SICOT Meeting – Roma September 2016

Risk factors of periprosthetic infection and my experience of how to prevent an infection

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«Postoperative infection is the saddest of all complications… »

Sir John Charnley

Risk Factors Associated with Deep Surgical Site Infections After Primary Total Knee Arthroplasty

An Analysis of 56,216 Knees

Risk Factors for Infection After Knee Arthroplasty

A Register-Based Analysis of 43,149 Cases

By Esa Jämsen, BM, Heini Huhtala, MSc, Timo Puolakka, MD, PhD, and Teemu Moilanen, MD, PhD

Investigation performed at Coxa, Hospital for Joint Replacement, Tampere, Finland

Preventing Infection in Total Joint Arthroplasty

Wadih Y. Matar, S. Mehdi Jafari, Camilo Restrepo, Matthew Austin, James J. Purtill and Javad Parvizi
J Bone Joint Surg Am. 2010;92:36-46. doi:10.2106/JBJS.J.01046

Review article: Risk factors of infection following total knee arthroplasty

Non modifiable

Patient-specific

The "systemic" risk factors:

- Diabetes
- Male gender
- Rhumatoid arthritis
- ASA score 3 or greater
- Recent weight loss
- advanced age
- debilitation
- oral steroids
- Disseminated cancer
- Admission from a healthcare facility

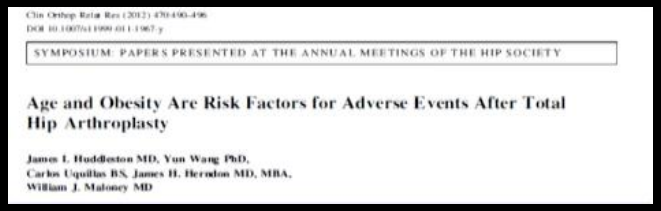
Simmons TD, Stern SH. Diagnosis and management of the infected total knee arthroplasty. Am J Knee Surg. 1996

Patient Optimization
Modifiable Risk Factors

- 1. Diabetes
- 2. Obesity
- 3. Malnutrition
- 4. Smoking
- 5. Mental health
- 6. MRSA Screening

Obesity

Modifiable



Clin Orthop Relat Res (2012) 470:490–496
DOI 10.1007/s11999-011-1967-y

SYMPOSIUM: PAPERS PRESENTED AT THE ANNUAL MEETINGS OF THE HIP SOCIETY

Age and Obesity Are Risk Factors for Adverse Events After Total Hip Arthroplasty

James I. Huddleston MD, Yun Wang PhD, Carlos Uquillas BS, James H. Herndon MD, MBA, William J. Maloney MD

Orthopaedics & Traumatology: Surgery & Research 100 (2014) S91–S97

Available online at ScienceDirect www.sciencedirect.com

Elsevier Masson France EM|consulte www.em-consulte.com/en

Review article

Obesity in orthopedics and trauma surgery

S. Parratte[a,*], S. Pesenti[b], J.-N. Argenson[a]

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[b] Service de Chirurgie Pédiatrique Orthopédique, Hôpital d'Enfants de la Timone, 13009 Marseille, France

AAHKS 2014

« It is our concensus opinion that consideration should be given to delaying total joint arthroplasty in a patient with a **BMI > 40**, especially when associated with other co-morbid conditions, such as poorly controlled diabetes or malnutrition.

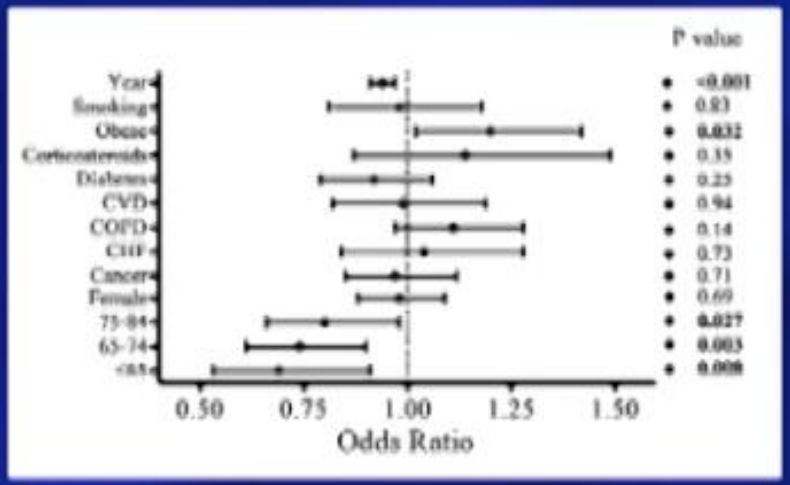
Mechanical / Biological

Real problem is biology : Fat degradation products (Leptine Adiponectine)

