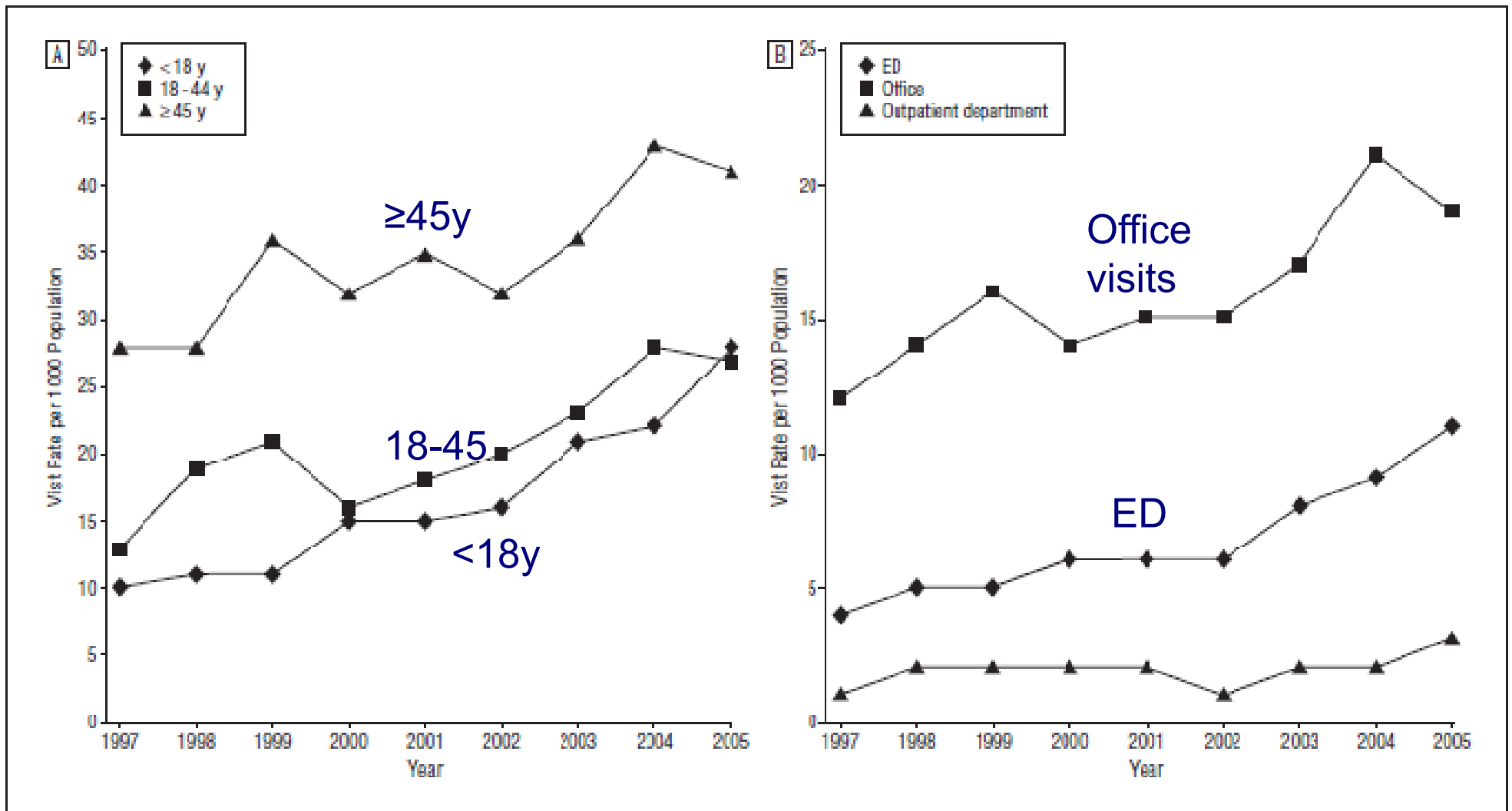


Figure. Annual visits to US EDs for selected skin and soft tissue infections, during the emergence of community-associated MRSA, 1993-2005.*

Ambulatory Trends in SSTI

- **Outpatient and ED visits for SSTIs from 1997-2005 examined**
- **Increase from 8.6 million in 1997 to 14.2 million in 2005**
- **Most cases seen by outpatient physicians not in EDs**

Ambulatory Trends in SSTI



Hospital Admits for SSTI

- **Increasing**
- **Admissions for SSTIs increased by 29% from the year 2000 to 2004**
- **By comparison, admissions for infectious pneumonia stayed consistent during same time period**



SSTIs at Denver Health

- **Retrospective cohort study of 322 patients admitted for SSTIs in 2007**
- **Hypothesis: diagnostic tests and antimicrobial agents overutilized in SSTIs**



SSTIs at Denver Health

- **103 (32%) of these cases were uncomplicated cutaneous abscesses**
- **66 (20%) uncomplicated cellulitis**
- **153 complicated SSTIs**

Complicating Risk Factors

- Diabetic ulcer/other ulcer
- PAD
- ICU admit/ severe sepsis
- Deep tissue infection
- Surgical site infxn
- Bacteremia
- Indwelling medical device
- Recurrent cellulitis
- Human/animal bite
- Perirectal abscess
- Periorbital/orbital cellulitis
- Need for fascial bx
- Recurrent cellulitis
- Hospitalization/health care facility within 90 days

Microbiology

■ Cutaneous abscess

- 52 of 77 that had culture data were *Staph Aureus*
 - 34 (65%) were MRSA
- 44% of all cutaneous abscesses were MRSA
- 97% of purulent infections were predominantly Staph or Strep

Use of diagnostic tests (%)

