





## Characterization of hospital and patients' microbiome for the realization of advanced nanosensors

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**Abstract**: As well as the human microbiota's role in health and disease, the artificial ecosystems harbour a peculiar microbial composition that interacts with their hosts and their wellness; despite its significance, there is limited understanding of the artificial microbiome and its connections with us.

The hospital is an environment of particular interest because healthy and sick people frequent it, antibiotics are widely utilized, and there is a high cleaning rate due to the necessity of sterilization. This contributes to developing a unique microbiota characterized by pathogens, multidrug-resistant (M.D.R.) bacteria, and harmless common species.

Furthermore, despite the high cleaning rate, death from hospital-acquired infections is the sixth leading cause of death in the U.S.A., moreover, W.H.O. estimates that 15% of patients suffer from nosocomial infections. The lack of successful prevention and efficacious diagnostic methods causes these. At the moment, standard diagnostic methods, such as culture and sensitivity testing, Polymerase Chain Reaction (PCR), Enzyme-Linked Immunosorbent Assay (ELISA) and serological testing, need lab personnel, are laborious, expensive and require samples from patients. At the same time, early diagnosis is crucial to overcoming pathogen infectious threats.

As part of the ANTHEM project, the presented study aims to characterize the hospital's microbiome and define the association between environmental parameters and infection levels. Using (meta)data retrieved from public repositories, combined with newly generated (meta)data from samples collected in different spaces and at different times of the day, it is possible to identify the pathogens spread in the hospital and on its hosts. This approach combines biomolecular and bioinformatics analysis and will help the development of rapid and user-friendly nanosensors for detecting pathogens on human skin and the environment.