→ low grad inflammation status

Superficial wound infection

- **Friedman et al, CORR, 2013**
  - **Obese patients → increased infections (surgical and extra-surgical sites)**
- **Huddleston et al, CORR, 2012**
  - **Obesity increases adverse events (OR = 1.20)**



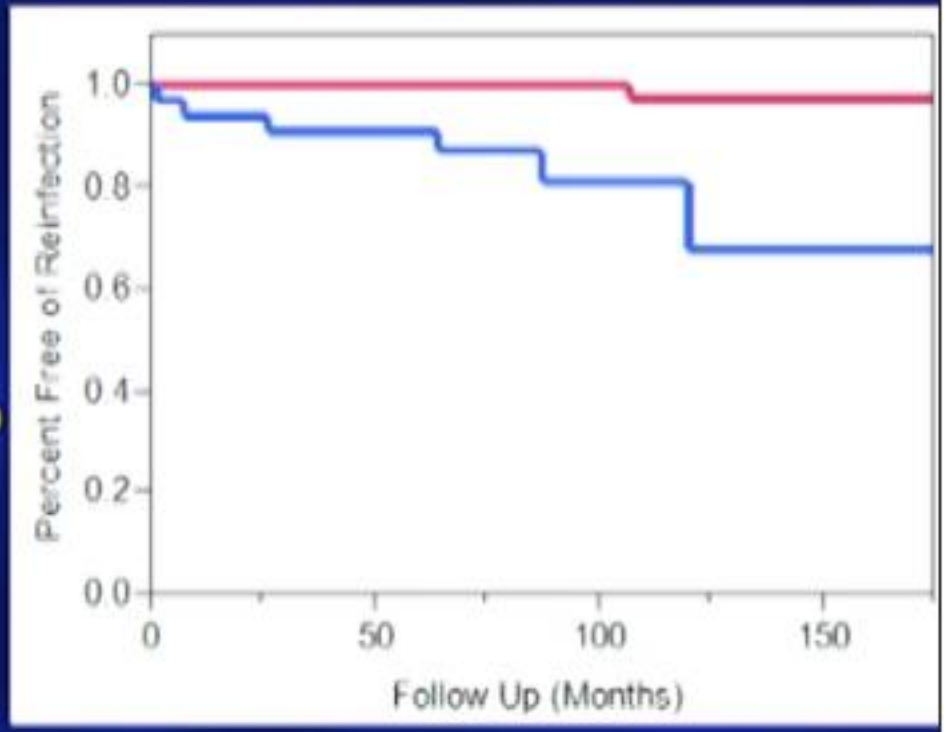
Deep periprosthetic Joint Infection

- Dowsey et al, CORR, 2009
  - Morbid Obesity (> 40 kg/m^2) → Increase PJI by 9X!
- Malinzak et al, JOA, 2012
  - Super Obese (> 50 kg/m^2) → Increase PJI by 21X!

REINFECTION

- Matt Abdel – HIP Meeting (Toulouse) 2014

- **Non-obese: 3%**
- **Morbidly Obese: 32%**
  - $p < 0.001$
  - **HR 18**



Current smoking

Modifiable

Systemic effects of smoking and Nicotine

Local Tissue Hypoxia :
- micro-vascular constriction
- Increase carboxyhemoglobin

