

ICSI

*International
Conference
on Surgical
Infections*

2006



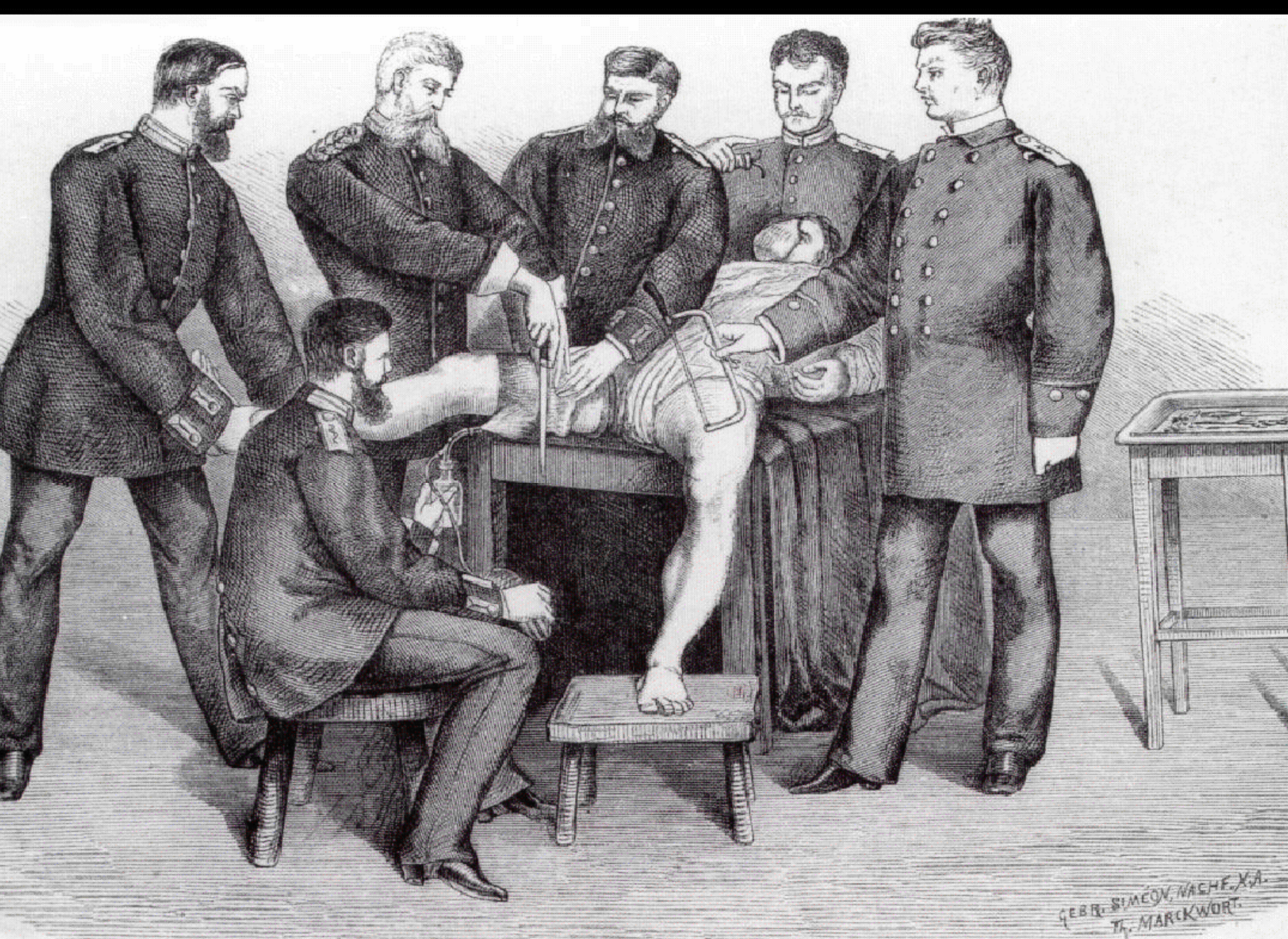
New strategies to prevent Surgical Site Infections

