UTI polymicrobial infections create an ecological environment in which the organisms found in the community impacts each other's:

- Proliferation rate
- Virulence potential
- Overall survival in the presence of antibiotics

**STABLE COMMUNITY FORMATION THROUGH CROSS-FEEDING**
Organisms produce metabolites that nourish the other members of the community.¹

**Improved Survival Rate With Antibiotics**

**Increased Survival In The Bladder Lumen**
Within mouse models, bladders first infected with *Group B Streptococcus* (GBS) down regulates the host immune response through the release of capsule sialic acids allowing co-infected UPEC to survive within the lumen of the bladder as such alter the long-term outcomes of the infection as there is an increased risk of ascending kidney infections.²

**Increased Risk Of Ascending Pyelonephritis**
Ascending pyelonephritis was caused by *Staphylococcus saprophyticus* when co-infected with *Proteus mirabilis* both by inoculating the organisms separately and in combination into rat bladders. Microbial cultures of tissue homogenates revealed that pyelonephritis by both bacteria occurred significantly more often in rats precisely when the two organisms were instilled together, implying a synergistic virulence between the two species.³

**Increased The Risk Of Urinary Stones**
In mouse models, coinfection with *P. mirabilis* and *P. stuartii* led an increased occurrence of urinary stones.⁴
Organism Interactions Affect Antibiotic Tolerance

Antibiotic tolerance is the ability of the bacterial population to survive transient exposure of antibiotics even at concentrations that far exceed MIC levels. As such, longer exposure rather than higher concentrations of antibiotics is required to produce the same level of killing in a tolerant strain. Tolerance occurs through the triggering of bacteria to grow more slowly. Tolerance can increase >3.5 fold based upon the organism interactions. For example, P. mirabilis has a protective effect on other organisms in the presence of antibiotics but mostly harms others in the absence of antibiotics.¹

One Strain Protects The Entire Populations Of Bacteria

Resistance, alternatively, is used to describe the inherited ability of microorganisms to grow in the presence of high concentrations of an antibiotic, irrespective of the timeframe of treatment. In many cases, resistant cells inactivate the antibiotic, decreasing its extracellular concentration by breaking down the antibiotic, which subsequently, assists the whole bacterial population.⁵

Bacterial Organisms Share Resistance Genes Through Horizontal Gene Transfer (HGT)

HGT is the movement of genetic material between organisms, including different species. Research studies indicate that horizontal gene transfer serves a greater role than clonal expansion in the rise of antibiotic resistance levels.⁶ ⁷

References:

QUESTIONS?
Contact Us at 800.493.4490