PHILIPS

Image guided therapy

Hybrid OR

New study concludes ceiling-mounted imaging systems do not affect sterility

Philips and TNO Research (an independent research institute, established by Dutch law) conducted the first study to evaluate the effect of ceiling-mounted imaging systems on colony forming unit (CFU) levels during surgery. The study measured CFU levels during live procedures performed using ceiling-mounted imaging systems combined with unidirectional flow (UDF) systems, explained below. A literature review was also done, explained on the next page. The authors concluded that the air quality remains to be far within the thresholds for microbiological air pollution so ceiling mounted systems have no impact on sterility.

Background

This is the first study that investigates the effect of large ceiling-mounted imaging systems combined with UDF systems on the air quality during surgery. Floor-mounted systems have also not been studied to date.

When ceiling-mounted equipment, like imaging systems, are positioned within a UDF area, their presence disrupts the airflow, which might affect the performance of the ventilation system. This raises the question if and to what extent ceiling-mounted equipment impacts the overall air quality (and therefore sterility) during surgical procedures.

Between March and June 2018, the CFU/m³ near the surgical wound and on the instrument table during surgery were measured in four hybrid operating rooms in the Netherlands, where ceiling-mounted imaging systems from Philips were used above the patient in their working position.

The results

As shown in the graph below, when ceiling-mounted imaging systems are used in combination with a large UDF system, there is no impact on sterility. In fact, it is feasible to reach air quality values far below the internationally accepted threshold value of 10 CFU/m³ and also far below Philips much lower targets of 5 CFU/m³ for infection-sensitive surgery. In this study, the average value near the surgical wound was 2 CFU/m³ and the average value near the instrument table (when placed directly below the UDF system) was 4.5 CFU/m³.

Conclusion

To achieve the CFU values outlined above at the instrument table, it must be placed directly under the UDF system. Staff compliance with the correct sterility procedure is of utmost importance. If this is the case, air quality values below the international threshold value can easily be achieved using ceiling-mounted imaging equipment.

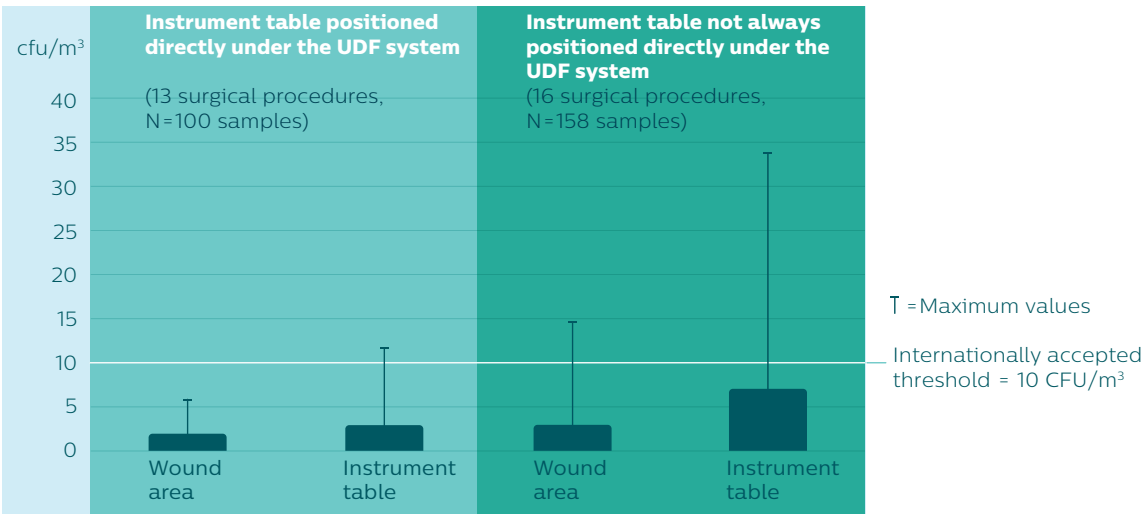


*Figure 1 - The position of the instrument table can have an influence on the overall cfu/m³ in the Hybrid OR.**

