

Infectious Complications of Combat Related Extremity Injuries in the British Military

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Background

- Extremities the most common site of combat injuries¹
- One third to one half associated with a fracture²
- Increase in blast weapons resulted in devastating extremity wounds³



1. Petricević A, et al 1998

2. Owens BD, et al. 2007

3. S Dentzer. 2006

Management

- Staged approach:
 - Irrigation
 - Serial debridements
 - Antibiotics
- Aim for skeletal stabilisation, restoration length, preservation optimum function



Complications

- Infection most common complication extremity wounds following ballistic trauma: up to 40%
- Risks life, significant morbidity
- Most common cause delayed amputation⁴



Aim

- Assess the infectious complications of mangled extremities
- Define contributing factors towards an increase in the rate of infections
- Possible need for review of current practice



Methods

- Patients identified JTTR
 - All patients with AIS \geq 2
 - Review clinical records
- Demographics:
 - MOI
 - Upper/Lower extremity
 - Tissue damage
 - Limb ischaemia
 - Systemic hypotension

Methods

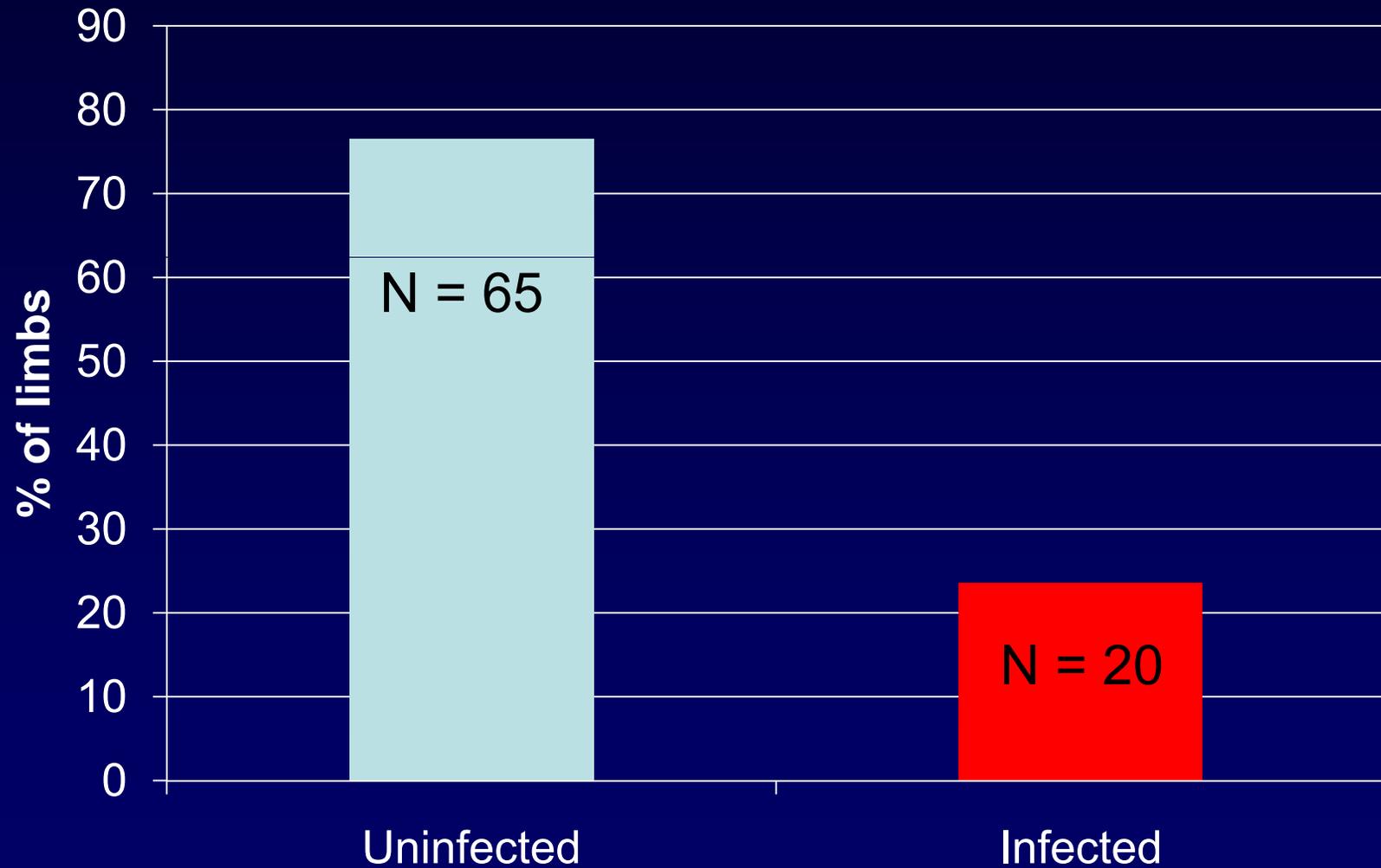
- Data points:
 - Time before surgery
 - Method initial and definitive fracture fixation
 - Antimicrobial therapy
 - Care at point of injury (tourniquets, clotting products)



