Surgical Smoke in the Operating Room

A Health Risk That Does Not Disappear Into Thin Air

QUELLE: FREEPIK.COM

Recently, WIRKSAM Editor Holger Menk sat down with May Karam, President of EORNA – the European Operating Room (OR) Nurses Association – and Markus Wiegmann, the Managing Director for Stryker in Germany, Switzerland, Austria and Poland. Together, they had a conversation about safety in Operating Rooms (ORs), specifically looking at surgical smoke.

Holger Menk: Ms. Karam, you represent EORNA at the European Surgical Smoke Coalition, a pan-European initiative that EORNA co-founded, which aims to raise awareness about the risks of surgical smoke. Can you tell us why this topic is so close to your heart?
May Karam: I worked as an Operating Room nurse in a Parisian hospital. Having been in this profession for 30 years, I am familiar with surgical smoke and the unpleasant smell that can occur when human tissue is cut or dissected. For many years I have been aware that exposure to surgical smoke was dangerous for my health and my co-workers'. However, I was not aware of the exact details of smoke composition and its full impact. Surgical smoke can in fact contain up to 150 hazardous substances, including known carcinogens that are classified by the EU, e.g. benzene.[1,2] There are also concerns that plumes may contain infectious viruses, which became particularly pressing in the context of the Covid-19 pandemic.[3,4]
Holger Menk: There is even a study that suggests that a day in the OR is equivalent to about 27 to 30 filterless cigarettes.[5]
May Karam: Exactly, these figures are very stark and should be a warning to anyone who steps into an OR. Because it is not always visible, smoke seems to "disappear" into thin air, but the health hazards, for the OR staff and to some degree for patients themselves, do not. At EORNA, after looking at all the work our American counterpart – AORN – has been doing, we chose to take a similar approach and advocate for better staff protection and for smoke-free OR policies across Europe. However, we knew we could not do it on our own. As a result, we decided to partner with ESNO, the European Specialists Nurses Association, as well as Stryker and in 2021 we created the European Surgical Smoke Coalition.
Holger Menk: Stryker has also been a member of the initiative since the very beginning. What motivates a medical technology company like Stryker, Mr Wiegmann, to join a movement such as the European Surgical Smoke Coalition?
Markus Wiegmann: The safety of patients and healthcare workers is at the core of our business. For example, surgical procedures are often performed using electrosurgical instruments that apply heat to cut human tissue. This means that the generation of surgical fumes is unavoidable, but exposure can be minimized to a large extent. There are solutions, known as local evacuation devices with filtration systems, that suck the plumes directly at the source. In laparoscopic surgery, where the patient's abdomen is insufflated with carbon dioxide, insufflators can also help remove the surgical smoke from the patient's body and avoid leakage of surgical smoke in the OR.
May Karam: One paradox that puzzles me is that there are technological solutions that can keep surgical smoke exposure low, and yet they are often not used. Unfortunately, in most countries in Europe, surgical smoke management measures remain unsatisfactory. Often what we see is that either hospitals are poorly equipped with solutions that do not capture smoke, or, within a single hospital, not all ORs are equally equipped.
Holger Menk: What do you think is the reason for that?
May Karam: One of the main reasons for this is that the way the danger is perceived amongst OR staff greatly varies. For example, we know from a survey conducted in 2020 in Germany that OR nurses, compared to surgeons, are significantly more concerned about the health hazards posed by surgical smoke.[6] Accordinfg to this survey, 86% of OR nurses are aware of the danger. This can partly be explained by the fact that OR nursing staff will spend 6-8 hours in a row in the OR; while others like surgeons, may come in and out.[7] While I do think OR nursing staff are the most exposed and inconvenienced by surgical smoke, they unfortunately still have little influence on prevention.
Markus Wiegmann: This kind of evidence is precious to measure the levels of awareness and understanding of risks associated with surgical smoke. Together with EORNA, Stryker also launched a survey amongst OR staff in Germany and across Europe. Here, too, the responses led to the same results as highlighted by the study May mentioned.
May Karam: Low awareness also means that those involved may not know of the most effective measures to protect themselves against plumes. At EORNA, we strive to close this knowledge gap by issuing appropriate information materials on the dangers of surgical smoke and formulating recommendations for safe handling.[8] We also organize regular educational events on safety in the OR, including surgical smoke. I must also applaud ESNO for the fantastic awareness guide they published last year.[9] This is another great educational tool not only for OR nurses but all healthcare staff, hospital managers and policymakers.
Holger Menk: In some EU countries – including Germany – there are also requirements from state occupational health and safety authorities on surgical smoke exposure. Is this a case of failure on the part of the authorities to monitor the implementation of the measures?
May Karam: I would not agree with this statement per se. It is important to understand that occupational health and safety is regulated on several levels. First, we know that there is an overarching legislation on workers' health and safety at EU level, which is then mirrored in Member States' legislation.[10] Those are quite broad and not specific to surgical smoke. Particularly on surgical smoke, you may have different approaches, with either the establishment of guidelines or more stringent measures, like laws. One thing is clear: occupational health and safety authorities have a key role to play in ensuring that medical staff are protected from surgical fumes. They should work closely with hospitals, and their occupational health and safety managers, to jointly address the issue.
Holger Menk: Is there a country in the EU where the risk of surgical smoke is dealt with in an exemplary manner?
May Karam: I would say Denmark. There it is mandatory that extraction systems are installed that capture surgical smoke at the point of origin. Outside of Europe, several U.S. states, such as Illinois, have passed similar laws. What puzzles and excites me is to see that the Danish legislation was introduced 12 years ago. In these U.S. states, the legislations were passed in the last couple of years. This is very encouraging for Europe. We cannot allow that an OR nurse in one European country is less protected than in another. The fact that there has been such a powerful wind of change across the ocean tells us that we can aim for the same in Europe.
Holger Menk: Do you know anything about the situation in Germany, Mr. Wiegmann?
Markus Wiegmann: Here, there are guidelines that recommend capturing surgical smoke at source e.g. through the use of handpieces with integrated suction or by using a separate local extraction.[11] We know that although 61.2% of the medical staff stated that they knew of the guidelines, only half could confirm having read them.[12]
Holger Menk: Do you think there is a need for change in policies?
May Karam: Yes. We need a clear commitment to better occupational health and safety in healthcare. That means more education, training, and effective technological solutions. Surgical fumes are one of many health hazards that nursing staff are exposed to every day in the OR - but also outside of it. I think we have momentum here. As I keep saying: we need to invest in those who invest in us. The pandemic has stressed again how we need to support healthcare workers. Not least to counter the shortage we are witnessing across Europe.
Holger Menk: Where do you see the role of the industry here?
Markus Wiegmann: I agree with May: the challenges facing the nursing profession are immense. Technology can only be part of the solution. But I do see our contribution as supporting healthcare professionals to provide the best possible care for patients. When developing our products or services, we therefore always take the perspective of the user or those who assist in their use.
Holger Menk: Let's look to the future - what should the European Surgical Smoke Coalition have achieved in 2025?
May Karam: I would like to see all ORs throughout Europe go "smoke-free". I hope that by 2025, we have achieved changes in some countries, and increased awareness among the healthcare community. To do this, the Coalition is our best ally.
Markus Wiegmann: What I would like most is for the initiative not to have to exist at all by 2025. Because that would mean that we have done our "job" and drawn enough attention to the issue.

