

## A Model of Antibiotic Resistant Bacterial Epidemics in Hospitals

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**ABSTRACT:** The development of drug-resistant strains of bacteria is an increasing threat to society, especially in hospital settings. Many antibiotics that were formerly effective in combating bacterial infections in hospital patients are no longer effective due to the evolution of resistant strains. The evolution of these resistant strains compromises medical care worldwide. A two-level population model is analyzed to quantify key elements in nosocomial infections. At the bacteria level, infected patients generate both nonresistant and resistant bacterial strains. At the patient level susceptible patients are infected by infected patients at rates proportional to the total bacteria load of each strain present in the hospital. The objective is to analyze the dynamic elements of nonresistant and resistant bacteria strains in epidemic populations in hospital environments, and to provide understanding of measures to avoid the endemicity of resistant antibiotic strains.

**Key Words:** antibiotic resistance, epidemic model, population dynamics

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