

*The aim of the project is to determine to what extent the applied ventilation and air conditioning system in operating rooms, including both the shaping of air quality parameters and thermal environment, affects the risk of unintentional perioperative hypothermia of patients.*

Man is a warm-blooded species. Hence the core temperature of his body should be maintained at 37°C. A change in this value by more than 0.3 °C can cause significant thermal discomfort, a feeling of excessive cold or heat, and the activation of thermoregulatory processes, which will seek to normalise the human core temperature protect it against excessive cooling or overheating. In a temperate environment, heat in the human body is generated through metabolic transformations connected with the digestion of food and muscular activity.

In surgery, patients are usually deprived of food for a long time, so there is no metabolic production of heat.

They are also immobile in one position, and the anaesthetics administered to them impair their ability to warm up the body through muscle trembling. This results in unintentional perioperative hypothermia, one of the common complications related to anaesthesia and surgery, occurring in about 50-90% of patients undergoing surgery.

Restrictive conditions regarding the cleanliness of the internal environment are required in operating rooms, which directly translates into the risk of patient infection. One of the elements necessary to keep the internal environment clean is designing special ventilation and air conditioning systems. There are mainly two ventilation systems used in operating theatres: laminar flow ceiling (LAF) and mixing ventilation (MV). These systems provide air with different thermal parameters (temperature, air velocity and humidity) and different airflow directions (air distribution). Meanwhile, these parameters are crucial elements affecting the heat exchange between man and the environment and may contribute to increased cooling of the patient's body. For this reason, recognising how the ventilation system used in operating theatres affects the patient is key to further developing recommendations and solutions that can be used in operating theatres.

The research will be carried out under laboratory conditions (a laboratory simulating an operating theatre located at the applicant's department) and under actual conditions (operating theatres in hospitals).

The topic of the influence of the thermal environment shaped by different types of ventilation and air conditioning systems in operating theatres is not recognised in the national and international scientific output, so the project will open a completely new research space and contribute to a better knowledge of the internal environment conditions shaped in operating theatres. Identification of risks associated with these systems, as well as the description of the project results in scientific publications, will create the possibility of developing recommendations for the design of ventilation and air conditioning systems and will also open the way to better adapt methods of local heating of patients in order to reduce the risk of hypothermia. The project results will have a significant impact on the socio-economic environment in the area of health. They will indicate opportunities for further development of solutions in the field of patient safety.



Photo: Patient during surgery (canva.com)