Opragon
by Avidicare

A unique system for ultra-clean air in operating theaters

Less airborne bacteria means less infections

An operating theater is filled with surgical staff, each of them shedding around 10,000 skin particles per minute. About 10% of these particles carry bacteria. Thus, each person sheds thousands of bacterial particles per minute.

Sir John Charnley performed a large scientific study of surgical site infections (SSI).[1] Based on 6000+ patients, he saw that less bacteria in the OR air reduced SSI occurrence during orthopedic surgery – from 8% to 1%.

Lidwell et al confirmed the findings with 8000 patients in several countries in a large study.[2] In summary – less bacteria in the OR air leads to lower risk for SSIs. Please see in-depth scientific overview on avidicare.com.

Example of Opragon hybride room installation

SSI is measurable, expensive and painful

SSI is a systems outcome with many contributions from different parts of the treatment chain.

SSIs are painful for the patient, sometimes even deadly. They are also expensive for the hospital and society at large. The American college of surgeons calculated a cost of $27,631 per SSI.[3]

The risk of SSIs is likely to increase due to the global rise of Anti Microbial Resistance (AMR). It is more important than ever to ensure that exogenous bacteria do not get into the wound at all, since AMR means that antibiotics will become less effective.

Ultra-clean in the whole room

Opragon systems are designed for installation in the false ceiling in ORs used for infection sensitive surgery. There are different versions available for hybrid ORs as well as instrument preparation rooms. The units are supplied with HEPA-filtered air from a standard external air handling unit equipped with a heating/cooling coil.

The air is supplied to the room both in the central Opragon unit and in the peripherally placed airshowers. The unique system supplies cooler air in the center than in the peripheral airshowers, which creates ultra-clean air in the whole room. This is made possible by effectively breaking the convection currents from the staff around the patient and actively transporting away the bacteria carrying particles before they can whirl around the room and contaminate the wound or the sterile instruments.

In a complete Opragon installation (see example below), less than 5 cfu/m³ can be maintained in the surgical working area and less than 10 cfu/m³ in the whole room (provided that the other hygiene and clothing requirements are also met). This creates a more flexible working space in the OR.

The technology is scientifically validated

An article in the Journal of Hospital Infection (Oct 2017) by Lund University shows that Opragon creates ultra-clean conditions in the whole room. It does so using less energy than other alternatives, while having the best working conditions.[4] A full list of 25+ supporting scientific papers is available on request.
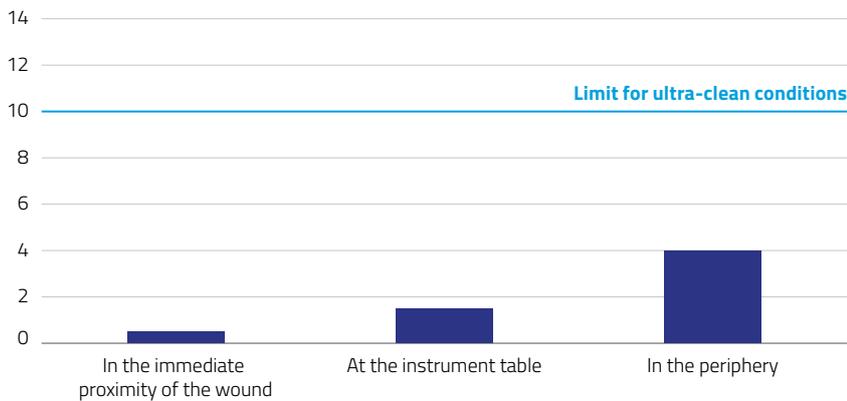

EXAMPLE OF AN OPRAGON INSTALLATION

1. Central Opragon unit: Cooled HEPA-filtered air provides an ultra-clean environment.

2. Peripheral airshowers: Their number varies depending on the size of the room. They control the room temperature and accelerate the sedimentation. The intake air is HEPA-filtered.

3. Exhaust air: The exhaust air is evacuated symmetrically at floor level.
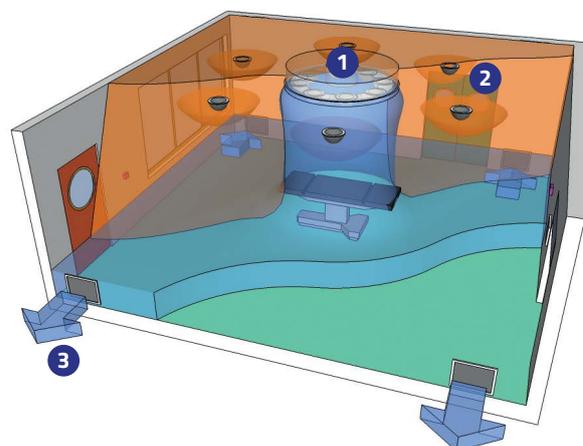
1   Charnley, J. (1972). Postoperative Infection after Total Hip Replacement with Special Reference to Air Contamination in the Operating Room. Clinical Orthopaedics and Related Research
2   Lidwell, O. M. (1988). Air, antibiotics and sepsis in replacement joints. Journal of Hospital Infection
3   facs.org
4   Alsved, M, et al. (2017) Temperature controlled air flow ventilation in operating rooms compared with laminar air flow and turbulent mixed air flow. Journal of Hospital Infection