**Jan Kluytmans
The Netherlands**

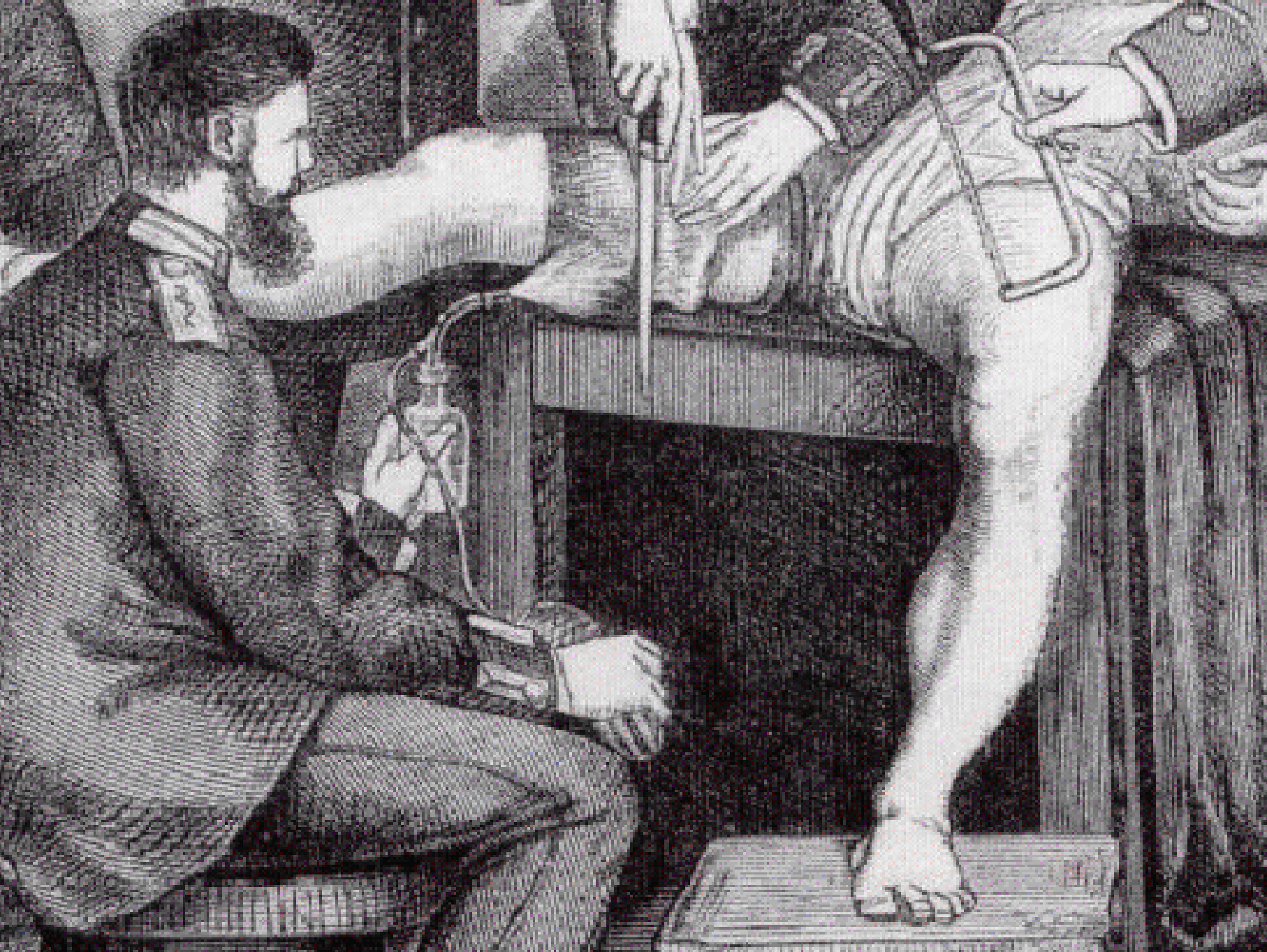
The importance of the skin



**When the integrity is disrupted
the risk of infection increases**



GEBR. SIMÉON, NACHE, X.A.
TH. MARCKWORT.



Developments

- ▶ **Before Lister (1867):**
 - mortality after amputations 60%**
 - > introduction of antisepsis**
- ▶ **End 19th century: asepsis**
- ▶ **Fifties peri-operative prophylaxis**

- ▶ **The cornerstones of modern surgery**

Current situation

- ▶ **USA: 27 million operations annually**
- ▶ **Incidence of SSI:**
 - ▶ French survey 3.4%
 - ▶ Dutch survey: 3.1%
- ▶ **Consequences of SSI:**
 - ▶ prolonged hospital stay
 - ▶ mortality
- ▶ **Prevention is important**

Pathogenesis

- ▶ The development of SSI involves a delicate interaction between micro-organism and host in which the surgeon and environment can play an important role.

Attack:

micro-organism (concentration and virulence)
surgeon (makes the incision, prosthetic material)

Defence:

host defence (local and general)
surgeon (prophylaxis, atraumatic procedure)



- ▶ If the concentration of micro-organisms in de wound is very high, the development of SSI is hardly preventable



Current

**Sources and
routes of
transmission**

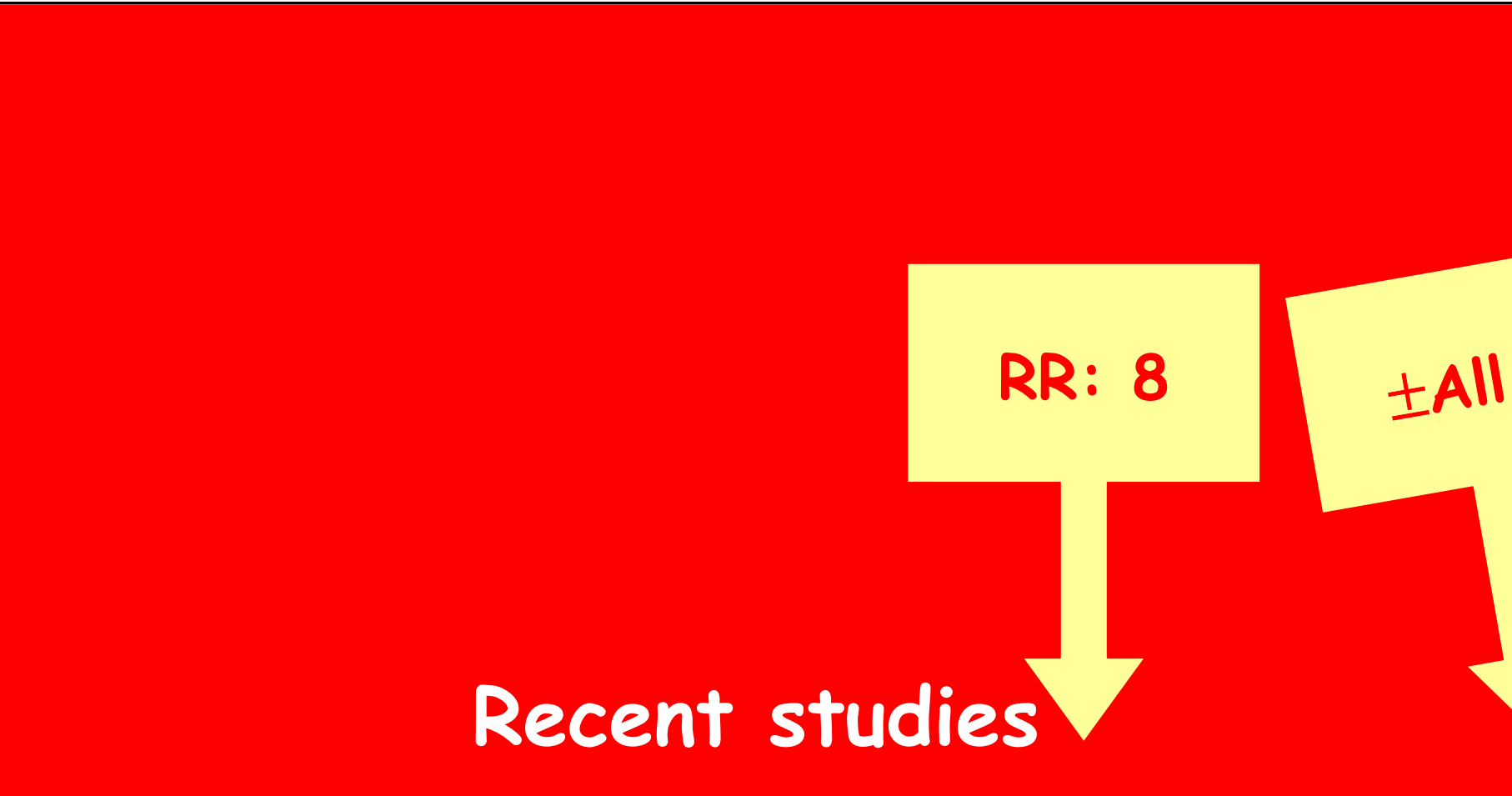
**Something old,
something new**



Contamination of the wound

Wound Classification	Cruse & Ford (n=63000)	SENIC (n=59000)	Olson & Lee (n=36500)	Culver et al (n=85000)
Clean	1,5	2,9	1,3	2,1
Clean-contaminated	7,7	3,9	2,4	3,3
Contaminated	15,2	8,5	7,9	6,4
Dirty	40,0	12,6	-	7,1

No. of patients	<i>S. aureus</i> carriage-rate (%)	No. of infections/no. of patients		Relative risk	95% confidence interval	ide i
		Carriers	Noncarriers			



RR: 8

±All

Recent studies

306	15	8/47	4/259	9.4	2.9–30.2
1,980	13	21/264	19/1,716	7.2	3.9–13.2
1,049	24	15/248	8/801	6.1	2.6–14.1
255	27	6/69	2/186	8.1	1.7–39.1

Reservoirs and routes of transmission

- ▶ **Most SSI are acquired during surgery**
- ▶ **Reservoirs mainly in the operating theatre during the procedure**
- ▶ **Exeption to this rule: open wounds**

