

Article

Air Monitoring in Operating Rooms: Results from a Comprehensive Study in the Campania Region

Paolo Montuori, Immacolata Russo, Elvira De Rosa *, Fabiana Di Duca, Bruna De Simone and Maria Triassi

Department of Public Health, "Federico II" University, Via Sergio Pansini n° 5, 80131 Naples, Italy;
pmontuor@unina.it (P.M.); imrusso@unina.it (I.R.); fabianadiduca91@gmail.com (F.D.D.);
desimonebruna7@gmail.com (B.D.S.); triassi@unina.it (M.T.)

* Correspondence: derosaelvira92@gmail.com

Figure S1. The layout of a typical operating room in healthcare facilities in the Campania Region

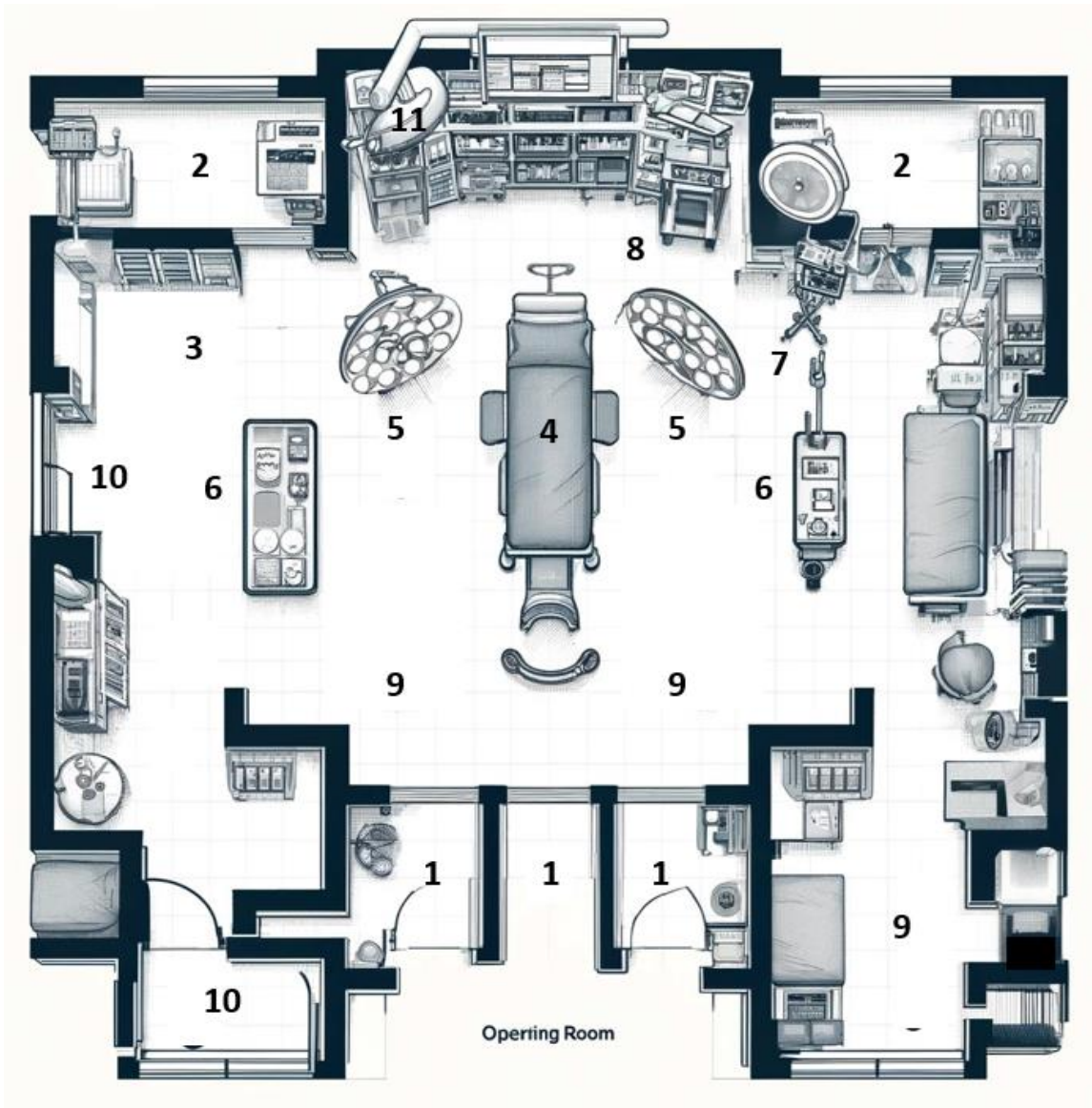


Figure S2. Flowchart of Research Methodology Steps

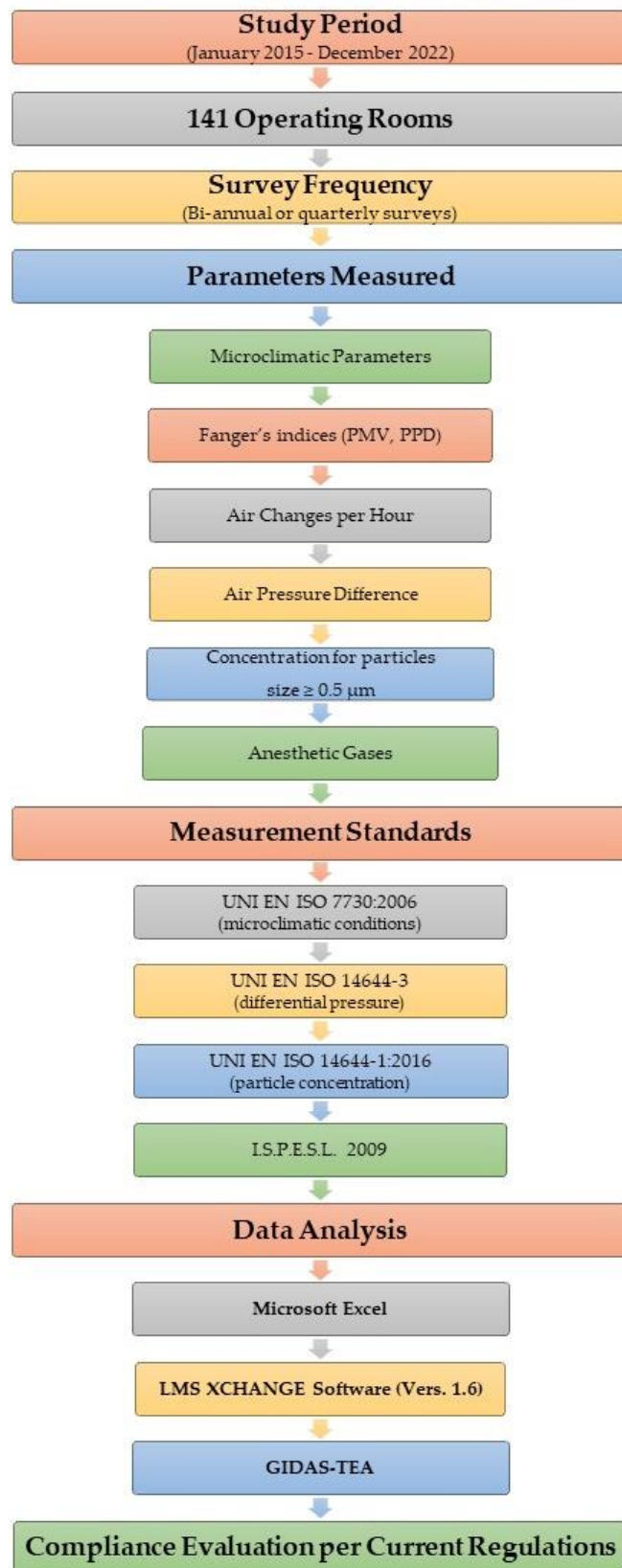
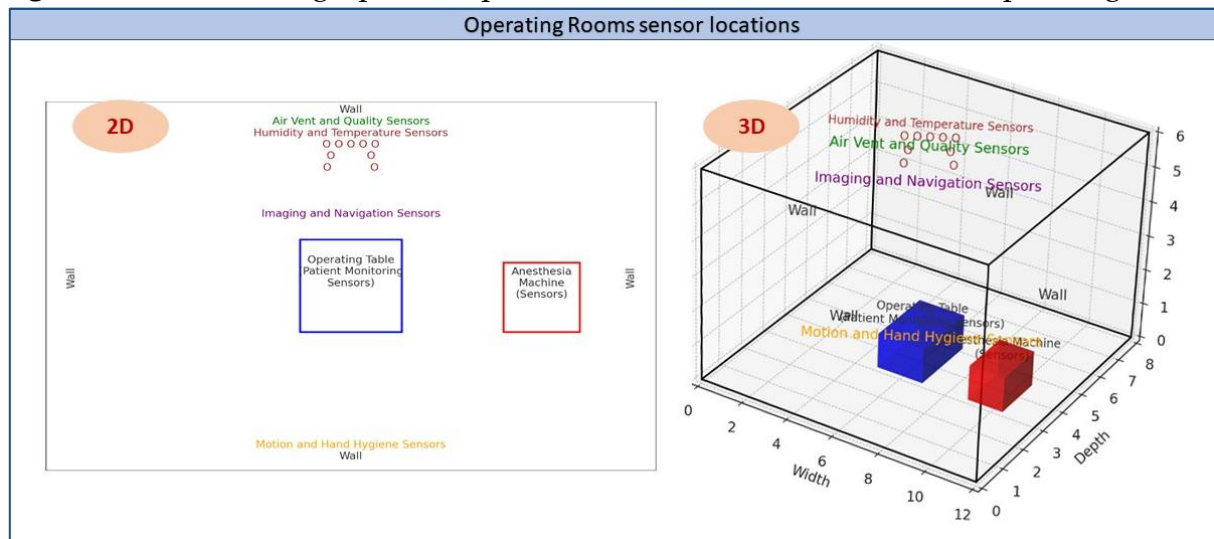


