Effect of using ceiling-mounted systems for imaging in hybrid operating rooms on the level of colony-forming units during surgery

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Disclosure

Roberto Traversari

I have the following potential conflicts of interest to report:

- [x] Consulting
- [ ] Employment in industry
- [ ] Stockholder of a healthcare company
- [ ] Owner of a healthcare company
- [ ] Other(s)

- [ ] I do not have any potential conflict of interest

Aim of the study

Aim:

Evaluate the level of colony-forming units (CFU)/m^3 during surgery when using a ceiling mounted system for imaging

Methodology

Method:

- CFU measurements during surgery
- Active sampling, each sample: 1 m^3 air in 10 minutes
- In 4 *hybrid operating rooms* at four different hospitals
- > 3 procedures for each system
- Simulated movement of C-arc (in HOR at rest)
- Surgery performed according to standard procedure of the hospital

Acceptance criteria

Requirement:

Less than 10 CFU/m^3 (average procedure)[1]

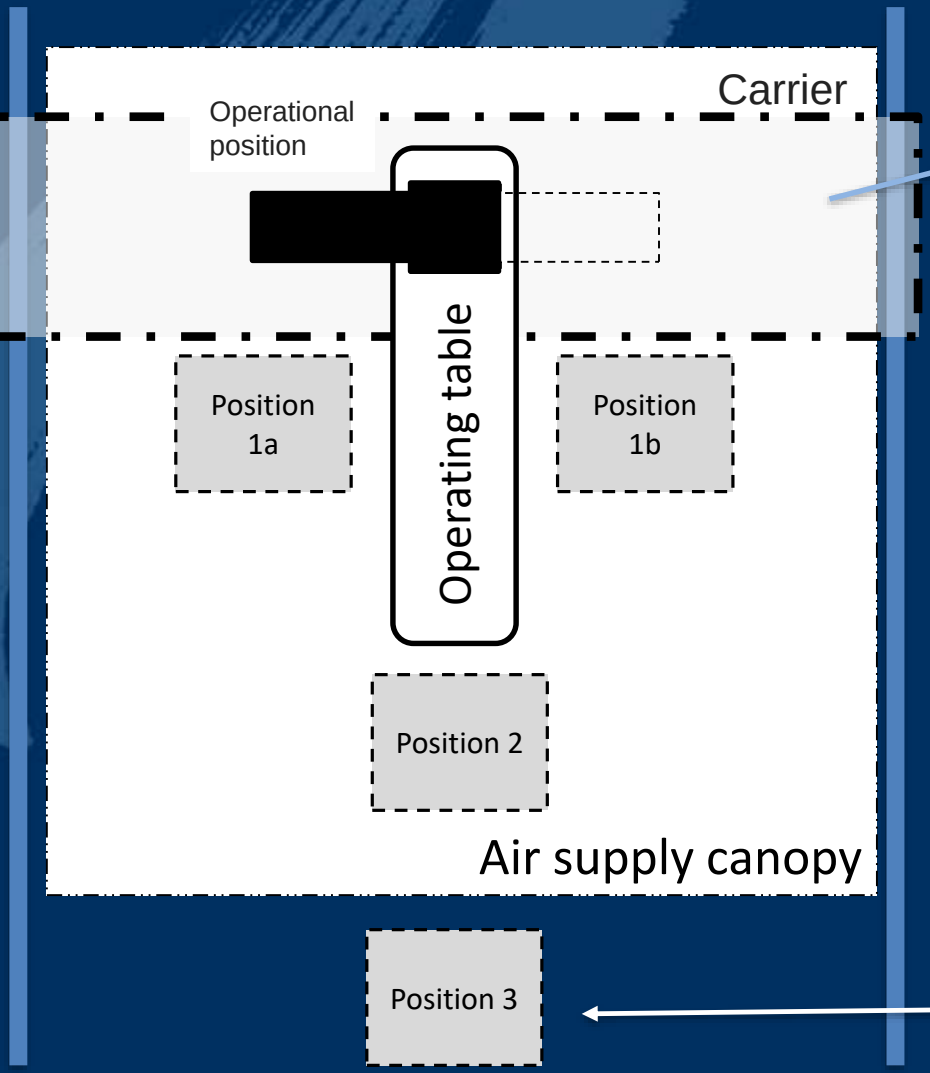
Less than 30 CFU/m^3 (individual samples)[1]