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Reservoirs and routes of transmission

- ▶ **Health care workers (HCW)**

 - When rules of asepsis and antisepsis are adhered to
HCW are of limited importance

 - Hand disinfection, gloves, masks (for sneezing mainly), and hats

- ▶ **Environment**

 - operating room (safe, clean and spacious)

 - ultra-clean air in high-risk surgery is disputable

 - in modern hospitals the OR is of limited importance

- ▶ **patient**

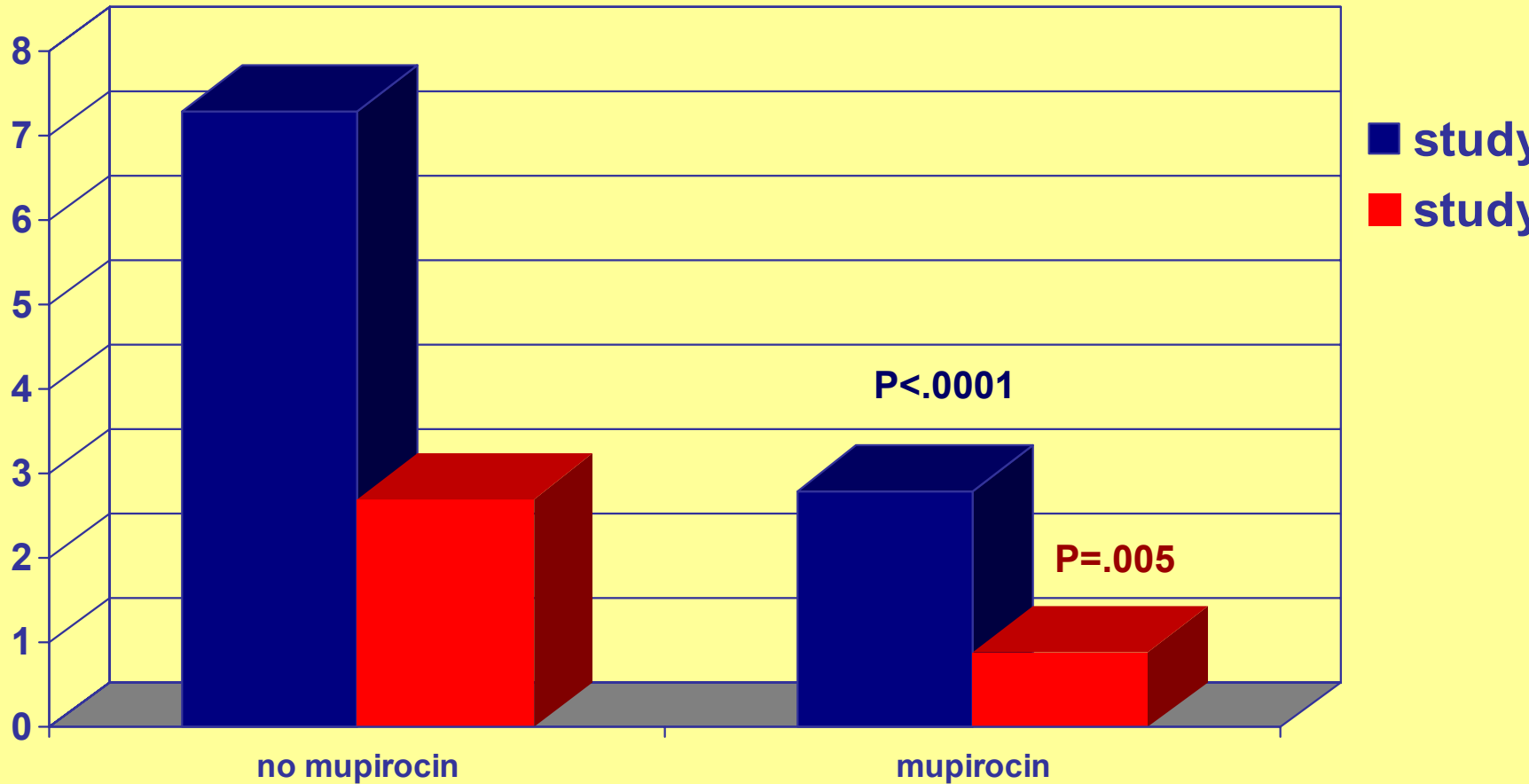
 - endogenous flora is the most important source in a modern hospital, when infection control is well organised**

Prevention

Standard of care

- ▶ antiseptis
- ▶ asepsis
- ▶ good surgical technique
- ▶ adequate perioperative antibiotic prophylaxis

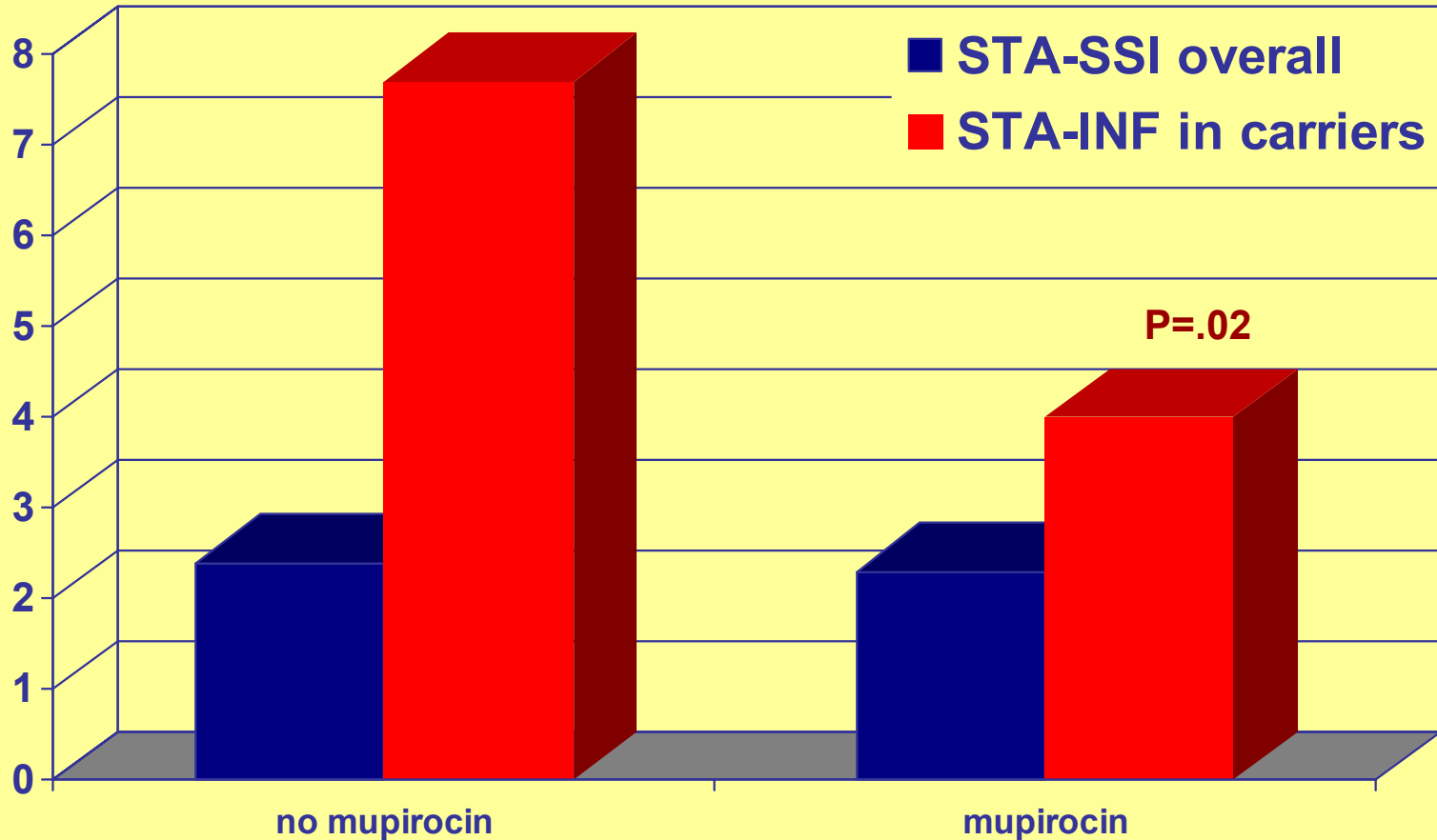
Perioperative eradication of nasal carriage of *S. aureus* In 2 historically controlled studies in cardio-thoracic surgery