ACTUAL BACTERIA LEVELS IN OPERATING ROOM DURING SURGERY (300+ MEASUREMENTS)

Average Avidicare CFU/m³ measurements

Limit for ultra-clean conditions

	In the immediate proximity of the wound	At the instrument table	In the periphery

(Bar chart values: ~0.5, ~1.5, ~4; limit line at 10; y-axis scale 0–14)

Ultra-low airborne bacteria levels during surgery

Avidicare is committed to real-world validation of the Opragon system. All installations have been validated with bacteria measurements during live surgery as part of a service offering and tuning of performance.

More than 300 bacteria measurements have been performed since 2007 and illustrate the Opragon efficiency. Averages are about 0.5 cfu/m³ in the air in the immediate vicinity of the wound, 1.5 cfu/m³ close to the instrument table and 4 cfu/m³ in the periphery of the room. The median value is actually 0 cfu/m³. Avidicare can thus safely promise less than 5 cfu/m³ in the center and less than 10 cfu/m³ in the periphery. The results were achieved by teams observing proper hygienic conduct and wearing standard surgical clothing.

The most comfortable system for surgical staff

The surgical staff needs to have optimal working conditions to be able to perform their important roles. This creates a need for a thoroughly calibrated air conditioning and ventilation system. It is especially challenging to combine with the many air changes needed to perform safe surgery.

The Opragon has a proven surgical staff satisfaction due to the minimal draught created when the air is released – not pushed – into the rooms. This leads to low noise level and next to no wind chill effect.

Example of Opragon 8 installation

TECHNICAL SPECIFICATION

OPRAGON 8 CENTRAL UNIT

- Number of airshowers: 8
- Airflow Opragon: 2800 m³/h≈780 l/s
- Diameter: 1940 mm
- Height: 200–400 mm
- Weight: 100 kg
- Material: Laser cut sheet metal
- Color: RAL9016 (standard) alternatively powder coated in desired color or in stainless sheet metal.

PERIPHERAL AIRSHOWERS

- Approx. 10–12 airshowers
- Airflow approx.: 3500 m³/h

OPRAGON 8 SYSTEM

- Total Airflow: Approx. 6300 m³/h

(Diagram labels: 200–400 mm, 172 mm, 1940 mm)
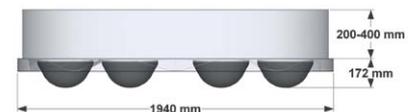
Sustainable and competitive life-time cost

The Opragon system has a flexible design that is tailor-made for each installation. The minimum space requirement between the structural and false ceilings is 30 cm (approx. 12 inches), which allows for installations in rooms with limited space in both new and refurbished units. This makes it easy to fit with other parts of the OR construction.

The Opragon is easy to maintain after installation which reduces total life-time cost – an important factor for the solid customer satisfaction among the clinics that have been using the Opragon for up to ten years so far.

The Opragon also boasts a low energy-cost without compromising efficiency, which is unique compared to other similar systems.[5]

An article in the Journal of Hospital Infection (Oct 2017) stated that there is a 30% lower cost of ownership with the Opragon system compared to standard laminar airflow systems.[6]

5   Löndahl et al, 2017, Energy efficient ventilation for hospitals, Swedish Energy Agency Report 2017:04
6   Alsved, M, et al. (2017) Temperature controlled air flow ventilation in operating rooms compared with laminar air flow and turbulent mixed air flow. Journal of Hospital Infection

Opragon installation in the Netherlands. Image courtesy: Linda Heller

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Together Towards Zero Infections

Avidicare is committed to the vision "Towards Zero Infections" and strives to eradicate Surgical Site Infections together with caregivers and partners.

Today, there are more than 120 Opragon installations at leading academic hospitals and specialist clinics in Northern Europe. This has allowed for extensive scientific validation of the benefits of the Opragon System including establishing ultra-clean ORs, low energy cost, increased installation flexibility and improved working conditions.

Avidicare holds six patents and is ISO-certified for quality and environment. The headquarter is based at Medicon Village in Lund, Sweden.

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New technology, a high level of ultra-clean air in the entire operating room, and good comfort for the staff were deciding factors in our choice of ventilation solution."

— Torbjörn Henrikson, Representative of Gävle Hospital

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