Infection • Antimicrobiens • Modélisation • Evolution

Doors opening and infectious risk in clean surgery: A Prospective, Cross-sectional Study

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ARIB
Attitudes, Risk of Infection, Behaviours in the Operating room

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  - Pfizer: Travel grant for the ICAAC 2011

Introduction

Current knowledge

- Behaviour in OR and infectious risk
  - Literature suggesting impact of team behaviour on the SSI risk
  - Low level of evidence: monocentric & methodological issues
  - Heterogeneous: outcomes and endpoints

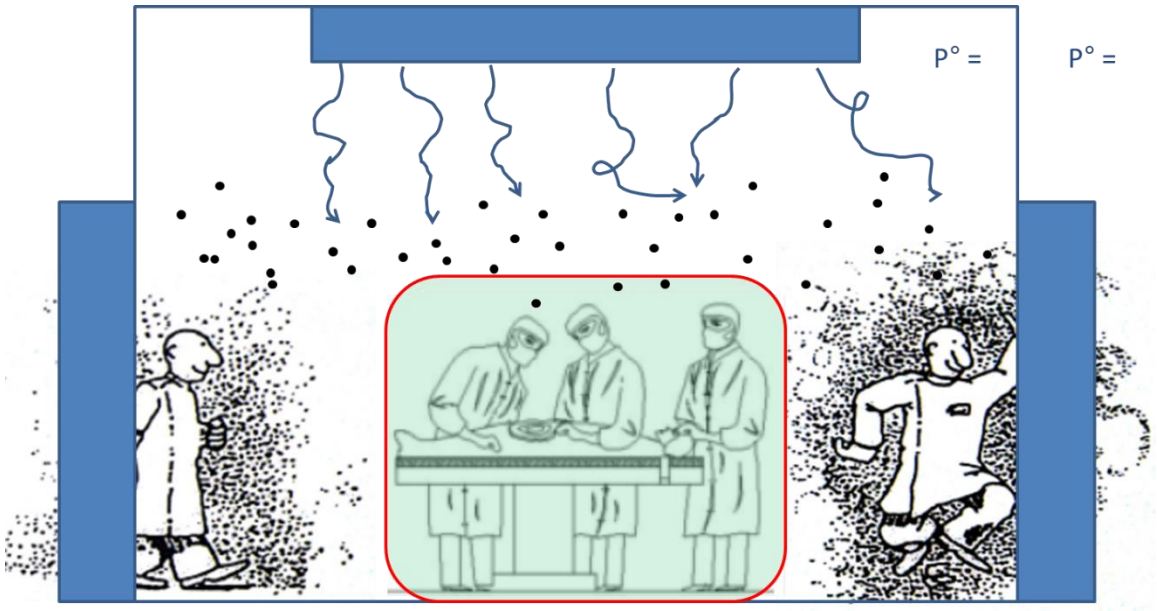
Birgand et al, ICHE 2015

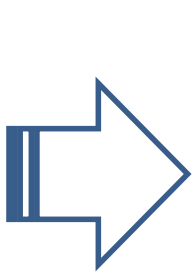
- Guidelines based on expert advices
  - SF2H 2004 (FR): "… restriction of the number of persons and movements in the operating room…"
  - NICE 2010 (UK): "Staff … should keep their movements in and out of the operating area to a minimum."
  - CDC 1999 (US): keeping OR doors closed (grade IA) and allowing only necessary personnel into the OR (grade II).