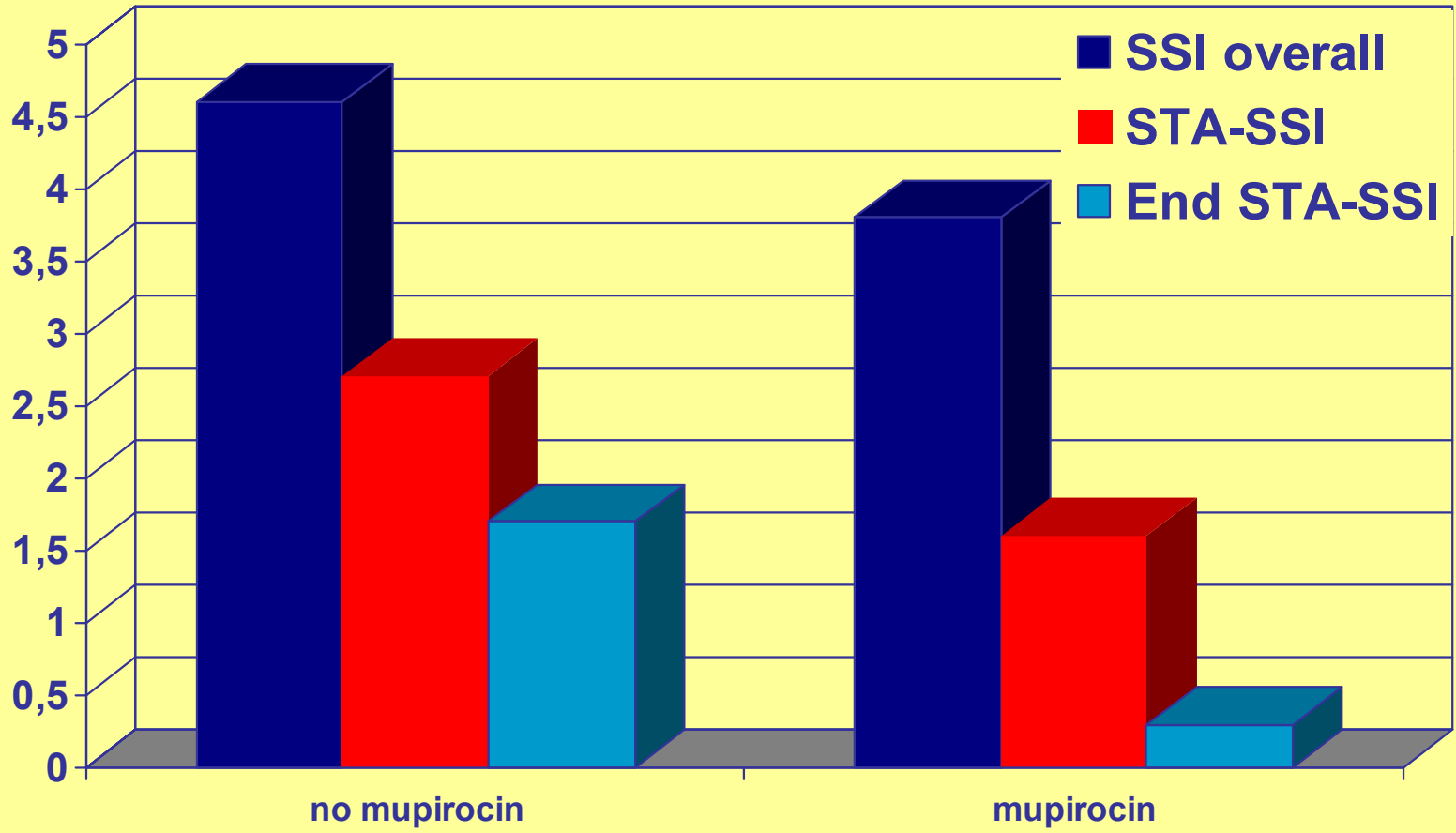
A: Kluytmans et al. Infect Control Hosp Epidemiol 1996;17:780-5

B: Cimochofsky et al. Ann Thoracic Surg 2001;71:1572-8

Perioperative eradication of nasal carriage of *S. aureus* in a randomised controlled study in many kinds of surgery