Learn more about the European Surgical Smoke Coalition at https://www.surgicalsmokecoalition.eu/ or contact secretariat@surgicalsmokecoalitio.eu

Foto: May Karam (privat)

May Karam
Has been a trained operating room nurse for 30 years. Her specialties include orthopedics, gynecology and traumatology. She also holds a master's degree in health safety and risk management for healthcare facilities. She has served as EORNA president since 2018 and is currently sitting at the IFPN - International Federation of Perioperative Nurses - Board as Treasury.

Foto: Christina Dages

Markus Wiegmann
Studied mechanical engineering and has worked in the medical technology industry for many years. He has been Managing Director of Stryker GmbH & Co KG since 2002. He has also been a member of the board of BVMed - Bundesverband der Medizintechnologie e.V. since 2020.

1 Pierce, J et al. laser-generated air contaminants from medical laser applications: A state-of-the-science review of exposure characterization, health effects, and control. 2011. 8(7):447-66

2 Directive 2004/37/EC of the European Parliament and of the Council of 29 April 2004 on the protection of workers from the risks related to carcinogens or mutagens at work, latest amendment 2019

3 Liu, Y et al. Awareness of surgical smoke hazards and enhancement of surgical smoke prevention among the gynecologists. Journal of Cancer. 2019. 10(12):2788-2799

4 Matta I, Laganà AS, Ghabi E, Bitar L, Ayed A, Petousis S, Vitale SG, Sleiman Z. COVID-19 transmission in surgical smoke during laparoscopy and open surgery: a systematic review. Minim Invasive Ther Allied Technol. 2021 Oct 6:1-8. doi: 10.1080/13645706.2021.1982728. Epub ahead of print. PMID: 34612141.

5 Hill, DS et al. Surgical smoke – a health hazard in the operating theatre: a study to quantify exposure and a survey of the use of smoke extractor systems in UK plastic surgery units. Journal of Plastic, Reconstructive and Aesthetic Surgery. 2012. 65(7):911-916

6 Michaelis, M et al. Surgical Smoke–Hazard Perceptions and Protective Measures in German Operating Rooms. Int J Environ Res Public Health. 2020. 17(2):515

7 Michaelis, M et al. Surgical Smoke–Hazard Perceptions and Protective Measures in German Operating Rooms. Int J Environ Res Public Health. 2020. 17(2):515

8 EORNA recommandations, 2018: https://eorna.eu/wp-content/uploads/2019/09/Prevention-and-Protection-of-Surgical-Plume-PNC-EORNA.pdf

9 Guide was made possible by Stryker and Johnsons & Johnson: https://www.esno.org/assets/files/ESNO-SurgicalSmokeV4.pdf

10 Directive 2004/37/EC of the European Parliament and of the Council of 29 April 2004 on the protection of workers from the risks related to carcinogens or mutagens at work, latest amendment 2019

11 Bundesanstalt für Arbeitsschutz und Arbeitsmedizin. TRGS 525 Gefahrstoffe in Einrichtungen der medizinischen Versorgung

12 Michaelis, M et al. Surgical Smoke–Hazard Perceptions and Protective Measures in German Operating Rooms. Int J Environ Res Public Health. 2020. 17(2):515