Objectives

1. To describe and assess the staff behaviour in the OR and its variability

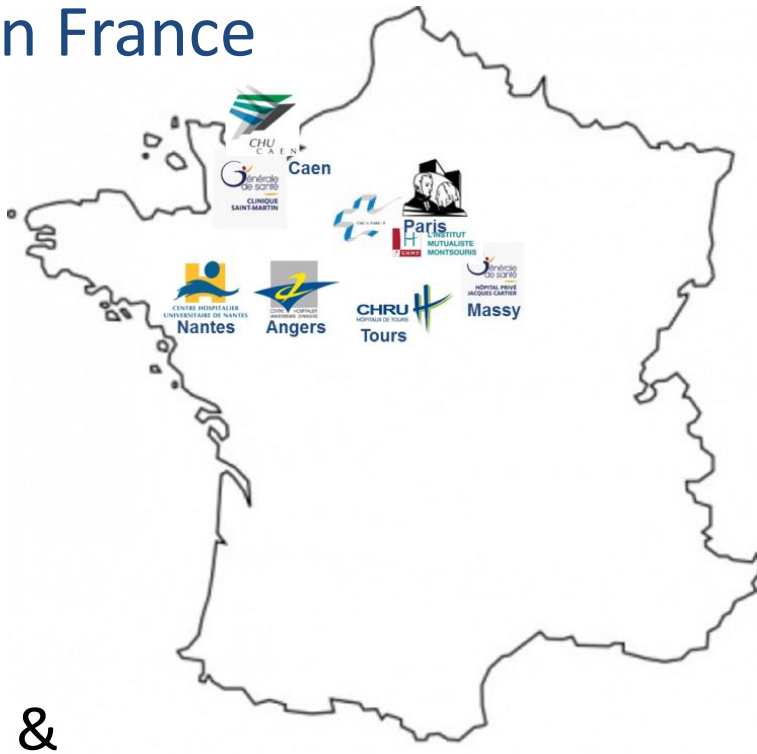
2. To correlate the staff behaviour with the SSI risk, approached with surrogates of SSI





Methods

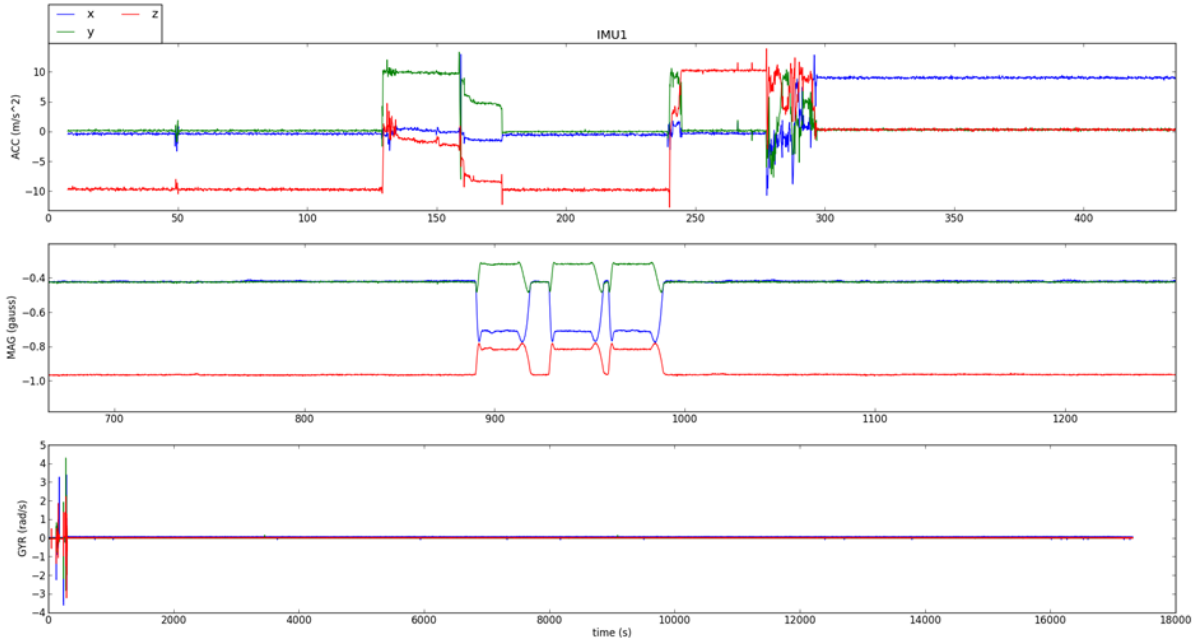
- Observational multicentre study in France
  - 10 hospitals & 13 operating theatres
- 2 surgical specialities
  - Reproducible + cutaneous approach
  - TKR/THR, median sternotomy
- Data collection tool
  - Objectively measure the movements & interactions of surgical teams: « video tracking »