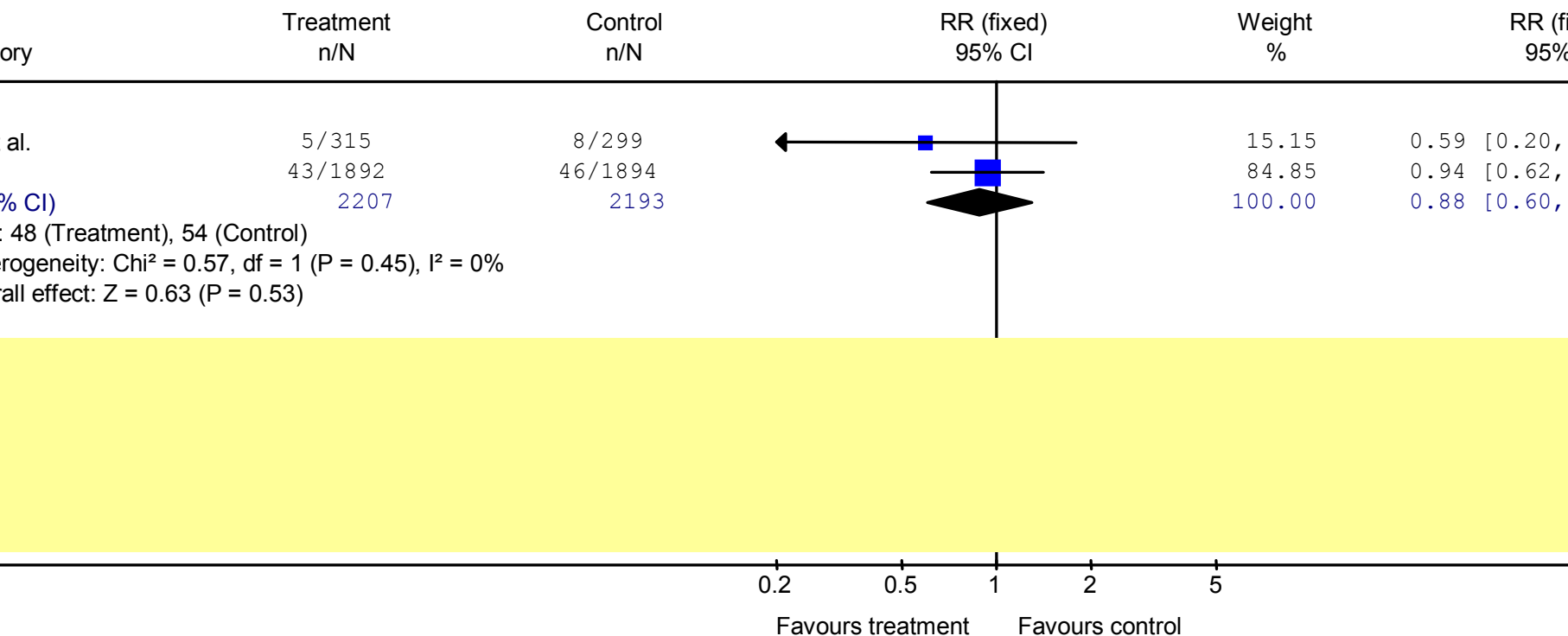


Perioperative eradication of nasal carriage of *S. aureus* in a randomised controlled study in prosthetic joint surgery

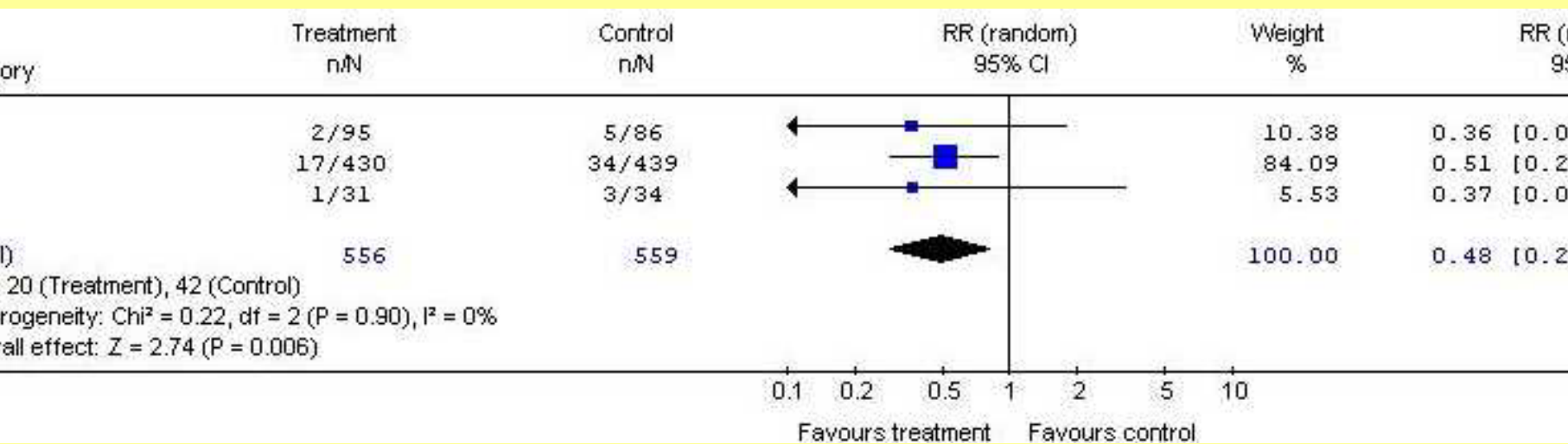


Combined results overall

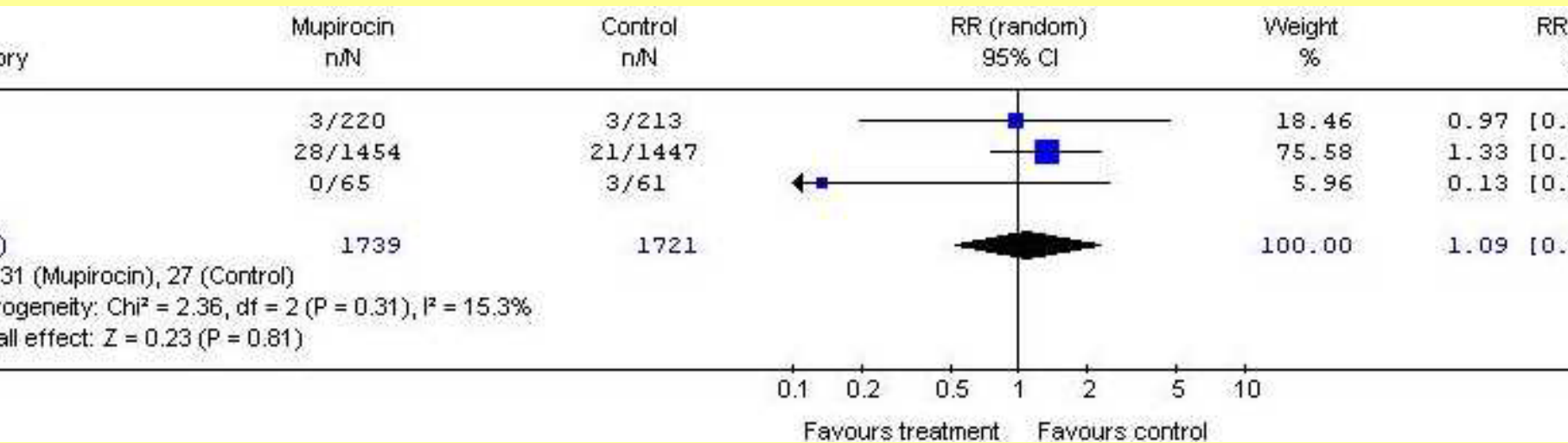
Effect of mupirocin nasal ointment preoperatively
 MUPIROCIN NASAL OINTMENT VS PLACEBO
 Surgical wound infection