Methods

- Statistics
 - Pearson square analysis
 - Fisher's Exact
 - Mann-Whitney U
 - Univariate and multi-variate analysis

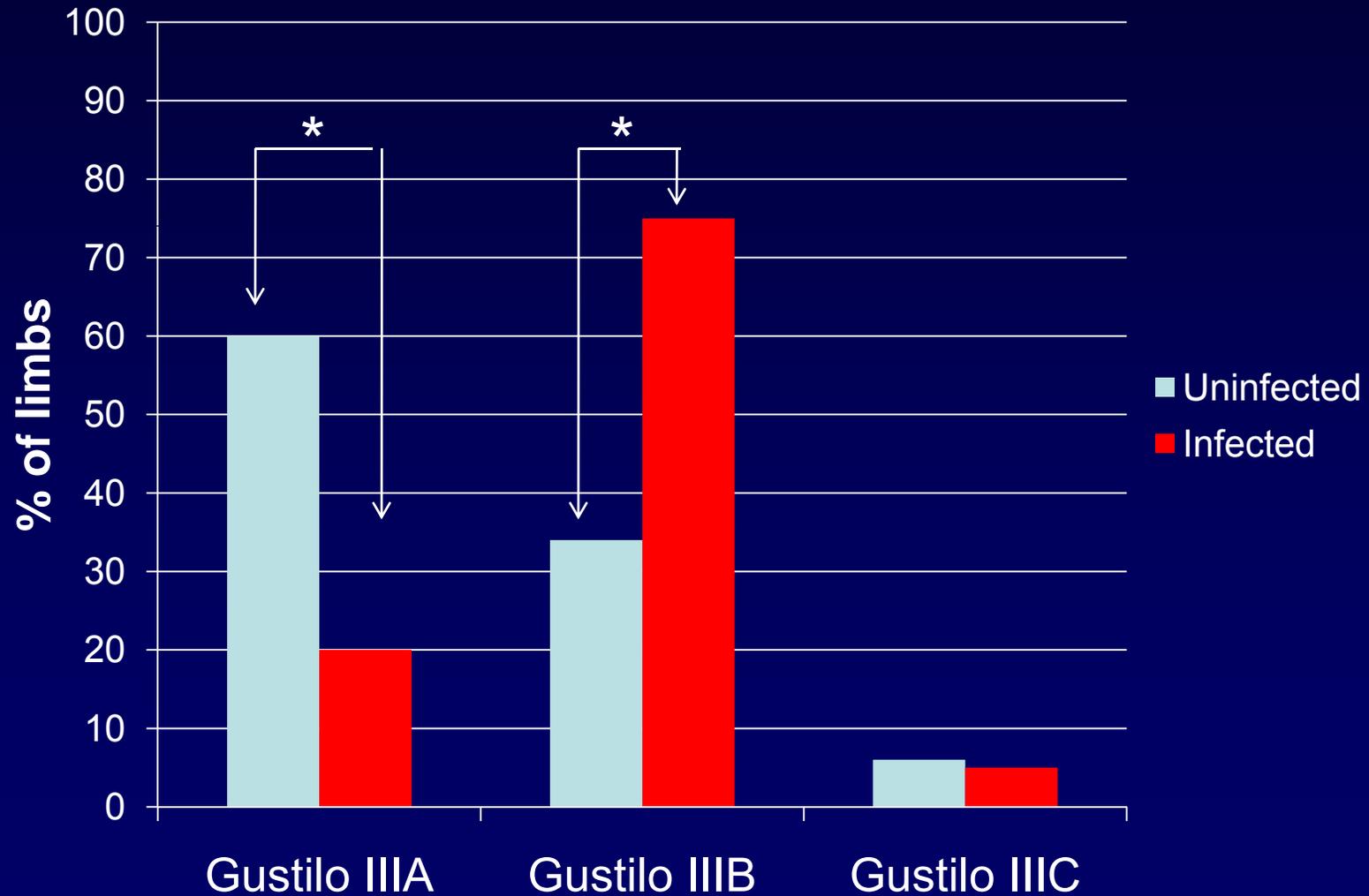
Results (n=85)



