

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

Roberto Traversari

The Netherlands Organisation for Applied
Scientific Research TNO, Delft, The Netherlands

<https://doi.org/10.1016/j.jhin.2018.10.016> (open source)

Disclosure

Roberto Traversari

I have the following potential conflicts of interest to report:

- ☒ 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)/m³ during surgery when using a ceiling mounted system for imaging



Methodology

Method:

- CFU measurements during surgery
- Active sampling, each sample: 1 m³ 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/m³ (average procedure)¹

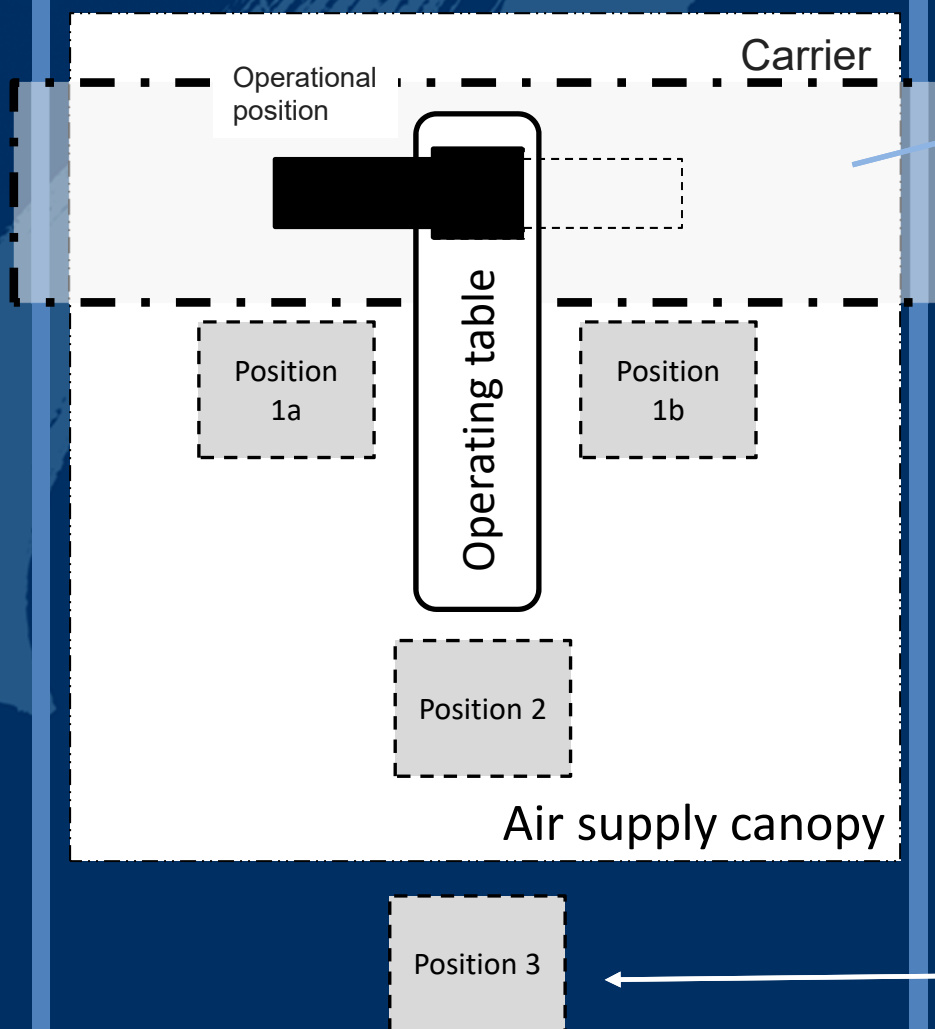
Less than 30 CFU/m³ (individual samples)¹

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
<i>Total number of surgical procedures</i>	16