Methods

Doors

- Autonomous inertial sensors fixed on each door
  - Records of door openings and movements



Methods

Reflective markers

- Reflective markers distinguishing professionnal categories
  - Surgeons/OR nurses/Anaesthetic team/Others
  - Number of persons and their movements

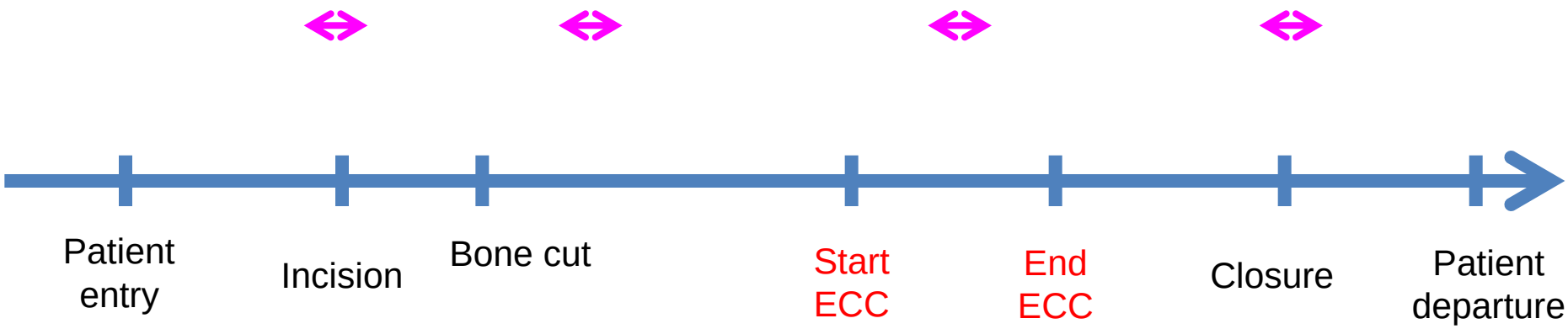
Surrogates of Infectious Risk

- Particle counts
  - Photodetection device (HandiLaz Mini) 1 minute every 3 minutes
  - 3 sizes of paticles: 0.3, 0.5, and 5 µm
  - Mean of particle counts $\log_{10}$ transformed

Particle count 0,3; 0,5; 5 µm (1 min x 3min)

Surrogates of Infectious Risk

- Microbiological air counts
  - Impactor air sampler (Air-test Omega), 100 L/min for 5 minutes (500 L)
  - Trypticase soy agar incubated for 4 days at 30°C



Surrogates of Infectious Risk

- Wound sampling
  - Sterile pads 7x2 cm before closure
  - 1 to 2 min on a surface area of 84 cm^2

Results

Overall data

Orthopaedic surgery

- 6 Operating rooms (4 Univ)
  - 4 with laminar air flow
  - Median Nbr of doors: 2 (1-4)
    - 2 OR with a single door
- 35 procedures
  - 18 Total Hip replacements
  - 17 Total Knee replacements
- Median duration [IQR]
  - Patient entry-exit: 2.5 h[2 - 3.1]
  - Incision – Closure: 1h [1.3 - 1.5]

