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Asymptotic Behavior in Nosocomial Epidemic Models with Antibiotic Resistance

We analyze a model of an epidemic in a hospital setting that incorporates antibiotic non-resistant and resistant strains of bacterial infection. The model connects two population levels—bacteria and patients. The bacteria population is divided into non-resistant and resistant strains. The bacterial strains satisfy ordinary differential equations describing the recombination and reversion processes producing the two strains within each infected individual. The patient population is divided into susceptibles, infectives infected with the non-resistant bacterial strain, and infectives infected with the resistant bacterial strain. The infective classes satisfy partial differential equations for the infection age densities of the two classes. We investigate the asymptotic behavior of the solutions of the model with respect to three possible equilibria:

- (1) extinction of both infective classes,
- (2) extinction of the resistant infectives and endemicity of the non-resistant infectives, and
- (3) endemicity of both infective classes.

Based on joint work with Erika D'Agata, Shigui Ruan, and Glenn Webb.