Decreased collagen production
- Wound healing

Decreased T cell function
- Infection

Smoking cessation 4-8 weeks prior surgery

Decrease complications but not normalize

Cochrane Database 2005 – Moeller Lancet 2002

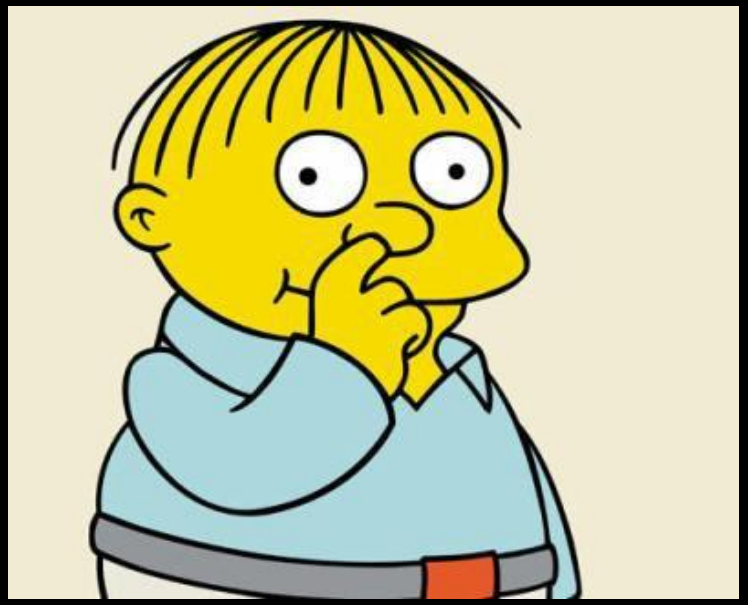
Modifiable

Nasal carriage of staphylococcus Aureus

Preop screening MRSA and MSSA

30% population MSSA carriers
4% MRSA carriers

Goal :
Decrease the incidence of postoperative S aureus SS by eliminating S aureus nasal carriage from the patient prior to surgery



Springer 2014 – Metanalysis 16 studies / 56711 patients

Nasal decolonization resulted in 54,6% decrease in the risk of SSI compared to controls