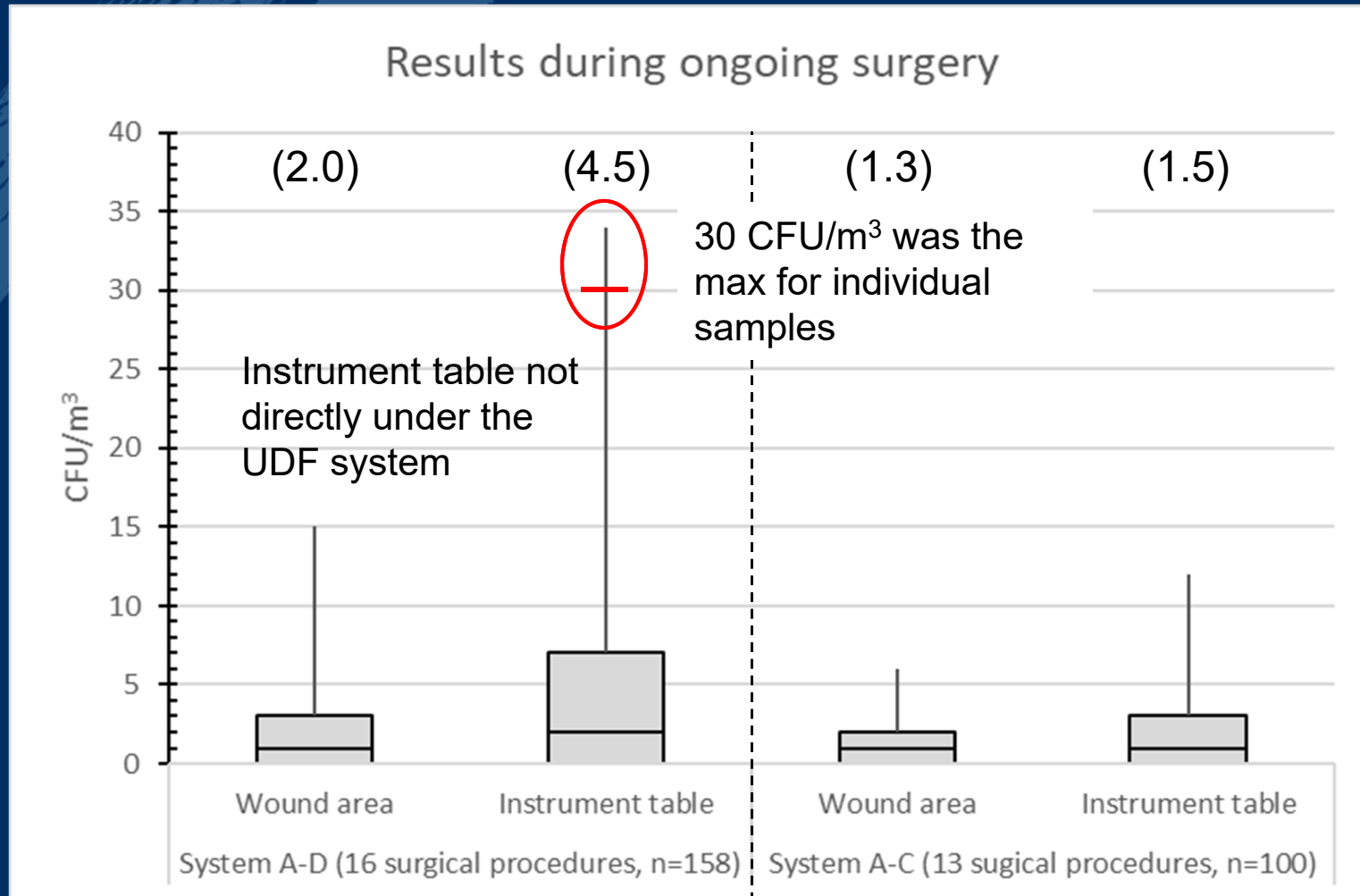
Position of the instrument tables



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	-	-

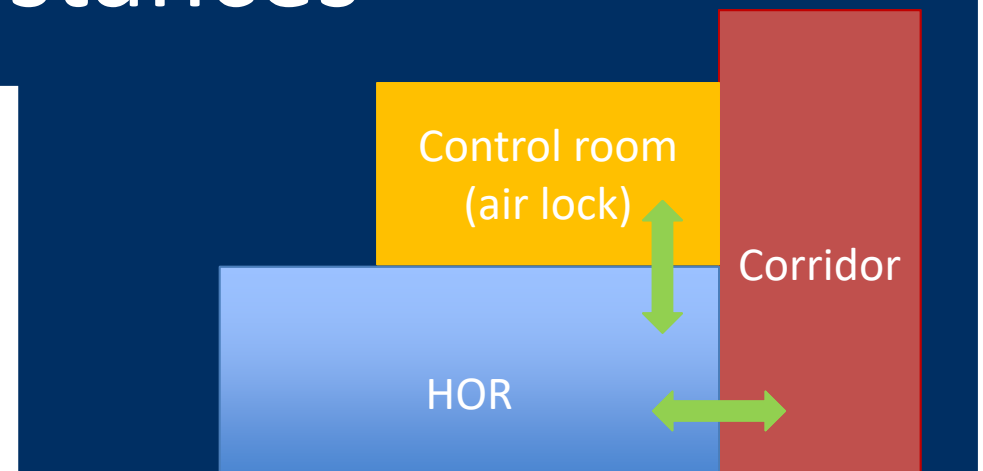
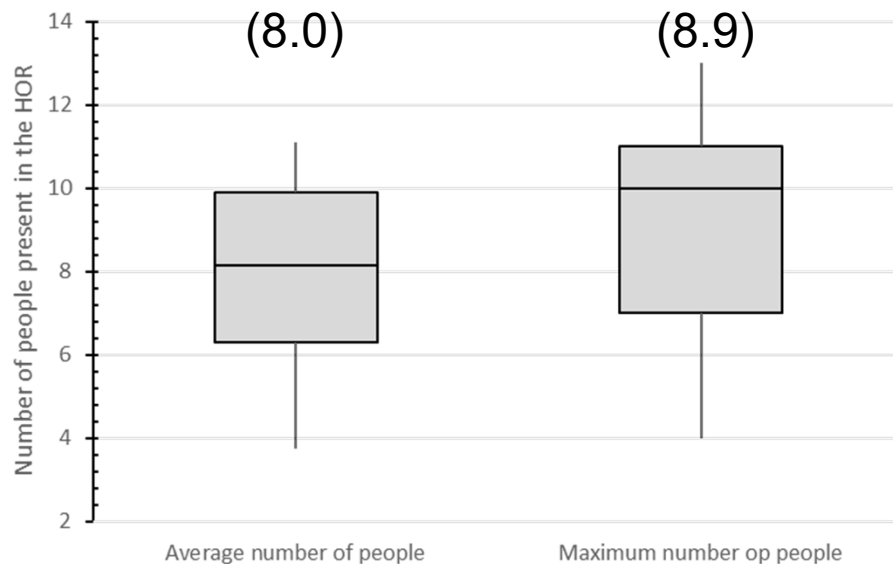