	Cellulitis(n=66)	Abscess(n=103)
ESR	59	50
CRP	68	55
Blood Cx	58	47
Plain film	71	49
US	42	14
CT or MRI	17	17

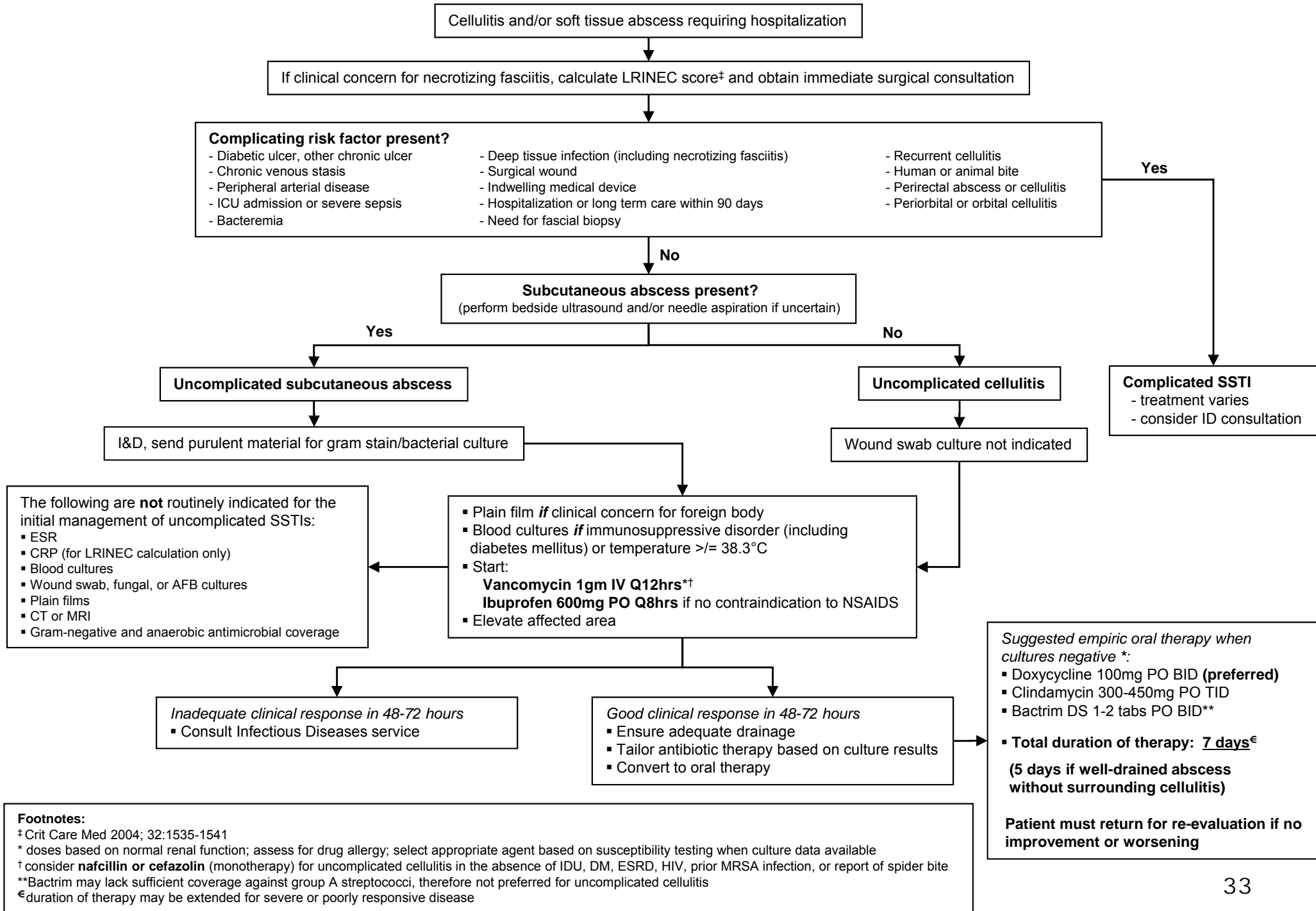


Antibiotic Utilization

- **61-67% of patients received broad-spectrum gram-negative therapy**
- **~1/3 of patients received gram-positive therapy ONLY**
- **Median total duration of therapy – 13 days**

Denver Health Guideline for the Management of Adults Hospitalized with Skin and Soft Tissue Infection

Updated 5/2009





Treatment of Uncomplicated SSTI

■ General principles

- Short course (7 days or less)
- Coverage for gram positive pathogens
- MRSA prevalent
- Adjunct therapy such as NSAIDs can shorten clinical course

Subcutaneous abscess

- Incision and drainage mainstay of treatment
- Small abscesses – moist heat to promote drainage
- Abscess <5cm in diameter
 - I&D alone
- Abscess >5cm or abscess with surrounding cellulitis or systemic signs/sx of infection
 - I&D
 - Adjunct antibiotic therapy targeted at MRSA

Prevention measures

- **Cover all wounds**
- **Dispose properly of bandages**
- **Avoid sharing items if infected**
- **HAND HYGEINE!**
- **Clean sports equipment**
- **Launder clothes in contact with contaminated area**

www.cdc.gov

Daum, RS. SSTIs Caused by MRSA. *NEJM* 2007;357(4):380-90

Conclusions

- **SSTIs in the US are increasing resulting in increased clinic visits, ED visits and hospitalizations**
 - Younger, healthier patients affected
- **CA-MRSA is the predominant cause of purulent SSTIs**
 - Therapy should be targeted at MRSA if prevalent in population
- **Judicious use of diagnostic tests and antimicrobial agents imperative**



Acknowledgements

- Tim Jenkins, MD