Figure S3. 2D and 3D graphical representations of sensor locations in operating rooms.



(Operating table: centrally positioned and equipped with sensors for patient monitoring, including ECG leads, a pulse oximeter, a blood pressure cuff, and a temperature probe; anesthesia machine: situated adjacent to the operating table; air vents and quality sensors: placed at the ceiling of the room to oversee air quality levels; humidity and temperature sensors: strategically distributed throughout the room to ensure continuous monitoring; imaging and navigation sensors: positioned close to the operating table to facilitate their effective use during surgical procedures; motion detectors and hand hygiene sensors: located at entry/exit points and near hand sanitizing stations to promote hygiene practices).

Figure S4. Microclimate control unit consists of M-Log, probes and supports



Figure S5. Concentration of Air change/hour (h^{-1}) from monitoring conducted during the study years 2015-2022.



Figure S6. Results of Air pressure difference (Pa) from monitoring conducted during the study years 2015-2022.

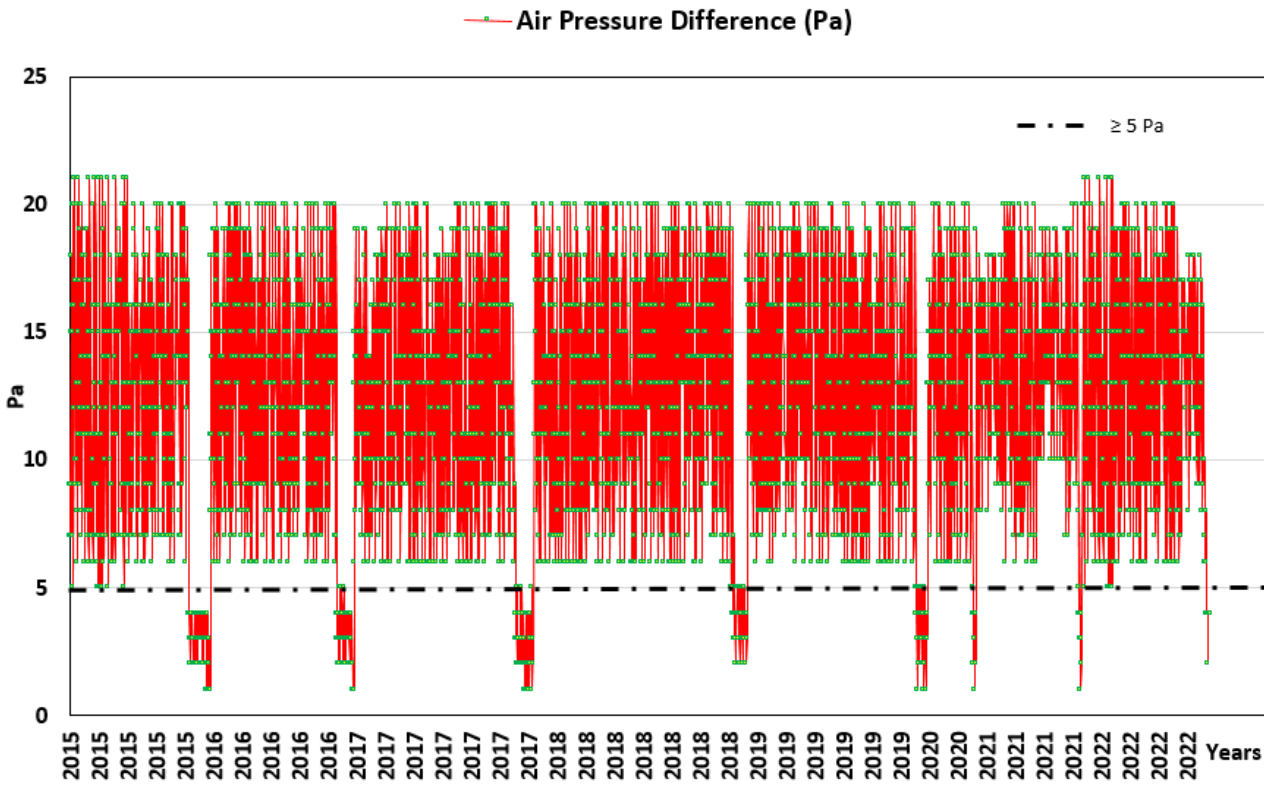


Figure S7. “Box plots of particles concentration and anesthetic gases”