Modifiable

Hematocrit < 36

British Journal of Anaesthesia Page 1 of 14
doi:10.1093/bja/aes139

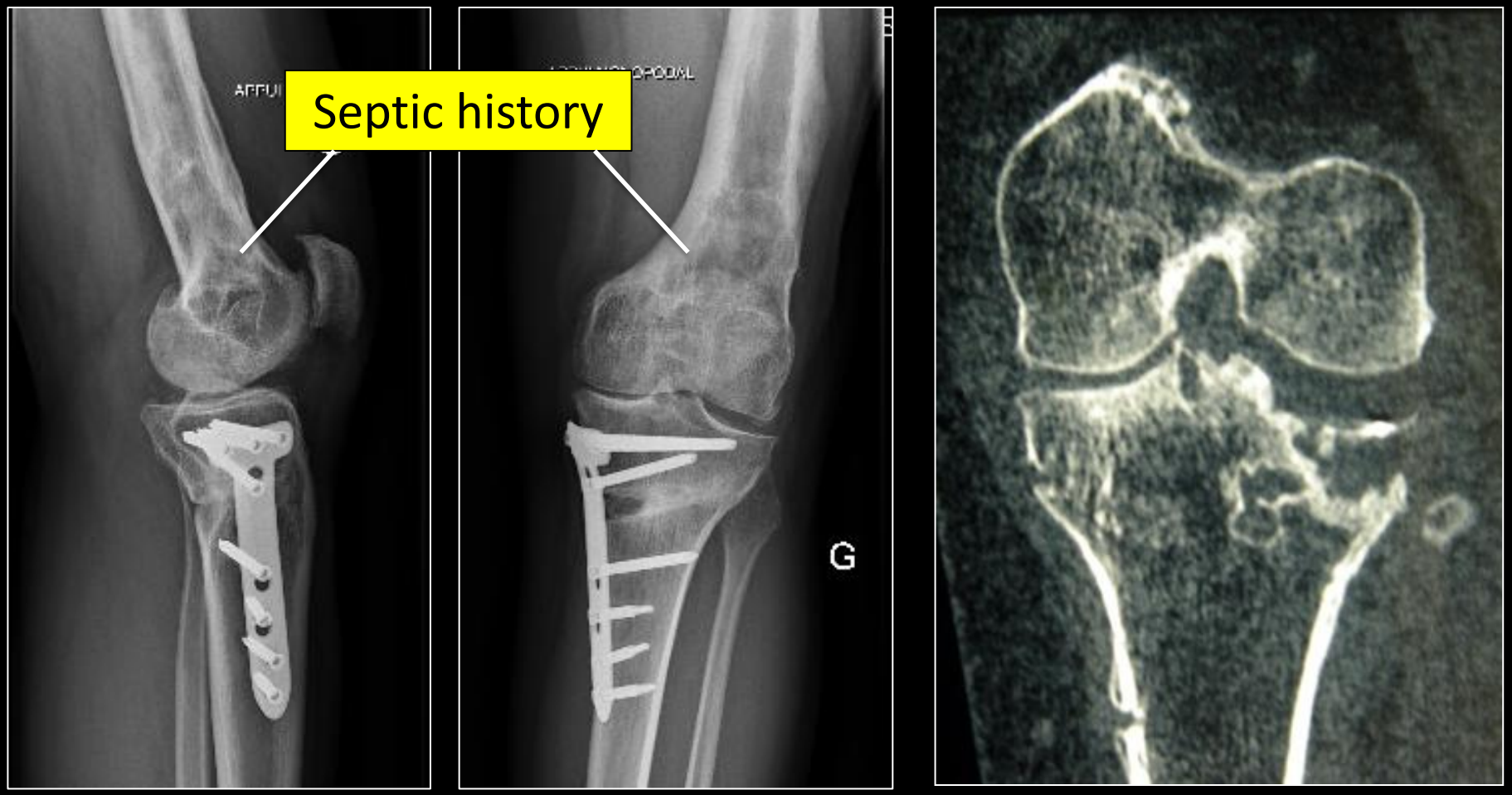
Patient blood management in Europe

A. Shander[1*], H. Van Aken[2], M. J. Colomina[3], H. Gombotz[4], A. Hofmann[5], R. Krauspe[6], T. Richards[8], R. Slappendel[9] and D. R. Spahn[10]

Allogenic blood transfusion
Blood Loss > 1L

Pulido et al. CORR 2008

Previous knee surgery



How to prevent an infection ?