[1] *SIS-TS 39:2015. Microbiological cleanliness in the operating room - preventing airborne contamination - guidance and fundamental requirements. Stockholm: SIS, Swedish Standards Institute; 2015..*

Types of surgical procedures

Type of surgical procedure	Number of procedures
Pacemaker implant	3
Heart valve replacement	2
EVAR procedure	9
Opening of a narrowed blood vessel	1
Angioplasty	1
Total number of surgical procedures	*16*

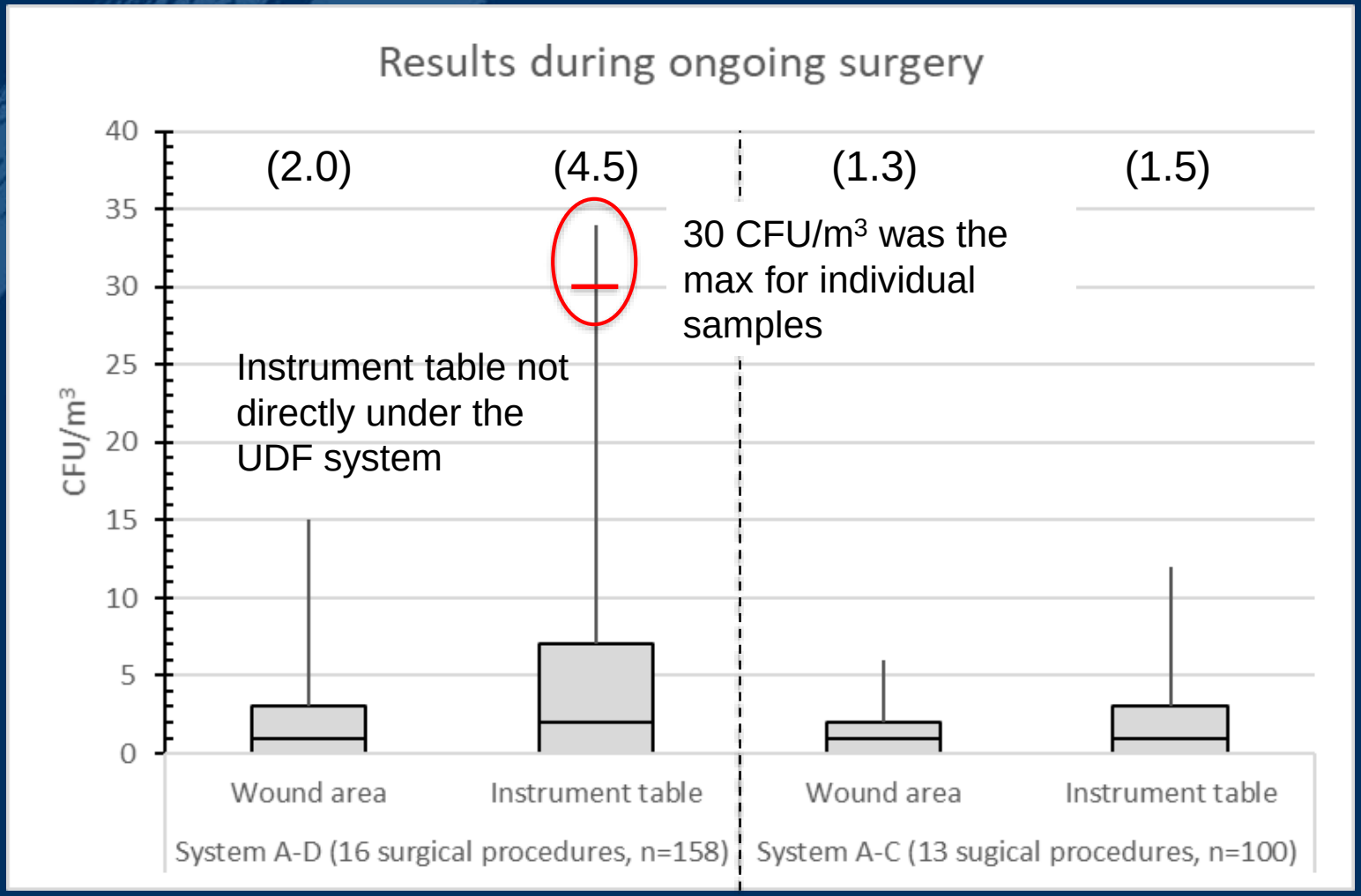
Position of the instrument tables



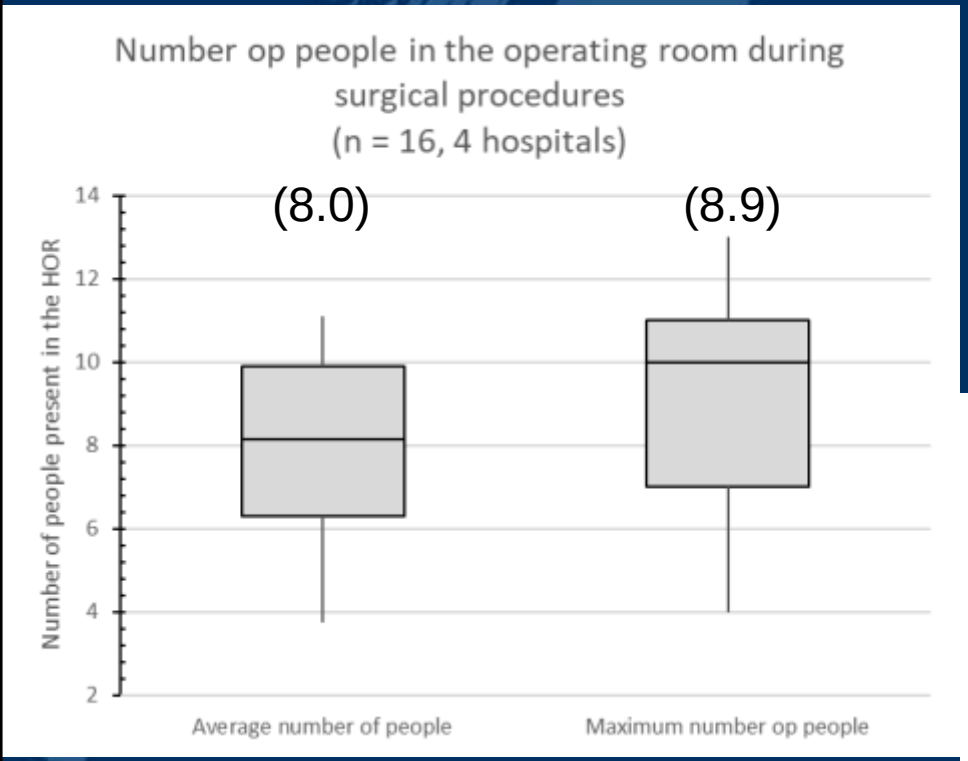
Hybrid operating room	Procedure				
	1	2	3	4	5
A	2	2	2	2	2
B	2	2	2	-	-
C	1a/ 1b	1a/1b	1a/1b	1a/1b	1a/1b
D	3	3	3	-	-