Instrument table not
directly under the UDF
system

Results

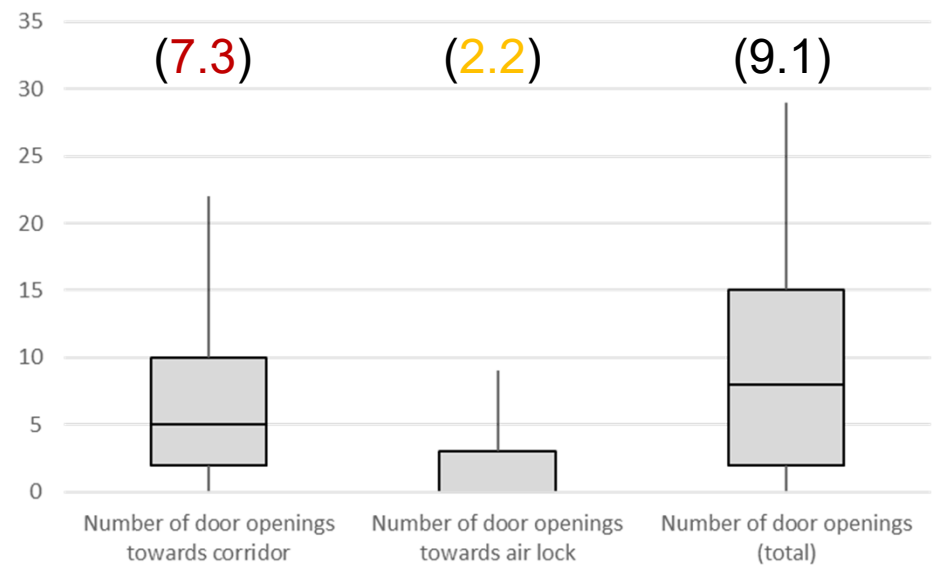


Circumstances

Number of people in the operating room during surgical procedures
(n = 16, 4 hospitals)