Results

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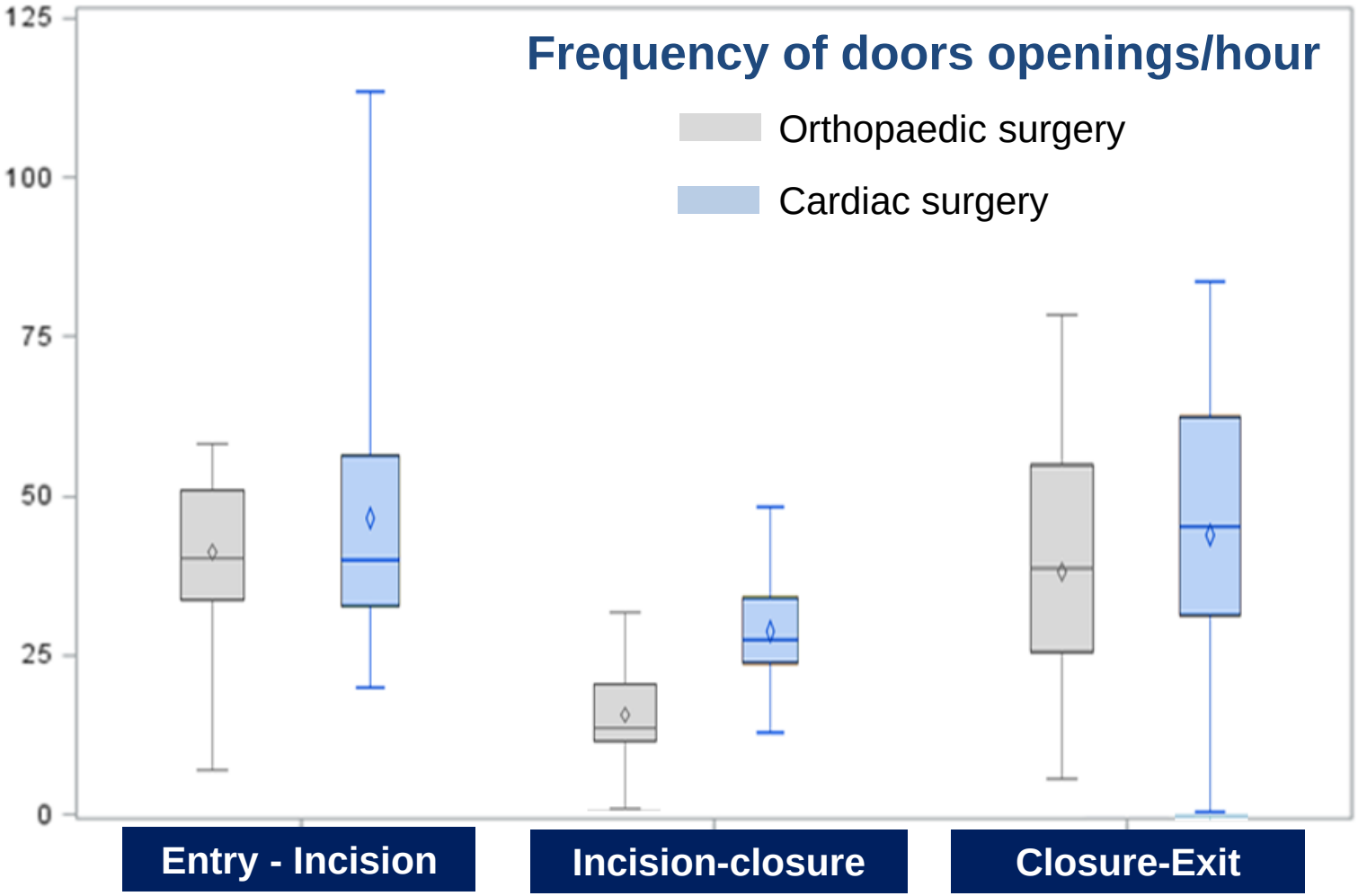
Cardiac surgery

- 7 Operating rooms (2 Univ)
  - 1 with laminar air flow
  - Median Nbr of doors: 2 (1-5)
    - 2 OR with a single door
- 25 procedures
  - 12 CABG
  - 6 Valve repl. & 7 CABG + Valve
- Median duration [IQR]
  - Patient entry-exit: 5 h [4.7 - 6.2]
  - Incision – Closure: 3.5 h [3-4.3]