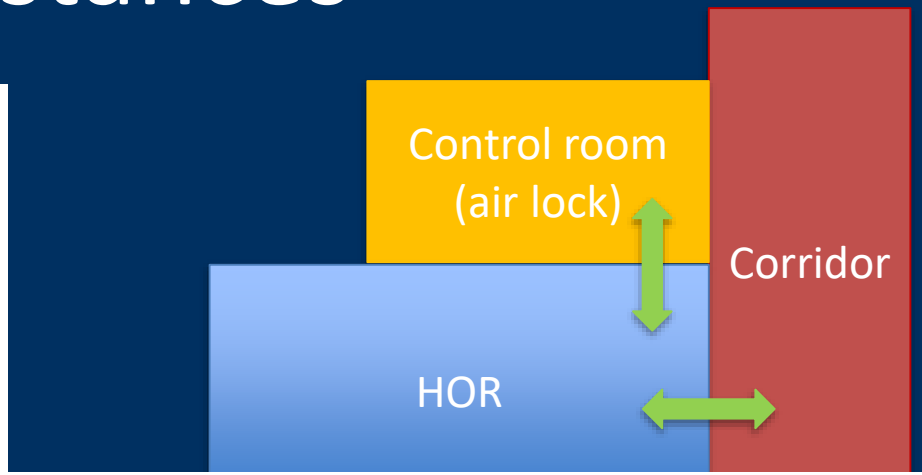
Instrument table not directly under the UDF system

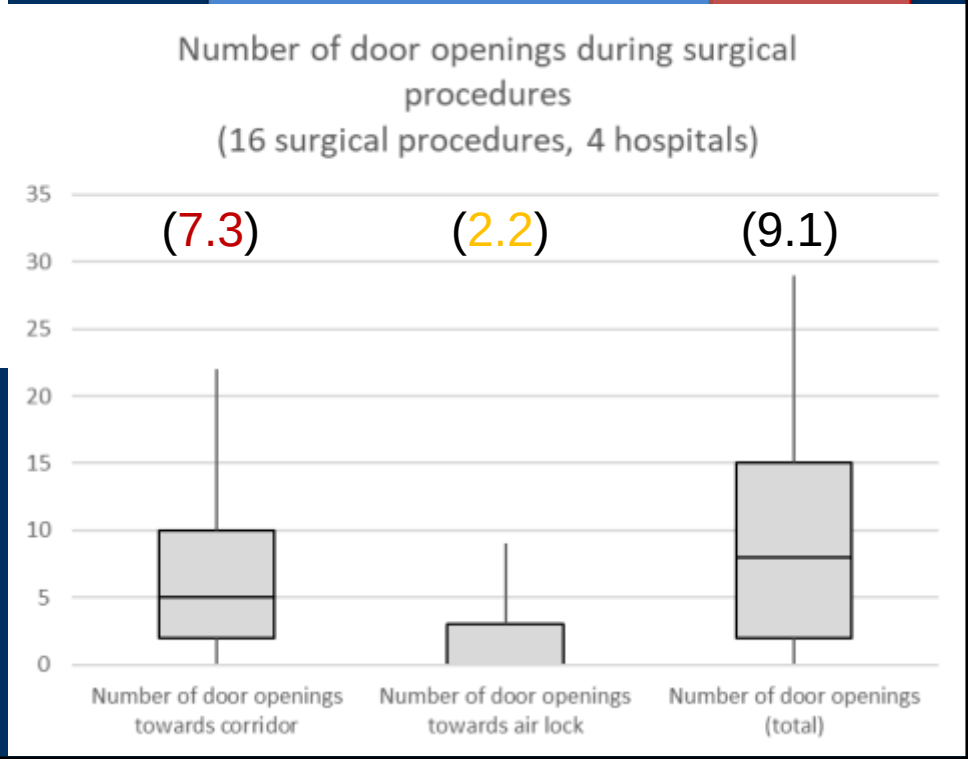
Results


Results during ongoing surgery
40
35
30
25
20
15
10
5
0
CFU/m3
(2.0)
(4.5)
(1.3)
(1.5)
30 CFU/m3 was the max for individual samples
Instrument table not directly under the UDF system
Wound area
Instrument table
Wound area
Instrument table
System A-D (16 surgical procedures, n=158)
System A-C (13 sugical procedures, n=100)

