O333
2-hour Oral Session
Prevention of surgical site infections: the holy grail of infection control

Do doors openings affect the air contamination in clean surgery? A prospective, cross-sectional study (the ARIBO project)

Gabriel Birgand*[1], Christine Azevedo[2], Roger Pissard-Gibollet[3], Gaelle Toupet[4], Stéphane Ruckly[4], Gilles Antoniotti[5], Marie Noelle Deschamps[6], Didier Lepelletier[7], Nathalie Laure van der Mee-Marquet[8], Jean-Baptiste Stern[9], Carole Pornet[10], Yves-Marie Vandamme[11], Jean-François Timsit[12], Jean-Christophe Lucet[4]

[1]*Arlin Pays de la Loire - Imperial College London, Nantes, France*

[2]*Institut National de Recherche En Informatique Et Automatique, Montpellier, France*

[3]*Institut National de Recherche En Informatique Et Automatique, Grenoble, France*

[4]*Inserm Umr 1137, Iame, Paris, France*

[5]*Générale de Santé, Paris, France*

[6]*Clinique Ambroise Paré, Neuilly Sur Seine, France*

[7]*Nantes University Hospital, Bacteriology and Infection Control, Nantes, France*

[8]*Chu Tours, Tours, France*

[9]*Institut Mutualiste Montsouris, Paris, France*

[10]*Chu de Caen, Caen, France*

[11]*Chu Angers, Angers, France*

[12]*Inserm Umr 1137, Paris, France*

Background: Inappropriate staff behaviours can lead to environmental contamination in the operating room (OR) and subsequent surgical site infection (SSI). This study focused on the continued assessment of OR staff behaviours using doors sensors and their impact on the SSI risk during surgical procedures.

Material/methods: This multicentre observational study included 13 ORs in 10 hospitals, 5 University hospitals and 5 private hospitals. Two specialties of clean surgery with cutaneous approach were included: cardiac surgery with procedures requiring a full median sternotomy (CABG or valve replacement surgery); and planned orthopaedic surgery for total hip (THR) or knee replacement (TKR). For each surgical specialty involved, the observed ORs were randomly selected. Doors opening were observed by means of wireless inertial sensors fixed on the doors. For each surgical procedure, 3 microbiological air counts, continuous particles counts of 0.3, 0.5 and 5µm particles, and one bacteriological sample of the wound before skin closure were performed. We collected informations on the OR staff, surgical procedures and surgical environment characteristics. Statistics were performed using univariate and multivariate analysis to adjust on aerolic and architectural characteristics of the OR.

Results: We included 34 orthopaedic and 26 cardiac procedures. The mean duration of intervention, from patient entry to exit in the OR, was 5.3 (SD 1.1) h. in cardiac and 2.6 (0.7) h. in orthopaedic surgery. The median number of doors opening was 146 (IQR: 121-183; Min-Max: 86-319) per intervention and 29 (IQR: 23-36; Min-Max: 17, 54) per h. in cardiac surgery and 71.5 (IQR: 58-92; Min-Max: 54-136) per intervention and 29 (IQR: 25-34; Min-Max: 16-65) per h. in orthopaedic procedures. Doors stayed open in average 43 minutes (Min-Max: 19-115) in cardiac and 36 (8-199) in orthopaedic, representing respectively 13.5% and 23% of the duration of intervention. The highest frequency of doors opening was observed between wound closure and patient exit, median 20.1 openings/h (12.5-32.3) and from patient entry to the incision 13.2 openings/h (8-19). The number and duration of doors opening was significantly different between centres (higher in university hospital, $p<0.01$)). High frequency of openings was observed for doors that should normally stay closed during procedures (materials store, decontamination room). The number of doors opening from skin incision to wound closure affected significantly the 0.5 and 5µm particles count ($p<0.01$ and 0.02 respectively) (Figure 1).

Conclusions: This study based on automatic observation suggests a large heterogeneity of doors openings between types of interventions, ORs and hospitals. Data give a standard of doors opening for CABG, THR and TKR. Door openings affected air contamination, potentially jeopardizing operating room sterility. The causes and influences of behaviours in the OR must be evaluated to identify ways to reduce the associated risks.

Figure 1. Distribution of particle counts according to the number of doors opening between the skin incision and wound closure in clean surgery.