Results

Door openings data



Results

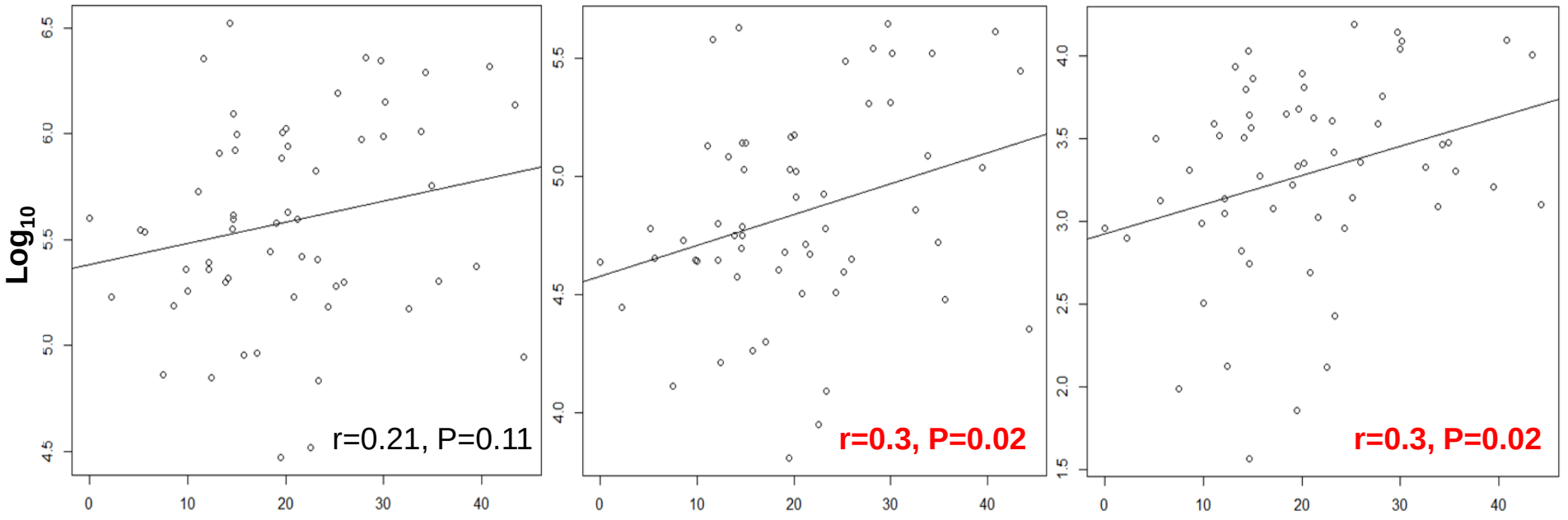
Door openings data

From incision - closure	Orthopaedic surgery	Cardiac surgery	
Mean number of doors openings / person			
Surgeons	4.4 (2.5)	5 [4 - 8]	
OR nurses	8.3 (7)	16 [8 - 28]	
Anaesthetic team	6.3 (5)	18 [13 - 22]	
Others	7.5 (5.2)	17 [10 - 24]	
Mean duration of doors opening (Min)			
University hospital	29.2 (18)	10.1 (23)	P=0.03
Private hospital	13.2 (5)	6.4 (3.7)	
Mean frequency of openings / h			
Materials store room	16.7 (6.2)	9.2 (2.6)	
Decontamination room	0 (0)	0.8 (1.0)	
Surgical team aseptic preparation	10.9 (8)	22 (9.8)	
Pre-operative patient preparation	3.5 (5.9)	5.3 (3.8)	