Literature review shows that many factors contribute to infection control

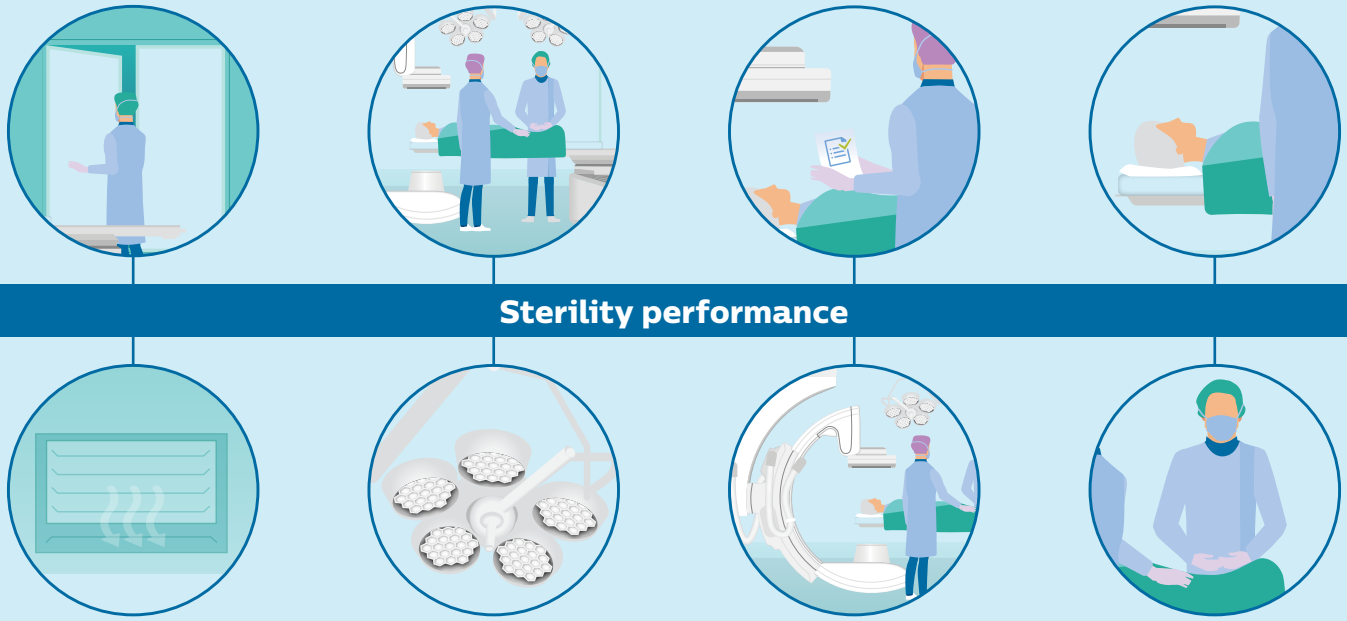
Desk research was done on 55 scientific articles about surgical site infections (SSIs) in both standard and hybrid operating rooms. It showed that ventilation systems, such as laminar air flow, are just one of many factors that can play a role in the incidence of SSIs in these clinical environments. Compared to other factors, like clothing systems, door openings, adherence to procedure protocols and patient preparation, ventilation systems have a debatable impact on good sterility performance.

Door openings and staff movement
The comings and goings of staff and movements within the OR

Cleanliness of the OR environment
The overall sterility and cleanliness of the OR environment

Procedural compliance
How closely staff comply with procedure protocols

Patient preparation and condition
The patient's health and adherence to preparation protocols prior to surgery



Ventilation system
The type and dimensions of the ventilation systems used during surgery

Other equipment
The type, dimensions, position and quantity of additional equipment

Imaging equipment
Like all other elements in the room, the imaging system and its movements can disrupt airflow

Surgical clothing and masks
Adherence to regulations and correct placement of protective clothing and masks

*Figure 2 - Key factors that can play a role in the incidence of SSIs in both standard and Hybrid ORs.**

* Traversari AAL, et al., Effect of using ceiling-mounted systems for imaging in hybrid operating rooms on the level of colony-forming units during surgery, Journal of Hospital Infection (2018), https://doi.org/10.1016/j.jhin.2018.10.016)

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