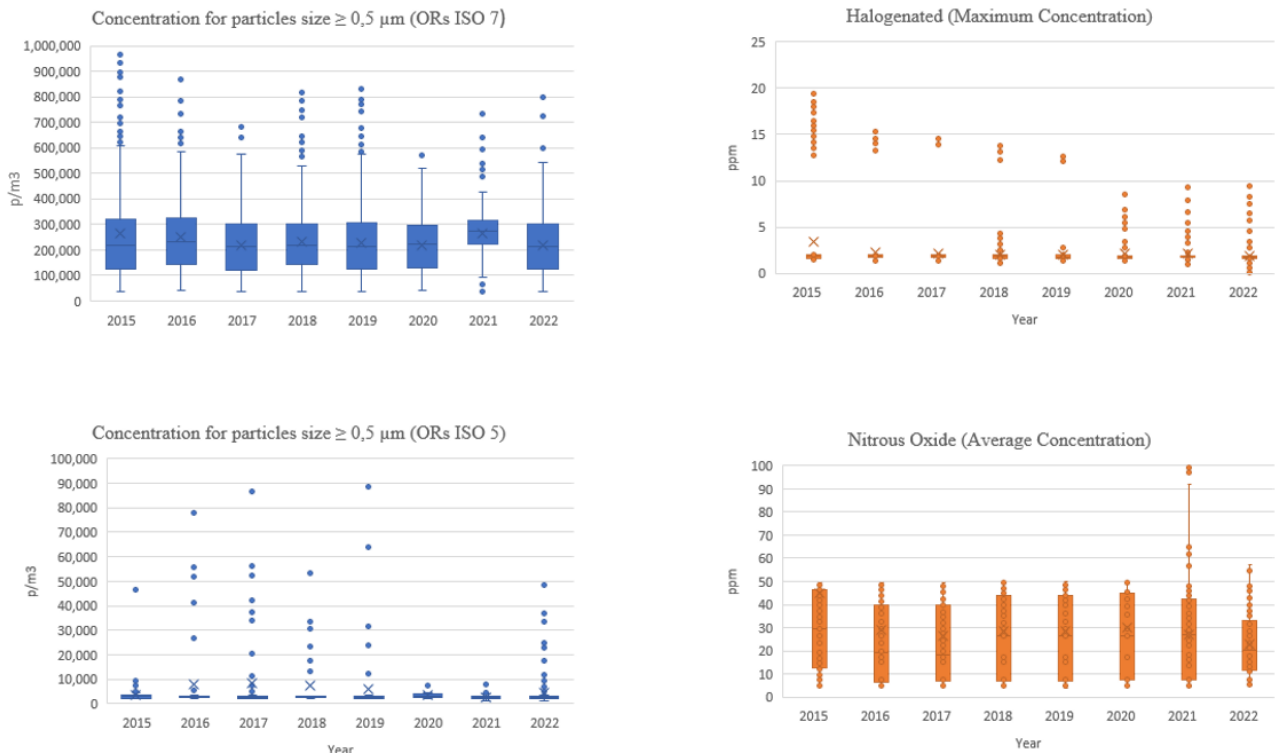


Table S1. Technical specifications of all instruments used for measuring environmental parameters in operating rooms

Measured variable(s)	Instrument model	Measurement range	Accuracy	Calibration
Air Temperature ($^{\circ}\text{C}$)	LSI M-Log ELO 009 + ESU	-30÷70 $^{\circ}\text{C}$	0,1 $^{\circ}\text{C}$	09/01/2023
	403.1			
Relative Humidity (%)	LSI M-Log ELO 009 + ESU 102	-5 + 60 $^{\circ}\text{C}$	±1,5%	18/01/2024
	LSI M-Log ELO 009 + ESU	0÷100%		09/01/2023
Air velocity (m/s)	LSI M-Log ELO 009 + ESU 102		0÷0,5m/s=NA 0,5÷1,5m/s=±10cm/s ≥1,5m/s=4%	18/01/2024
	LSI M-Log ELO 009 + ESV 307	0,01÷20 m/S		26/09/2023
Air Change/Hour (h^{-1})	LSI M-Log ELO 009+ ESV 307	0,01÷20 m/S	0÷0,5m/s=NA 0,5÷1,5m/s=±10cm/s ≥1,5m/s=4%	26/09/2023
	LSI M-Log ELO 009+ ESV 202	0,2÷20 m/S		22/11/2023
Air Pressure Difference (Pa)	Manometer TESTO 512	0/+20 hPa	0,5 % ± 1 Digit	13/04/2024
Particles concentration (p/m ³)	Discrete Particle counter Solair 3100	0,3÷10 μM (Air flow 28,3 L/min)	90-110 %	31/05/2024
Anesthetic Gases (ppm)	Multigas monitor Brüel & Kjaer Model 1302	0,03 ppm N ₂ O 0,01 ppm Sevoflurane 0,01 Desflurane	±10%	20/10/2023