Results

Door openings frequency - particle counts

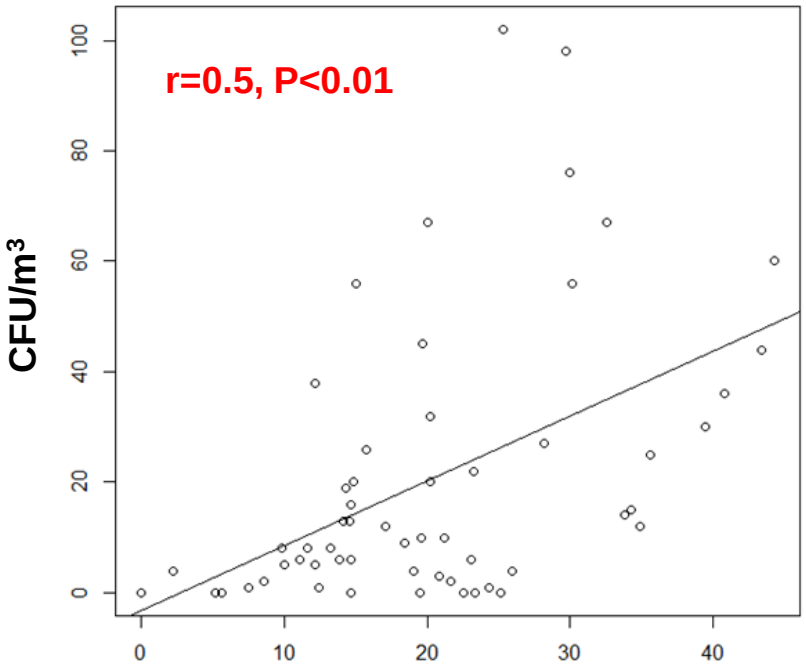
0.3 µm particles | **0.5 µm particles** | **5 µm particles**



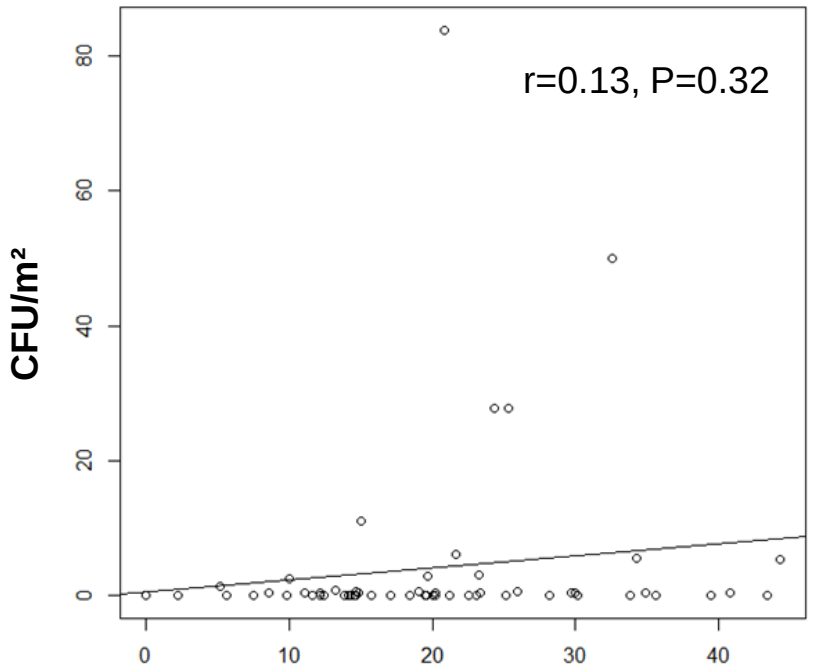
Results

Door openings frequency - microbiology

Airborne bacteria



Wound



Frequency of doors openings (per h)

Discussion

- Behavioural aspects are critical for the control of the exogenous risk of SSI
- Door openings affect air contamination
  - Jeopardizing operating room sterility
- Large heterogeneity of doors openings
  - Between types of interventions, ORs and hospitals
  - Partly preventable: ~ 50%, providing large room for improvement

Raymond, ePoster #EVLB53 ECCMID 2016

Discussion

- Strengths
  - Wide data collection of movements during +60 procedures
  - Multicenter study in different ORs/ clean surgical specialties
  - Original approach using high technology tools

- Limitations
  - Endpoint: surrogates of environmental infectious risk, not SSI
  - Hawthorne effect: data will allow the assessment
  - Reasons of doors openings not collected

Perspectives

- Enlargement of the analysis
  - Movements of persons in the OR with multiple adjustments
  - Safety climate and infectious risk questionnaires
- Better understanding of behaviours to shape interventions
  - Qualitative assessment of surgical professionals perception
- Improving organisation, communication, anticipation
  - Increase the awareness
  - Improve behaviours by monitoring, goal setting, leadership, ergonomics

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  - Y.M. Vandamme,
  - N. Van der Mée – Maquet,

Thank you for your attention

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