Rule n°1

Patient selection

Procedure-specific

Suboptimal prophylactic antibiotic

- *Timing*
- *Dose*
- *Antibiotic*

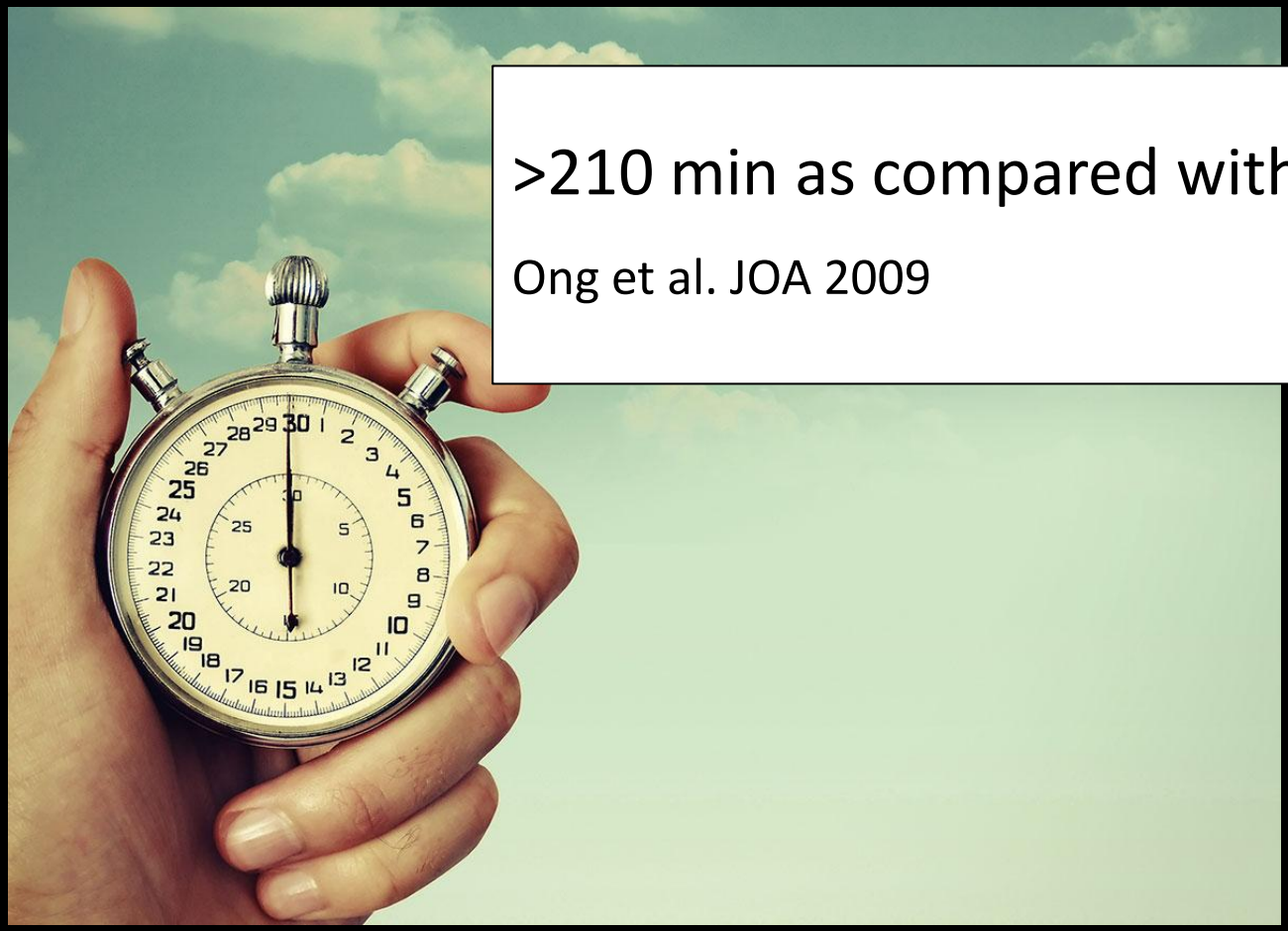
Individuals for Whom Vancomycin Should Be Used
Patients colonized with MRSA* (detected during screening)
Patients with history of infection with MRSA*
Institutionalized patients (nursing home, dialysis, etc.)
Health-care professionals
Patients with proven β-lactam allergy

Nb of surgeons participating in procedure

LYON GENOU

CENTRE ALBERT TRILLAT

Longer procedure time



>210 min as compared with <120 min

Ong et al. JOA 2009

Prolonged wound drainage

< 24h

Kurtz SM, Ong KL, Lau E, Bozic KJ, Berry D, Parvizi J. Prosthetic joint infection risk after TKA in the Medicare population. Clin Orthop Relat Res. 2010;468:

Mihalko WM, Manaswi A, Brown TE, Parvizi J, Schmalzried TP, Saleh KJ. Infec- tion in primary total knee arthroplasty: contributing factors. Instr Course Lect. 2008; 57:317-25.

ATB loaded cement ?

The Use of Erythromycin and Colistin-Loaded Cement in Total Knee Arthroplasty Does Not Reduce the Incidence of Infection