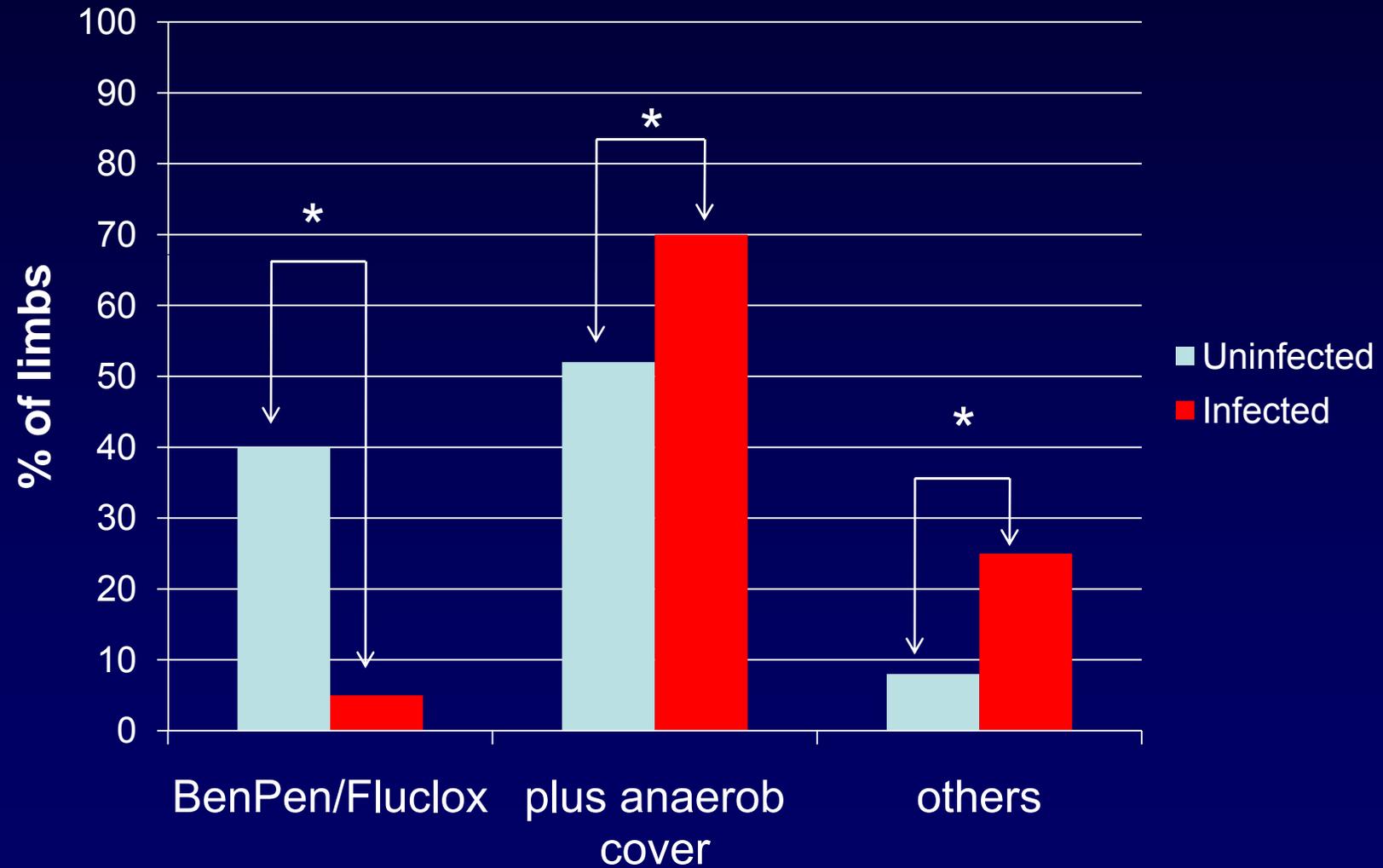
Results

- No significant influence on rate of infection by:
 - MOI
 - Lower v Upper Extremity
 - ISS
 - Time to ER/OR
 - NV status
 - Clotting products
 - Vascular grafts
 - Method of stabilisation (Fd Hosp/UK)