Number of door openings during surgical procedures
(16 surgical procedures, 4 hospitals)

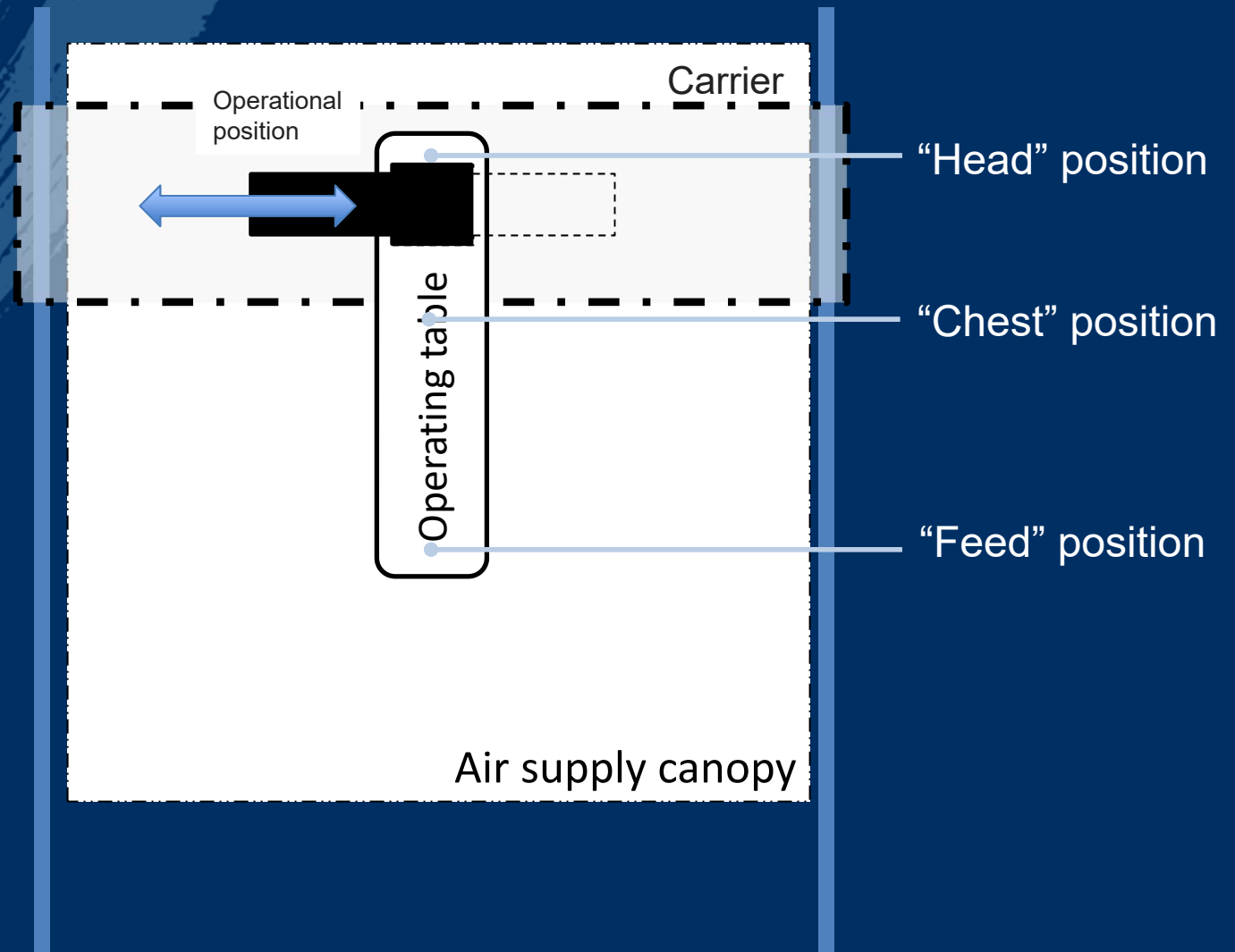


Simulated movement

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 $< 10 \text{ CFU/m}^3$
- The position of the instrument table is critical

Simulated movement

- CFU level at the “head” position is slightly higher than other position (but smaller than 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

Roberto Traversari

+31(0)653 194 752

Roberto.traversari@tno.nl