A Prospective Randomized Study in 3000 Knees

TABLE IV Multivariate Model of Risk Factors for Deep Infection*

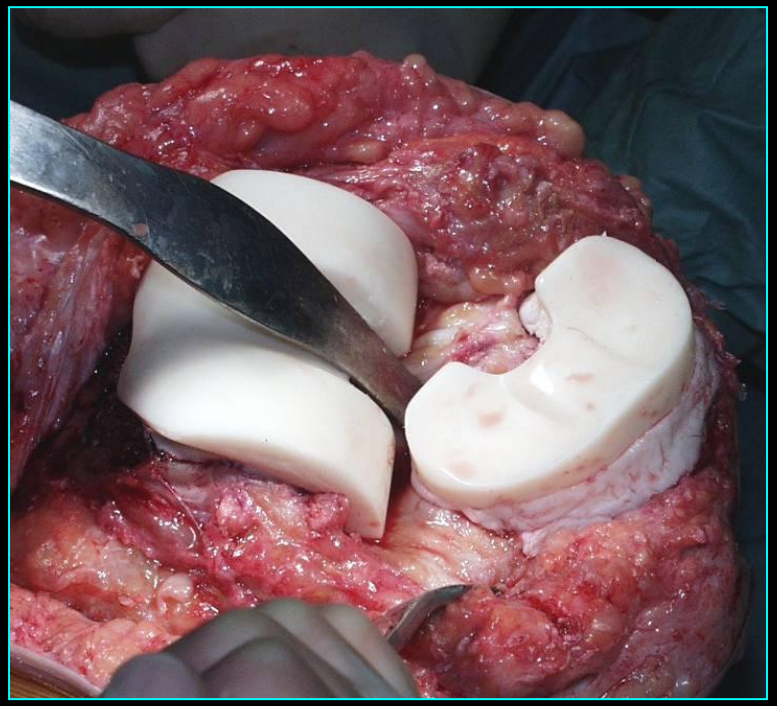
Variable	Odds Ratio (95% CI)	P Value
Sex (M)	2.11 (1.10-4.04)	0.023
Operating time of >125 min	2.67 (1.28-5.57)	0.009

*Calibration (Hosmer-Lemeshow test) (p = 0.177). Discrimination power area under the curve was 0.624 (95% CI, 0.532-0.716). CI = confidence interval.

Rev Chir Orthop Reparatrice Appar Mot. 2007 Oct;93(6):582-7.

Surgical site infection after total knee arthroplasty: a monocenter analysis of 923 first-intention implantations.

Debarge R1, Nicolle MC, Pinaroli A, Ait Si Selmi T, Neyret P.



- Rhumatoid arthritis
- Diabetis
- Previous surgery

My experience ?