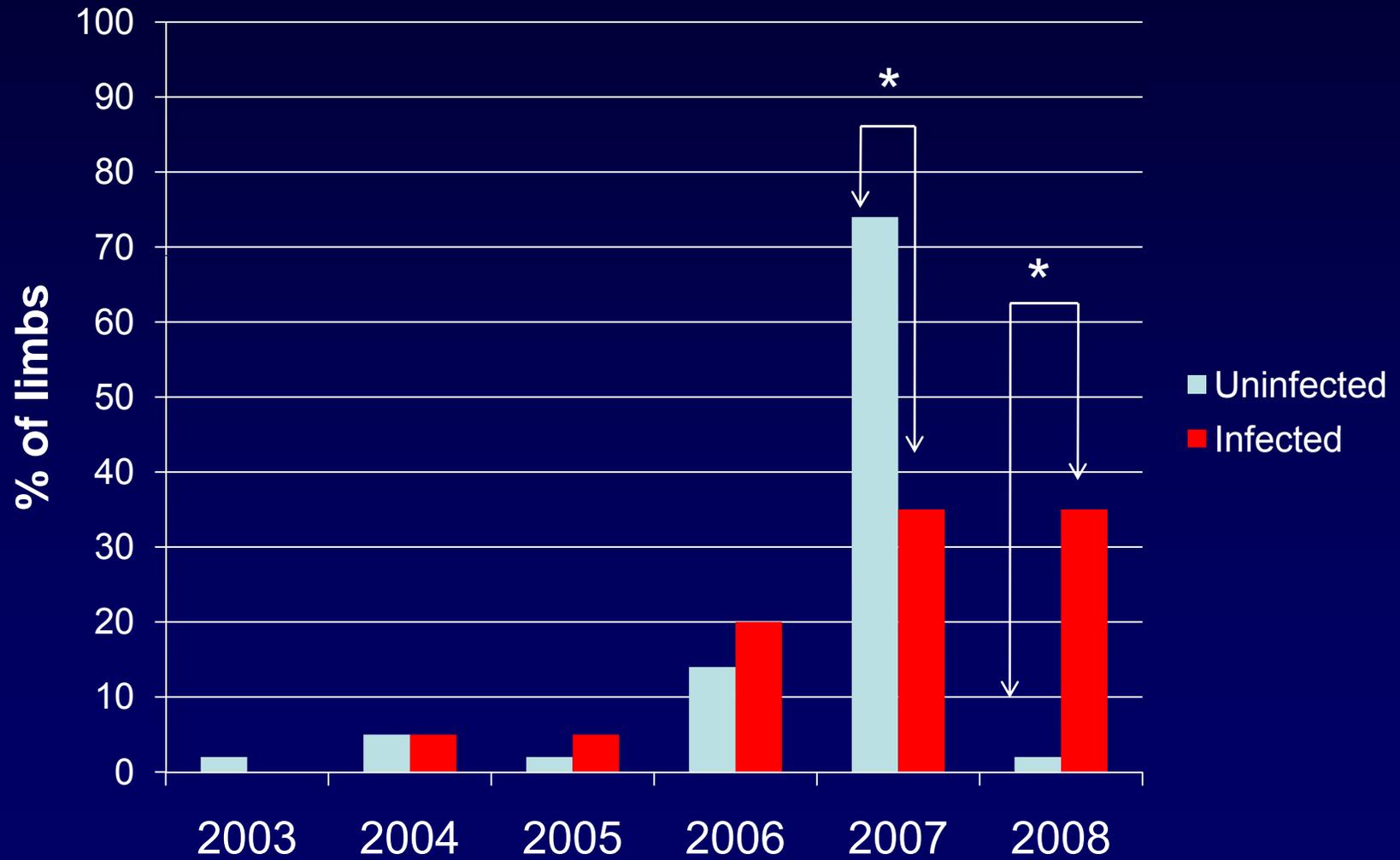
Gustilo Classification



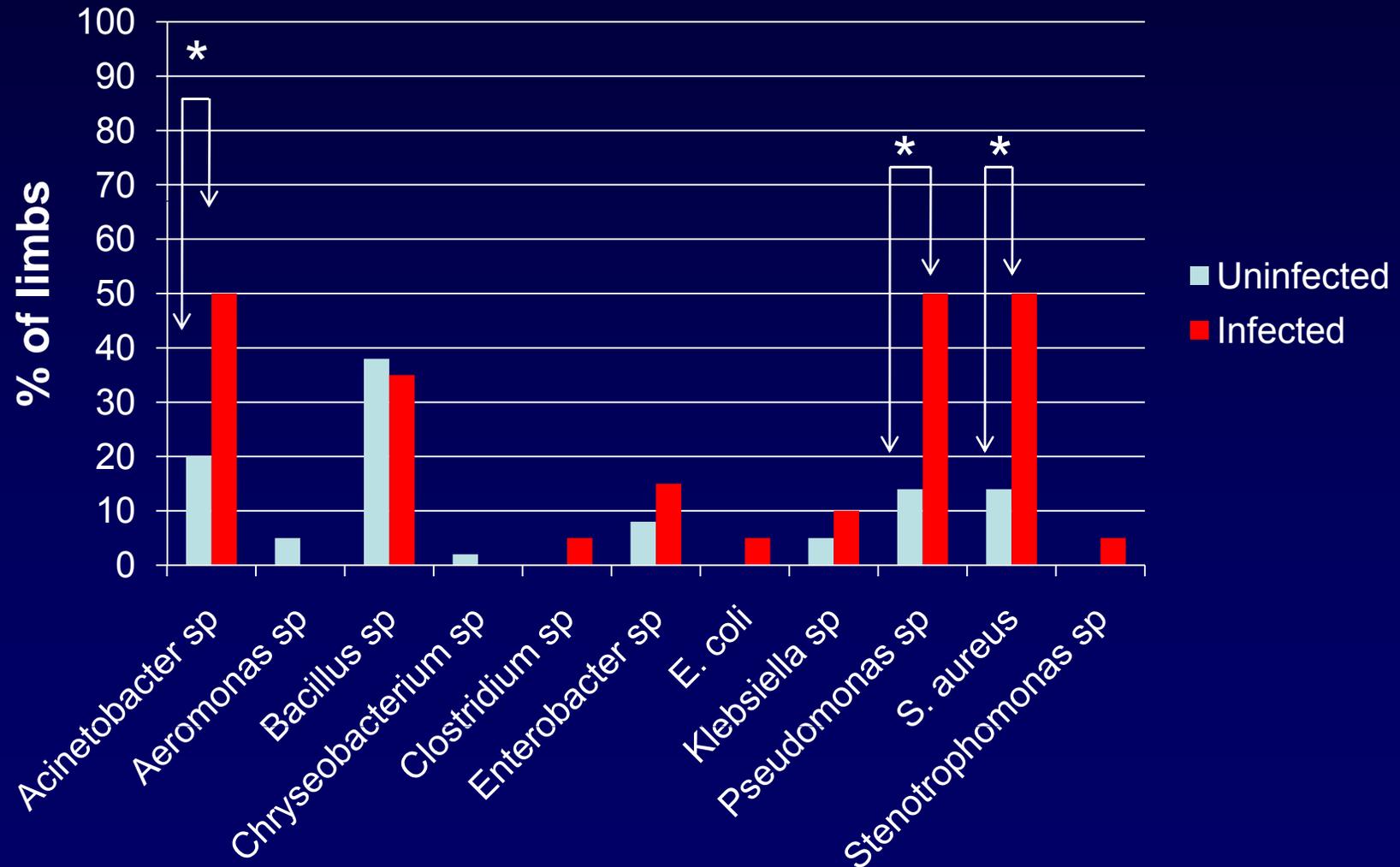
Antibiotic cover



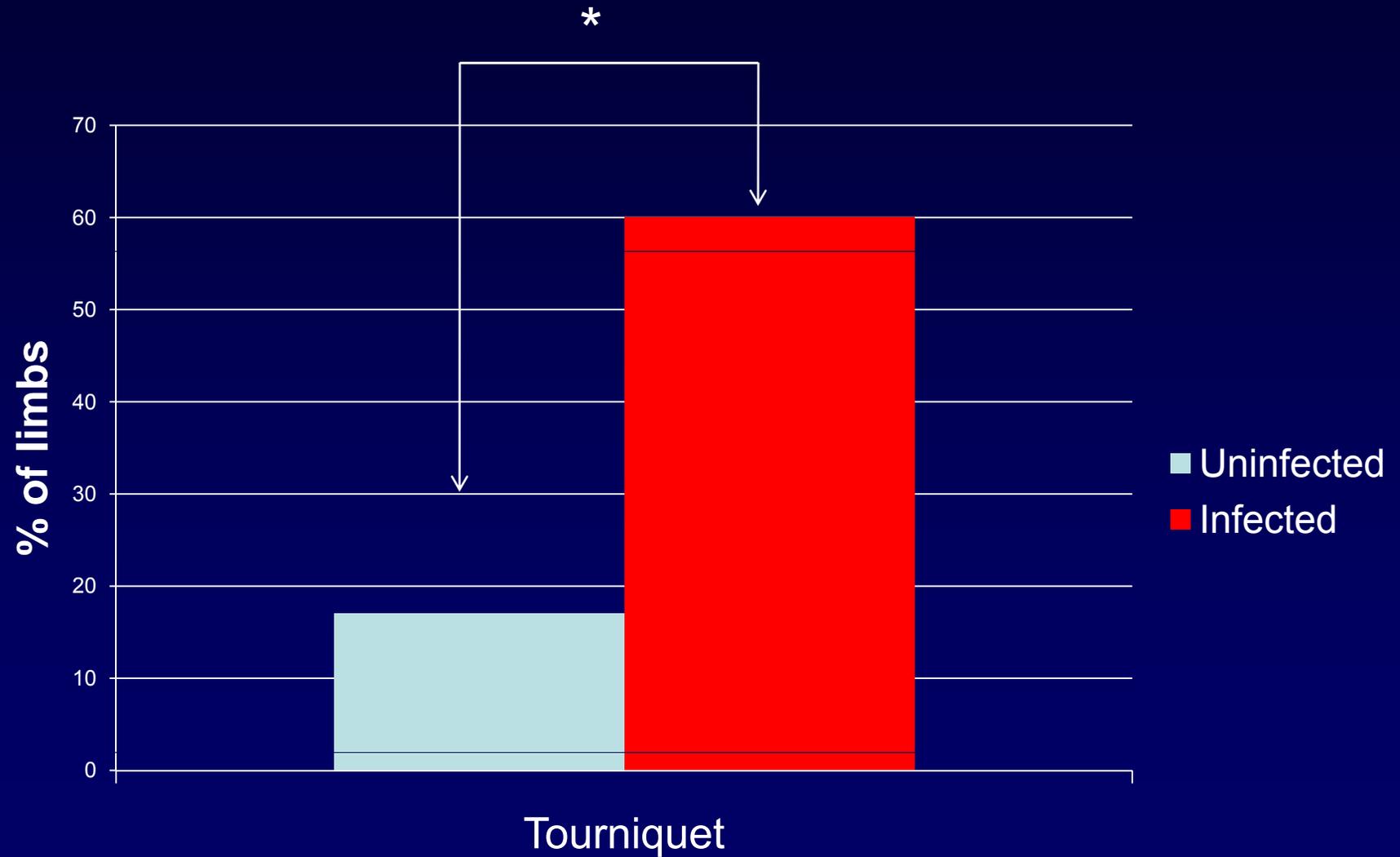
Year of Injury



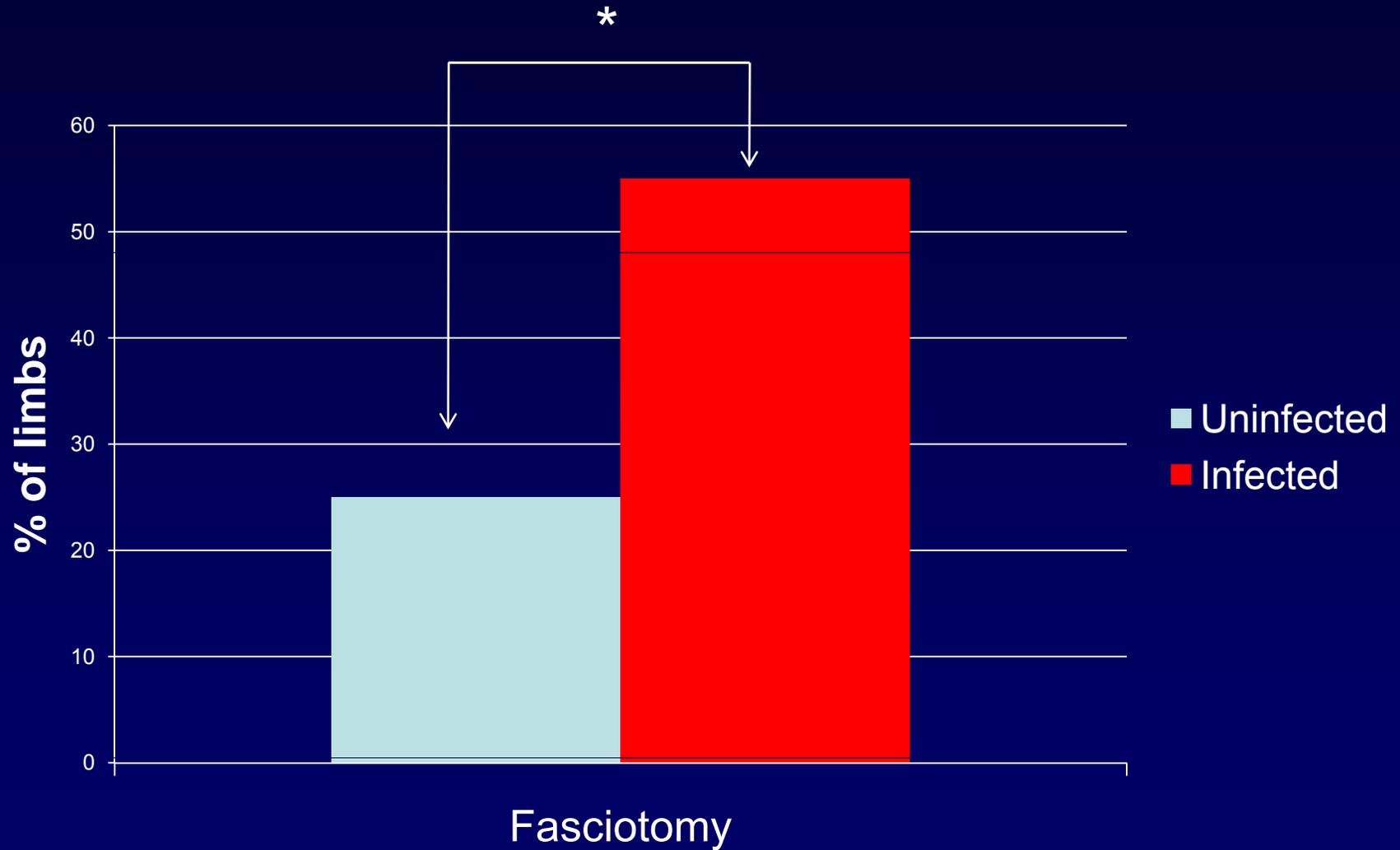
Infecting organism



Tourniquets



Fasciotomies



Multivariate analysis of significant risk factors ($p < 0.05$) without the inclusion of bacteria recovered

	Without Bacteria	
	p value	95% CI