Surgical patients: carriers



Surgical patients: non-carriers



Warming

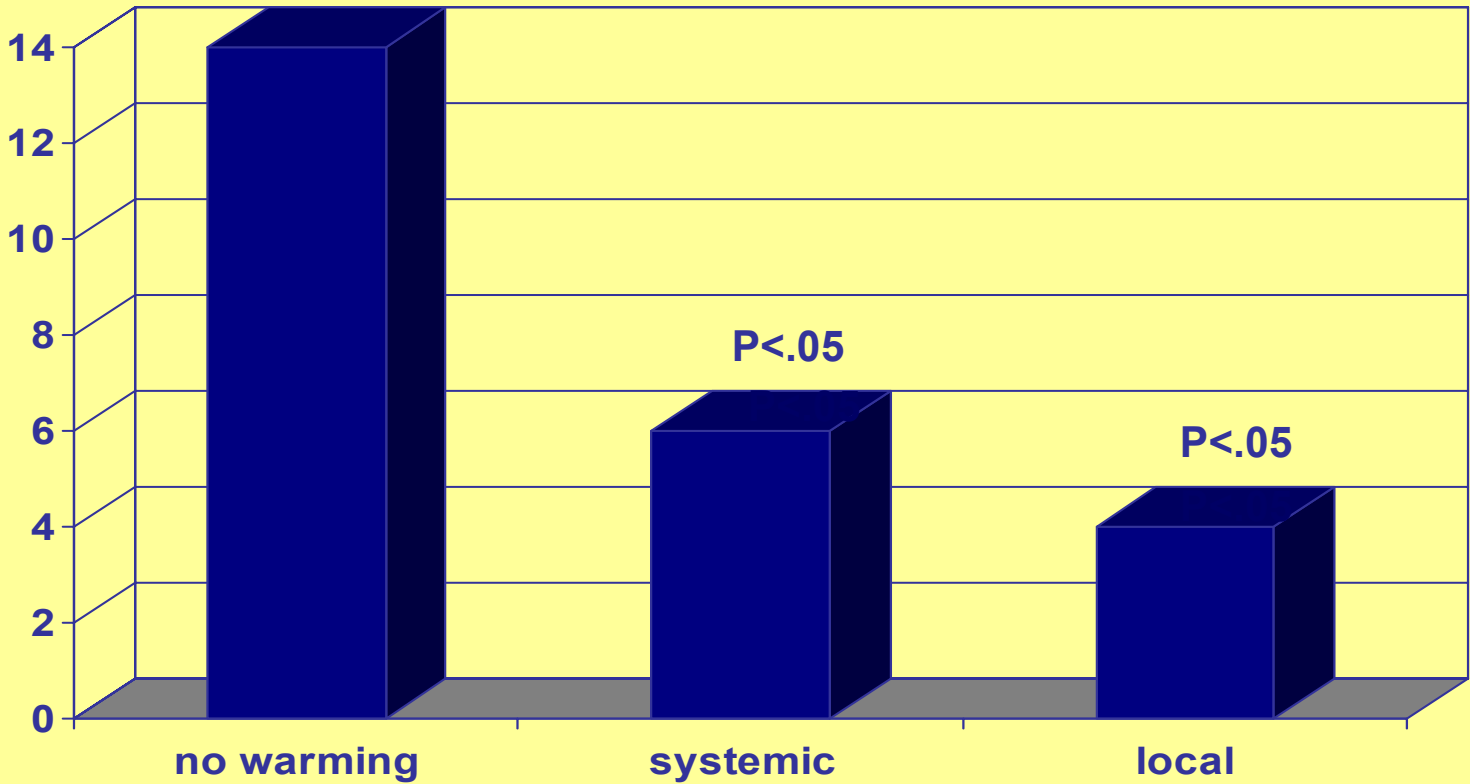
Kurz et al NEJM 1996;334:1209-15

- ▶ **perioperative normothermia reduced the SSI rate significantly in GI-surgery**

Melling et al Lancet 2001;358:876-80

- ▶ **preoperative warming**
 - ▶ **systemic (warm air blanket) and local**
 - ▶ **randomised controlled trial**
 - ▶ **clean surgery**
- ▶ **body core temperatures significantly higher in both groups (within normal range)**
- ▶ **SSI rate significantly lower in the warmed patients**