1995 – 2015

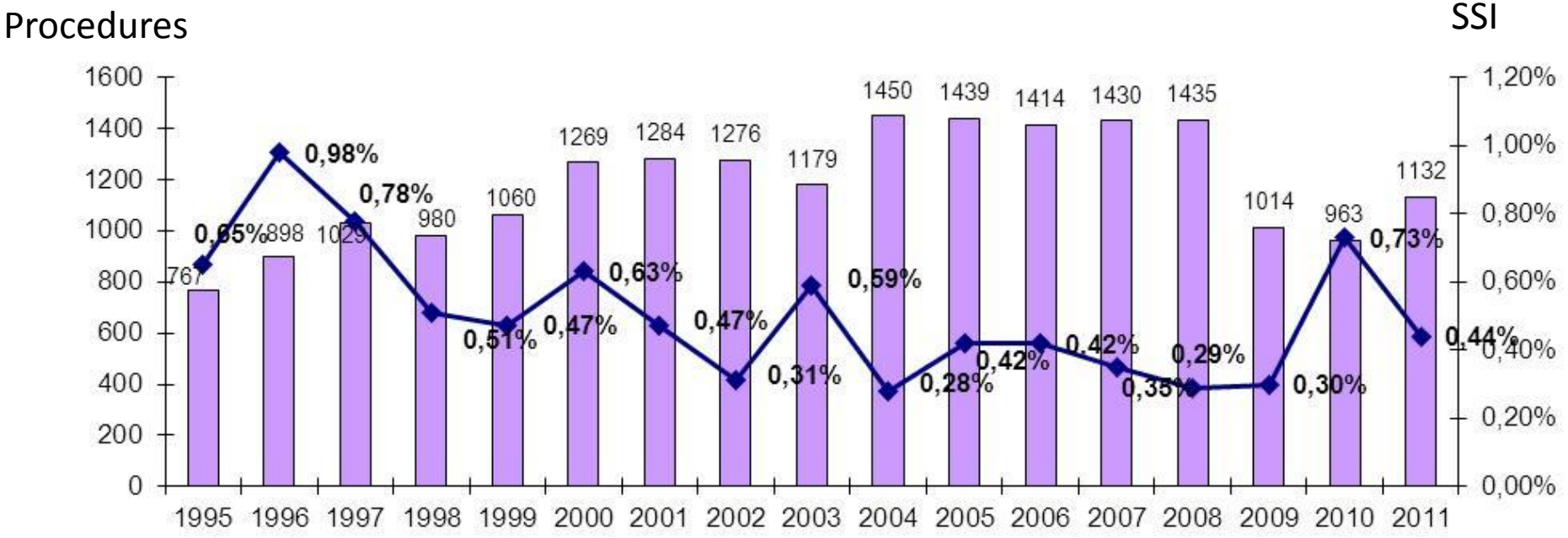
Perioperative infection Database

n =25,000

Lyon metropolis
2,000,000 inhabitants

Rhône-Alpes Auvergne region
7,500,000 inhabitants

Follow up ++


Procedures
SSI
1600
1400
1200
1000
800
600
400
200
0
1,20%
1,00%
0,80%
0,60%
0,40%
0,20%
0,00%
767
898
1029
980
1060
1269
1284
1276
1179
1450
1439
1414
1430
1435
1014
963
1132
0,65%
0,98%
0,78%
0,51%
0,47%
0,63%
0,47%
0,31%
0,59%
0,28%
0,42%
0,42%
0,35%
0,29%
0,30%
0,73%
0,44%
1995
1996
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PREOPERATIVE

Early

« Host optimization »

- Improve control of glucose and ulcers in diabetics
- Control nidus of infection (dental clearance, etc.)
- Malnutrition: improve nutritional status
- Obesity: decrease weight and improve nutritional status
- Skin (psoriasis, eczema, ulcers)
- Vascular insufficiency
- Smoking cessation
- MRSA† decolonization

PREOPERATIVE

Day of Surgery

- Surgical site shaving
- Skin decontamination
- Betadine shower
- Chlorhexidine wipes/showers
- Prophylactic antibiotics

INTRAOPERATIVE

Surgical factors

- Prophylactic antibiotics
- Skin preparation
- Draping
- Changing scalpel blades
- Bleeding control
- Skin closure
- Dressing

***Surgical team**

- Gloves

***Surgical environment**

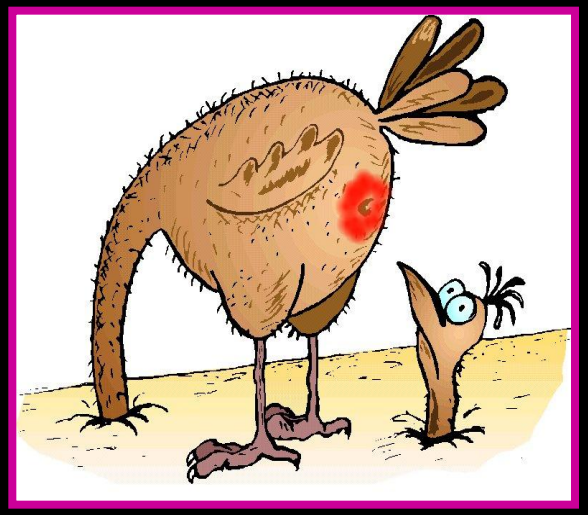
- Operating-room traffic
- Airflow

POSTOPERATIVE

- Immediate
  - Prophylactic antibiotics
  - Dealing with persistent draining wounds
- Late
  - Antibiotics before dental, genitourinary, and gastrointestinal procedures

Take home message

INFECTION PREVENTION



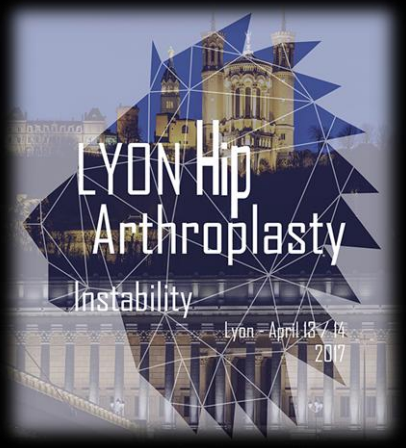
Be aware of risk factors

Patient information ++

Patient optimization

Perfect control of your surgical environment

Follow up +++



LYON KNEE
SCHOOL of SURGERY

Thank You

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