Gustilo classification	0.58	
Year of injury	0.89	
Tourniquets in the field	0.023	1.24-20.02
Antibiotics during evacuation	0.015	1.37-19.1
Antibiotics in the OR (Fd Hosp)	0.046	0.165-0.98
Systolic blood pressure at time of air evacuation	0.37	
Fasciotomy	0.047	1.02-16.58

Multivariate analysis of significant risk factors ($p < 0.05$) with the inclusion of bacteria recovered

	With Bacteria	
	p value	95% CI
Gustilo classification	0.92	
Year of injury	0.37	
Tourniquets in the field	0.15	
Antibiotics during evacuation	0.031	1.22-56.62
Antibiotics in the OR (Fd Hosp)	0.38	
Systolic blood pressure at time of air evacuation	0.89	
Fasciotomy	0.063	0.91-29.88
<i>Acinetobacter</i> species	0.12	
<i>Staphylococcus aureus</i>	0.07	0.86-30.91
<i>Pseudomonas aeruginosa</i>	0.011	1.73-65.87

Limitations

- Retrospective
- Limited follow up
- Not controlled interventions

Summary

- Infections common complication
- Strong associations with:
 - Abx (anaerobic cover)
 - Type of infecting organism
- Also:
 - Tourniquets
 - Fasciotomies
 - Severity of injury
 - Year of injury

Discussion



- Consider antimicrobial agent and immediate care procedures used at point of injury
- Continue research to reduce infection rates in salvaged limbs

Thankyou.

Questions?