



(will be assigned by SIRe)

## PhD Project

Project Details	
<b>Project Title</b>	Development of appropriate interventions to reduce AMR burden in the ICU environment of hospitals
<b>Project Summary</b>	<p>Multidrug-resistant (MDR) gram-negative bacteria have emerged as major concerns in the hospital environment. Hospital acquired blood stream infections due to MDR gramnegative bacteria are more common in intensive care units (ICUs). The immediate patient environment (such as bed rail, bedside tables etc.) and common areas within ICU (such as sinks) could serve as reservoirs of MDR gram-negative bacteria that could subsequently lead to blood stream infections in patients. Thus, it is important to characterize the gram-negative bacterial pathogens present in ICU environment and those isolated from blood stream infections from the patients admitted to ICU so that effective infection prevention interventions can be designed. Whole genome sequencing of the gram-negative bacterial pathogens isolated from ICU environment and blood culture isolates will be performed to examine for clonality. As sink (entry point) as well as the final wastewater treatment plants (final discharge point) have significant role in transmission and emergence of different MDR bacteria. Different environmental cleaning intervention procedures aimed at decontaminating sinks and immediate patient environment will be designed and their impact on ICU acquired blood stream infections will be examined. Similarly, performance of the wastewater treatment technologies will be evaluated to minimize/eliminate the AMR burden posed by the wastewater discharge. Two medical ICUs in two different hospitals will be sampled for this project.</p>

PhD Supervisors			
Role	Faculty	Academic Unit in IITD	Email ID
Supervisor 1	Dr. Shaikh Ziauddin Ahammad	Department of Biochemical Engineering and Biotechnology	zia@iitd.ac.in
Supervisor 2	Dr. Sumanth Gandra	School of Medicine, Washington University St. Louis, USA.	gandras@wustl.edu

### Project requirements (Student qualifications, experience required, etc.)

- MBBS / MTech in Biochemical Engineering

### Source of funding (IRD/FITT Project details, if any)

RP04036

### Role of Faculty Members involved

The expertise of the collaborators is complementary. There are clearly two segments of the entire research work. SG is an infectious disease physician with expertise in hospital acquired infections and antibiotic resistance. He will help in developing the surveillance of antimicrobial resistance, antibiotic use, understanding the drivers of antimicrobial resistance and epidemiology of multi-drug resistant healthcare associated infections in the ICU and other hospital environment. His expertise on infectious disease prevention will help understanding the role of different pathogens present in the ICU environment, sinks and wastewater treatment plant. Different ARB, ARGs, MGEs, will be analyzed under the supervision of SZA at his lab. Removal efficiency of different treatment systems used in treating hospital wastewater will be evaluated and appropriate treatment system will be developed at SZA's lab under his supervision.