



## Microbiological Profile and Antibiotic Sensitivity of Infectious Keratitis

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### ABOUT THE STUDY

When corneal infections have concerning features such as purulent discharge, anterior chamber reaction, significant pain, infection obscuring visual axis, and/or conjunctival infection, culturing should be considered for timely and adequate treatment. The most common way to diagnose infectious keratitis is to culture corneal samples and then test for antibiotic susceptibility and resistance. These findings aid in tailoring the types of treatment used to eradicate infection while minimizing antibiotic overuse, which encourages further microbial antibiotic resistance. Bacteria such as *Staphylococcus* are most commonly found in corneal infections of all types, whereas *Pseudomonas* is most commonly found in contact lens wearers. While this is true, microorganisms can vary in their location as well as their antibiotic resistance patterns. Over a five-year period, this study aimed to outline the microorganism profile causing infectious keratitis, as well as their antibiotic susceptibility and resistance patterns at the University of Mississippi Medical Center. Bacteria and/or fungi were found in 35.9% of the 563 eyes with diagnosed keratitis studied. *Staphylococcus* was the most frequently isolated organism, accounting for 50% of gram-positive bacterial infections and 27.2% of overall infections.

*Pseudomonas aeruginosa* was the second most common organism isolated, accounting for 60.5% of gram-negative bacterial infections and 18.7% of total infections. *Staphylococcus aureus* was the third most common organism isolated, accounting for 20.1% of gram-positive bacterial infections and 11% of total infections. These findings are consistent with recent microbiological profiles, which show that coagulase negative *Staphylococcus* is the most common isolate in infectious keratitis. *Pseudomonas* is well known to be one of the most common causes of infectious keratitis in contact lens wearers, and our findings appear to support this. In 37.2% of contact lens wearers, *Pseudomonas aeruginosa* was the most commonly isolated microorganism. Microorganisms treated with broad-spectrum antibiotics have naturally developed resistance to the drugs.

In our hospital, we frequently begin using topical broad-spectrum antibiotic drops right after culturing. A combination

of Vancomycin and Tobramycin is commonly used to treat gram-positive keratitis and gram-negative infections. We discovered that vancomycin was effective against 93.3% of gram-positive cultured bacteria with no resistance. Our cultured gram negative bacteria were 81.8% susceptible to tobramycin, with no resistance. This demonstrates that our empirical management with vancomycin and tobramycin at our institution is still an effective treatment. Moxifloxacin is commonly used to treat less severe cases of keratitis. Other Fluoroquinolones, which were not tested in our labs, such as Ciprofloxacin and Levofloxacin, had low levels of resistance for both gram positive and gram negative infections.

Erythromycin is also used in milder cases of keratitis. We discovered that Erythromycin is effective against 38.1% of gram-positive infections and resistant to 56.0%. Regardless of treatment, 19.89% of patients required an additional procedure. The most common procedures were corneal transplant (49.1%) and evisceration (11.6%). We believe this is due to a previous ocular or systemic disease, such as diabetes, a compromised immune system or autoimmune disease, glaucoma, or dry eye syndrome. Some repeat keratitis cases were in the same individuals who had previously been lost to follow up but then presented with severe keratitis requiring additional procedures. When compared to other keratitis cases with good follow-up, these patients also had significantly lower visual acuity upon presentation, with no significant improvement in resolution after treatment of any kind. Except for the percentage of patients who were lost to follow-up, the majority of patients improved at least one line of vision between 1 and 3 months after treatment.

Our data came from charts with the diagnosis 'keratitis.' This did not always correlate with infectious causes, as peripheral ulcer keratitis and terrien marginal degeneration were sometimes diagnosed and coded as 'keratitis' at first presentation. This limitation includes more cases of keratitis in our study that were not infectious and thus did not require culturing, falsely lowering the age of keratitis cases cultured. However, because this study was conducted entirely at a tertiary institution, the findings may be less generalizable to other populations. Many

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institution, the findings may be less generalizable to other populations. Many infections were referred to our centre for treatment, potentially inflating the number of cases recorded. *Pseudomonas aeruginosa* is the most commonly identified organism in contact lens wearers. Based on susceptibility and resistance patterns, the empirical treatment of vancomycin and tobramycin used at our institution continues to be an excellent treatment for these microbes.