Circumstances





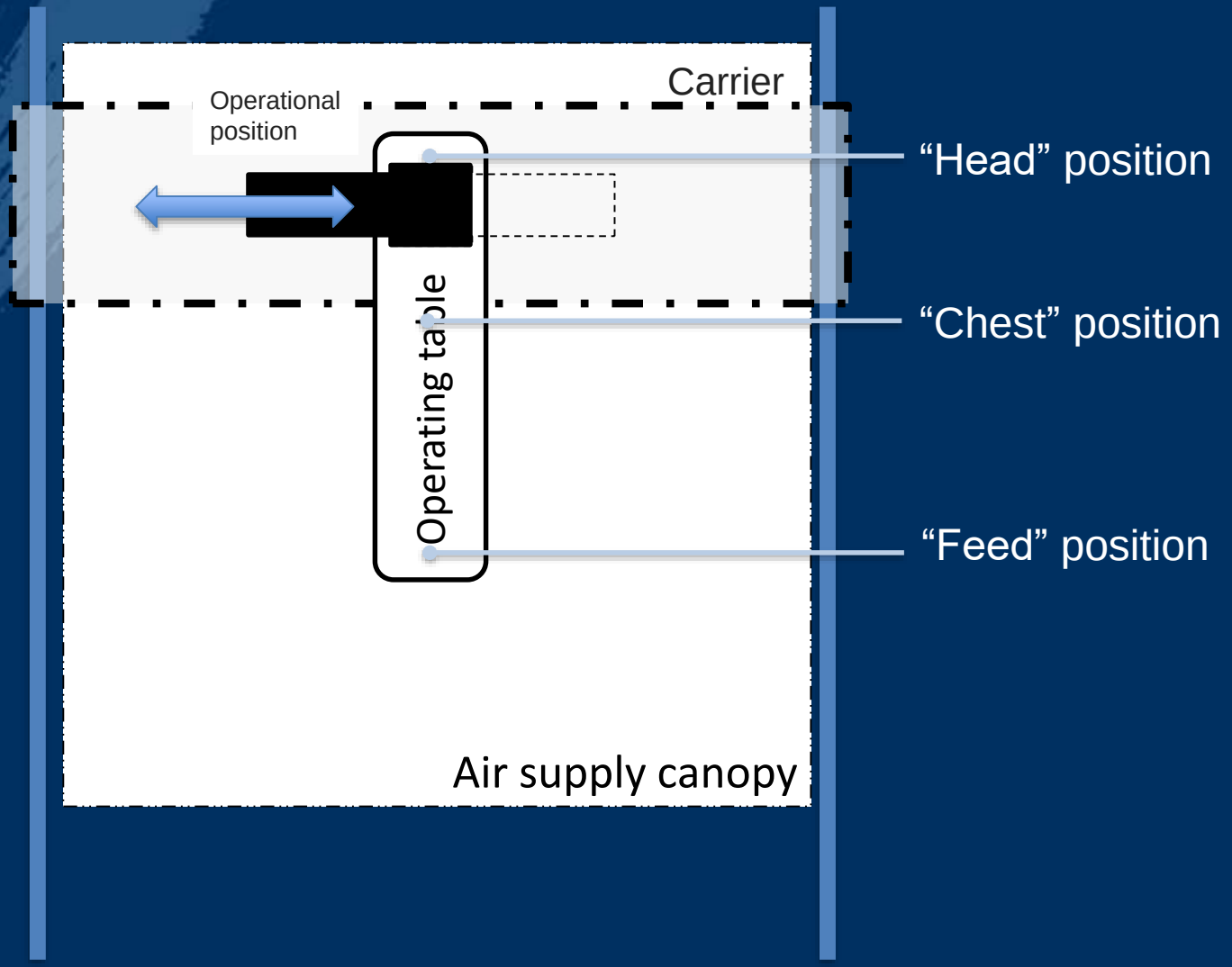


Simulated movement

Movement C-arc:

A: 2 min in, 2 minute out

B: 1 min in, 1 minute out



Conclusions

During surgery

- Low CFU levels are demonstrated < 10 CFU/m^3
- The position of the instrument table is critical

Simulated movement

- CFU level at the “head” position is slightly higher than other position (but smaller that 10 CFU/m^3)

- Probably caused by:
  - the disruption of the unidirectional air flow (UDF) by the carrier
  - the movement of the C-arm (due to the resulting turbulence)

- Less probably:
  - falling microorganisms carrying particles from the system itself

Thank you

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