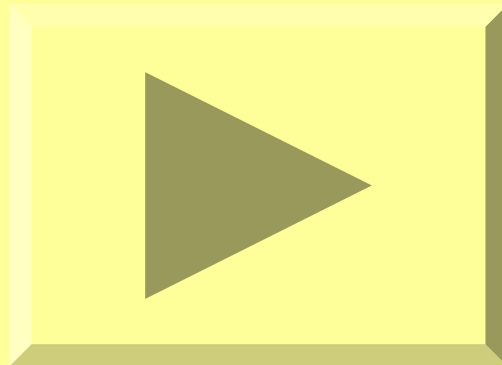
SSI rates and preoperative warming



No adverse events recorded
SSI-rate is too high

SENIC-study

**active surveillance with feedback of
surgeon-specific rates reduces
the SSI-rate by 40%**

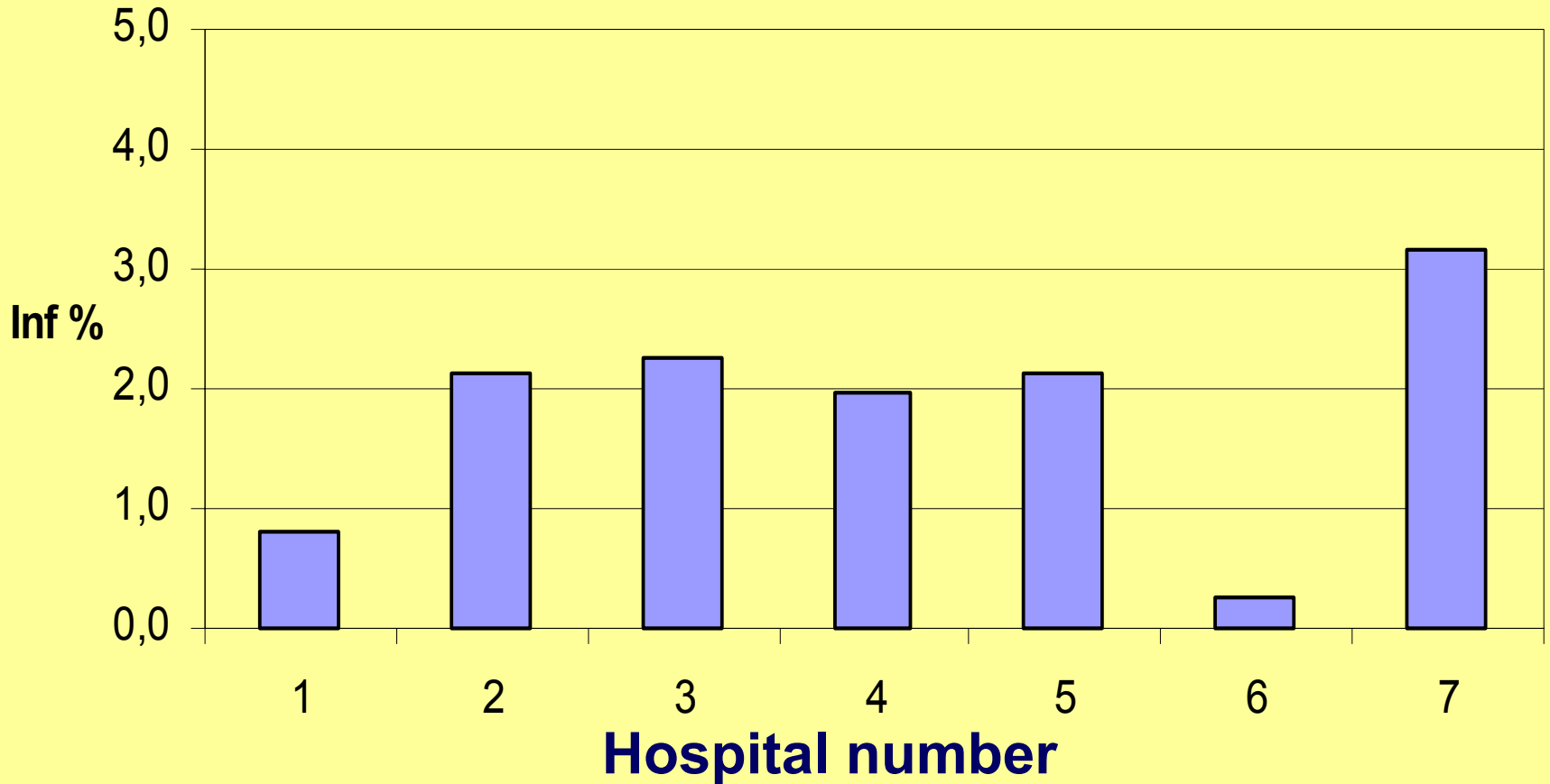


Surveillance

- ▶ **Uniform definitions are important (CDC)**
- ▶ **Case finding method is crucial and post-discharge surveillance is getting more and more important**
- ▶ **Stratification is mandatory to be able to compare**
(wound classification, ASA-score and procedure specific duration)
- ▶ **Feedback of surgeon specific rates is mandatory**
(confidential information, stratification)
- ▶ **Comparison within or between hospitals is very difficult and should be done very carefully. This has not been validated so far.**

