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Is unidirectional airflow in operating theater still recommended to reduce surgical site infections? The French point of view through the recent international literature

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To the Editor—The indication of unidirectional airflow (UAF) with an airflow velocity between 0.25 and 0.45 m s^{-1} in the operating room to reduce surgical site infections (SSIs) is actually questionable, according to the recent international publications.[1-3] The WHO 2016[4] and CDC 2017[5] guidelines no longer advocate the use of an UAF as a preventive measure to reduce the risk of SSI. However, some authors still recommend doing so in prosthetic orthopedic surgery.[6] The question of the choice of the type of airflow and the air control performance arises or will arise in hospitals during the renovation or the construction of a new operating room.

Recent International Literature

In the study published by Barbadoro et al[7] in 2016, 2 periods were compared: 2001–2013 with turbulent flow use and 2004–2013 with UAF use.[7] After multivariate analysis, a significant decrease of SSI incidence in an operating room equipped of UAF was observed in clean + clean-contaminated surgeries (odds ratio [OR], 0.57; 95% confidence interval [CI], 0.48–0.68) and in contaminated + dirty surgeries (OR, 0.31; 95% CI, 0.17–0.56), respectively. However, this study suffers from numerous biases (ie, nonrandomized single-center survey, no control group, and "before and after" study design).

The meta-analysis published by Bischoff et al[2] in 2017 compared the efficiency of UAF versus turbulent flow in different surgeries. Overall, 12 studies were selected including observational studies (n = 9) or registered database analysis (n = 3). The meta-analysis of 8 cohorts showed no difference in deep SSI incidence after 330,146 hip replacement procedures (OR, 1.29; 95% CI, 0.98–1.71; $P = .07$; $I^2 = 83\%$). Furthermore, no difference was detected after 134,368 knee arthroplasties (meta-analysis of 6 cohort studies; OR, 1.08; 95% CI, 0.77–1.52; $P = .65$; $I^2 = 71\%$). There was no significant difference between digestive and vascular surgeries. The findings of this study are under debate.[6]

In 2017, Oguz et al[8] published a single-center randomized study assessing the influence of 4 factors on the bacterial air contamination after orthopedic surgery: (1) use of UAF, (2) duration of surgical procedure, (3) presence of professionals in the operating room and (4) type of warming (ie, pulsed-air or non–pulsed-air heating system). The patients were randomized into 2 groups, according to the type of warming: pulsating air or electric heating. The unidirectional versus nonunidirectional flow comparison was performed within each randomized group. In multivariate analysis, a significant increase of the number of bacteria in the air was detected according to the duration of the intervention in the absence of UAF.

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Cite this article: Lepelletier D, *et al.* (2019). Is unidirectional airflow in operating theater still recommended to reduce surgical site infections? The French point of view through the recent international literature. *Infection Control & Hospital Epidemiology*, 40: 384–385, https://doi.org/10.1017/ice.2018.345

Recent International Guidelines

In 2016, the WHO published recommendations for SSI prevention[4] and concluded: "laminar flow ventilation should not be used in patients receiving arthroplasty." The quality of the recommendation was "conditional" and the level of evidence "low to low enough." In 2017, the Centers for Disease Control and Prevention (CDC)[5] and the American College of Surgeons and Surgical Infection Society[9] published respectively new guidelines for SSI prevention without a specific recommendation on that topic (ie, "no recommendation" or "unresolved issue").

Discussion

Since the publication by Lidwell et al[10] in 1987, no new randomized clinical trial was published on this topic until the latest randomized study assessing the air quality in the operating room published by Oguz et al[8] in 2017. However, the endpoint was microbiological, and patients were not randomized according to the type of flow. Bischoff et al's meta-analysis[2] or the recent World Health Organization (WHO) guidelines[4] synthesized disparate and heterogeneous studies but relied on solid methods (grading of recommendations, assessment, development and evaluations, GRADE). However, the GRADE method is not always suitable and was not performed in 2015 to grade the French recommendations. With the current state of knowledge, the French Society of Hospital Hygiene highlights the importance of initiating a global risk analysis beyond on the air performance class in the operating room. The new French guidelines oublished in 2018 recommend the possible use of UAF only in prosthetic orthopedic surgery to reduce aerobiocontamination (with no SSI reduction evidence) and with a low level of recommendation. But this measure needs to be included in a bundle of prevention measures, including personal behavior and antibiotic prophylaxis, which remains the major preventive factor. This French opinion and new recommendations aim to help international hospitals in their choice of appropriated airflow, especially when designing or renovating an operating room.

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Improving the availability, accessibility, and use of eye protection in patient care settings

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To the Editor— The International Safety Center has been collecting occupational mucocutaneous exposure incidents for blood and body fluid splashes and splatters since the early 1990s through the Exposure Prevention Information Network (EPINet). In the last 5 years, according to aggregate data submitted via the EPINet network healthcare facilities and reported publicly, eye exposures often exceed 60% of all other mucocutaneous exposures reported to employee health.[1–5]

Because EPINet is the only surveillance system in the world that captures mucocutaneous exposures from health systems and reporting them publicly, it provides the only representative data that exist, and these data clearly illustrate that eye exposures make up the largest percent of any other reported/reportable non-sharp blood and/or body fluid exposure and that small percentages of employees indicate they are wearing any form of eye protection (eg, goggles, eyeglasses with sideshields, or faceshield). Most of these exposures occur in the patient room or the exam room (28.1%–61.3%) (Table 1).[1–5]

I read with interest Dr Mermel's letter, "Eye Protection for Preventing Transmission of Respiratory Viral Infections to Healthcare Workers" (November 2018) about the serious risks of any type of infectious or bloodborne disease to the unprotected eye.[6,7] Improving eye protection availability, accessibility, and use in patient and exam rooms is crucial to protecting not only worker safety but also patient safety and clinical outcomes. There is growing support for Dr. Mermel's recommendation " . . . to wear eye protection when caring

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Cite this article: Mitchell DrPH, MPH, CPH AH. (2019). Improving the availability, accessibility, and use of eye protection in patient care settings. *Infection Control & Hospital Epidemiology*, 40: 385–386, https://doi.org/10.1017/ice.2018.346