

Measurements of bacterial counts in the air at a specialized hospital for cardiac surgery and treatment in Norway 2013-2015

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Introduction

The LHL clinic Feiring is a specialized hospital near Oslo, Norway, for diagnosis, treatment and rehabilitation of adults with heart disease. Since its inception in 1989, the hospital has performed over 70,000 cardiac exams (angiography) and more than 50,000 cardiovascular treatments. Around 25 percent of all investigations and treatments carried out in Norway within our specialty are performed at our hospital. We conduct approximately 4,500 angiographic studies, 1700 stenting (PCI), 200 ablations and 650 bypass and valve operations each year.

Surgical procedures at the Feiring heart clinic, Norway

Angiography

Percutaneous coronary intervention (PCI angioplasty w/ stent)

Transcatheter aortic valve implantation (TAVI)

Cardiac ablation procedures

Bypass / valve operations

The classification of these types of surgical procedures is *ultraclean*, with special requirements for air quality. One of several parameters we measure twice a year, is the number of bacteria in the air, defined as cfu = colony forming units.

According to current guidelines, bacterial counts in air in connection with sensitive surgery are set to maximum 10 cfu/m³.

Methods

Measurements of bacteria were carried out in connection with two bypass surgeries with 8 - 10 persons present.

Unilabs, Telelab, NO-3700 Skien, Norway by the Laboratory for environmental microbiology (Miljøbakteriologisk laboratorium) carried out the counting of bacteria.

The company OPAK AS and indoor climate consultant Mr. Kjell Fossum carried out other measurements and evaluations.

The equipment used was a Merck MAS 100 (air sampler) adapted to 90mm Petri dishes with blood agar supplied by Unilabs/Telelab, Skien, Norway. Bacterial analysis were performed by the same laboratory.

Results and discussions

After the summer holiday in 2013, we experienced problems with air quality of one surgical theatre following rehabilitation of the ceiling. We implemented several internal and external infection control programs, but this did not lead to any reduction of bacterial counts. (Table / Results September 10, 2013).

After several preliminary trials, readings and measurements the Aerte Air Disinfection instrument (Aerte AB, Box 2020, SE-194 02, Upplands-Väsby, Sweden) was introduced in our clinic. The Aerte AD2.0 mimics a natural disinfection process that goes on continually in the external environment, by the release of active oxygen species.

We installed and started to use the air purifier after the summer holiday in 2014.

New bacterial measurements were performed in October 2014; the results were significantly improved. (Table October 21, 2014). Average bacterial count at that time were 8,7 cfu/m³.

This count is below the requirement for ultraclean, infection sensitive surgery, compared to the figures in September 2013 (average bacterial count: 22,9 cfu/m³)

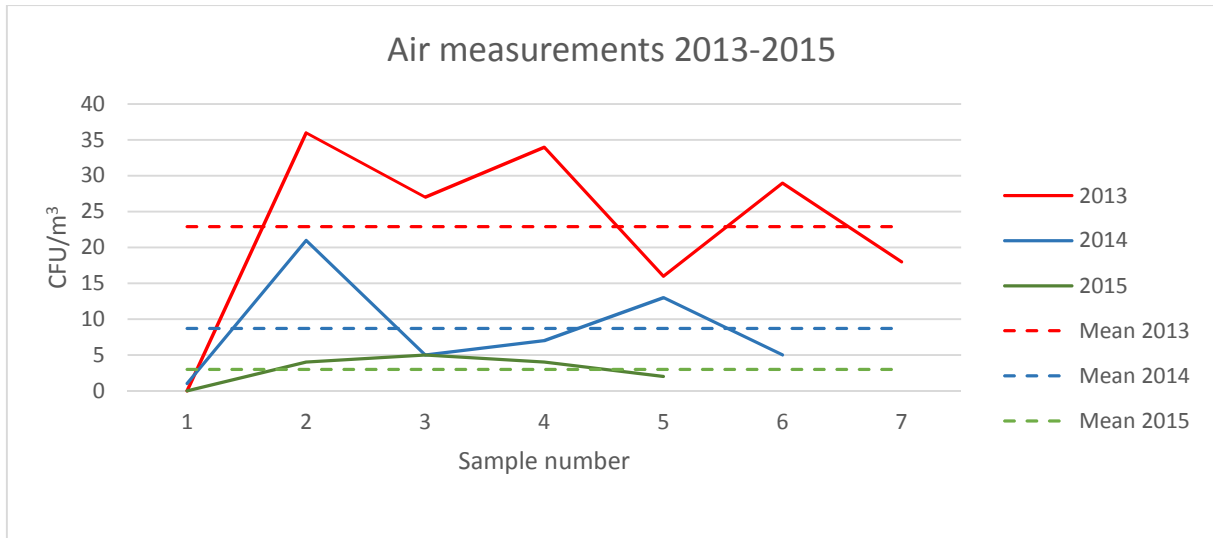
Subsequent measurements in May 2015 demonstrated outstanding results with mean bacterial counts of 3.0 cfu/m³.

Measurements carried out in surgery theatre nr. 2 before and after the implementation of the Aerte Air Disinfection System.

10 Sep. 2013 cfu/m ³	21 Oct. 2014 cfu/m ³	11 May 2015 cfu/m ³	No. persons present	Time for sample collection	Comment
0	1	0	1	07.00	0-specimen
36	21	4	9	08.40	Operation starts
27	5	5	10	09.10	Operation continues
34	7	4	9	13.00	Operation starts
16	13	2	8	14.15	Operation ends
29	5				
18					
22,9	8,7	3,0			Average cfu/m ³



Graph illustrating measured values and calculated mean values 2013-2015.



Conclusion

The Aerte AD2.0 Air Disinfection system significantly reduced the level of airborne microorganisms in our surgery theatre.

The system requires little space, is quite and easy to operate.