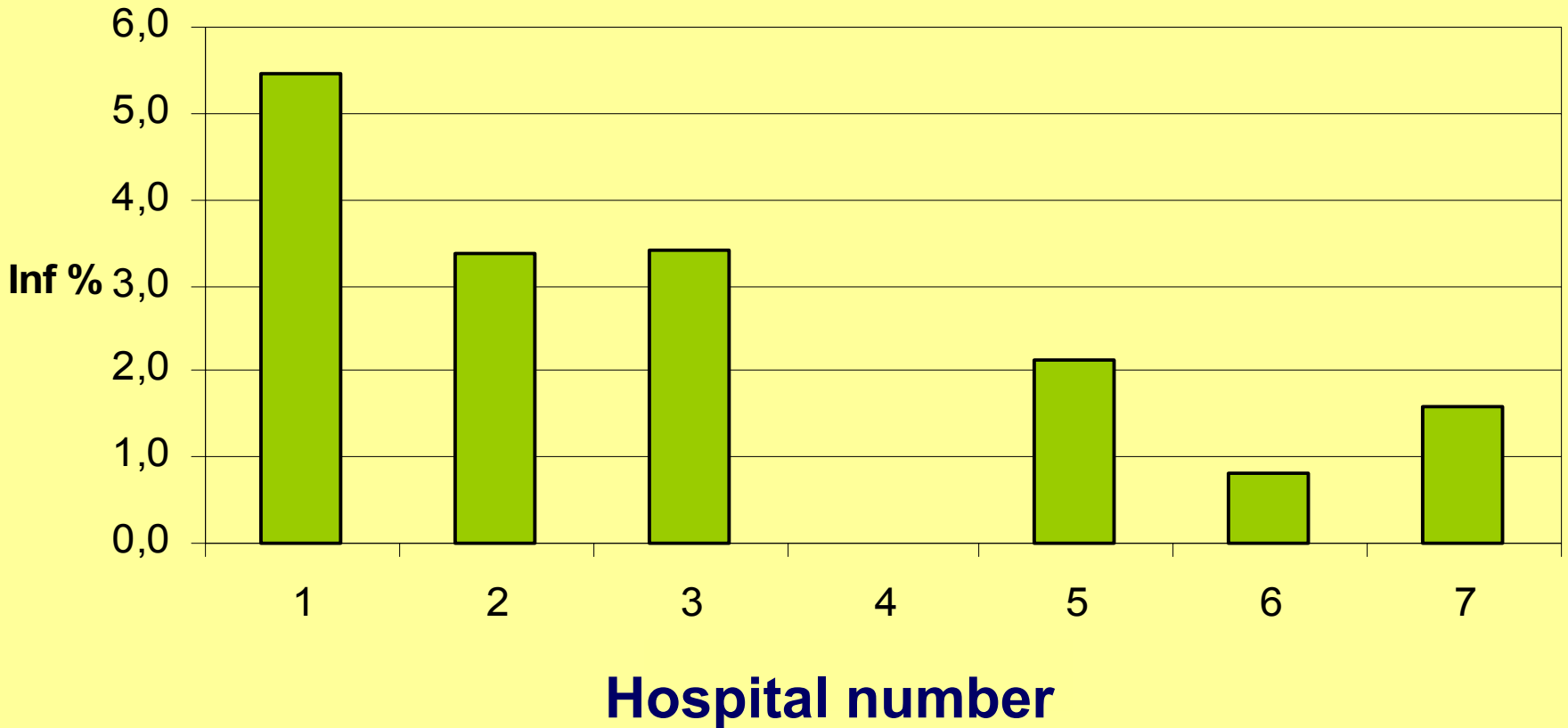
Multicenter Surveillance Projects

Cardiothoracic surgery, superficial SSI



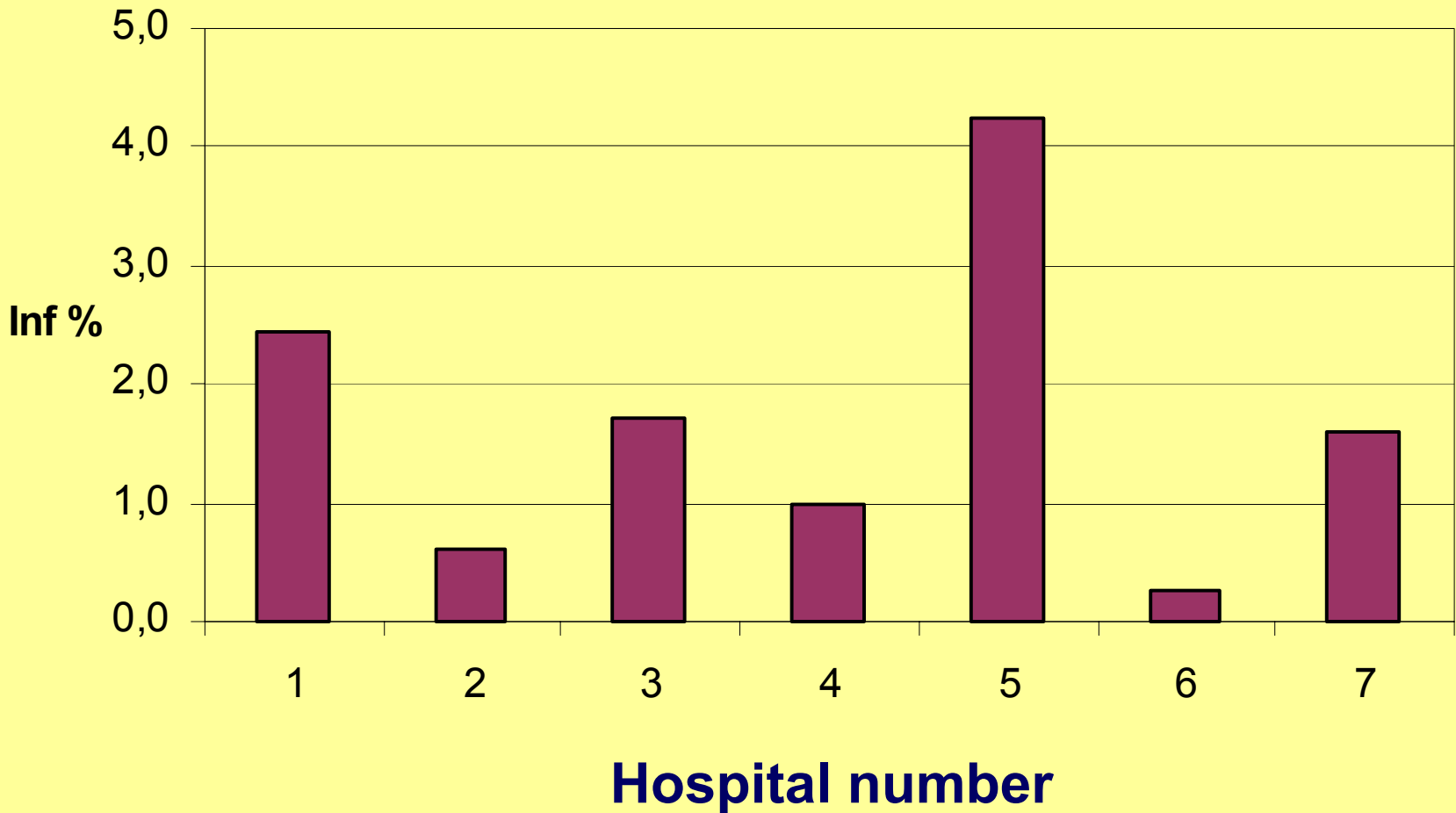
Multicenter Surveillance Projects

Cardiothoracic surgery, donor site SSI

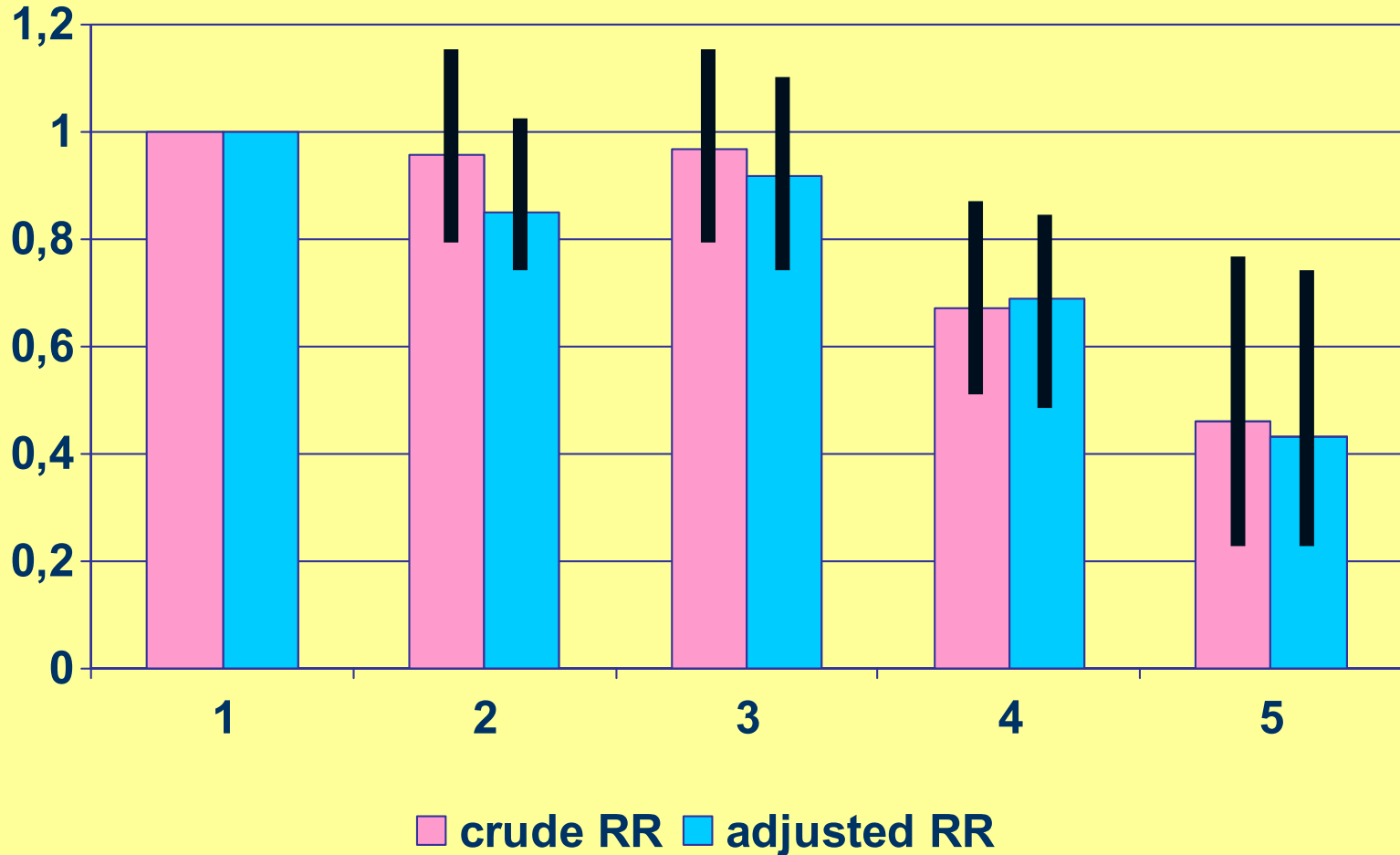


Multicenter Surveillance Projects

Cardiothoracic surgery, deep SSI



Surveillance system useful when sustained



adjusted for: PDS, ASA-score, age, pre-op LOS, type of procedure, wound class, duration of surgery/emergency, hospital type, number and experience of surgeons

Conclusions

- ▶ **SSI are serious and frequent complications of surgery**
- ▶ **The pathogenesis is very complex**
- ▶ **Nowadays, endogenous infections are most important**
- ▶ **Most important developments**
 - ▶ **Nasal carriage of *S. aureus***
 - ▶ **Warming of the patient**
 - ▶ **Optimalisation of surveillance programs**

