

IMPACT OF URINE pH ON ANTIBIOTIC RESPONSE IN WOMEN WITH UROPATHOGENIC *ESCHERICIA COLI* RECURRENT URINARY TRACT INFECTIONS

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Background

As early as Brumfitt in 1948, the relationship between the effectiveness of certain uro-antibiotics and urinary pH levels has been considered.¹

Summary of ideal urinary pH range of commonly prescribed antibiotics²⁻⁵

Acidic pH (5-6)	Alkaline pH (7-8)	No Difference
Nitrofurantoin Tetracyclines	Fluoroquinolones Aminoglycosides Macrolides	Sulfamethoxazole Oxacillin Amoxicillin and clavulanic acid Vancomycin Imipenem Clindamycin

STUDY GOAL

To compare the urine pH of women infected with *E. coli* to their antibiotic treatment response.

Materials and Methods

- An IRB-approved, prospectively maintained database of well-characterized women with antibiotic-refractory recurrent urinary tract infections (RUTI) managed with electrofulguration (F) at a tertiary care center was reviewed.
- Inclusion criteria: women with at least 6 months follow-up post-F, an electronic medical record (EMR) documenting urine pH value at the time of each urine culture, and at least one *E. coli* positive urine culture.
- Total number of urine cultures post-F, urine pH variability, antibiotics prescribed, and the interval (months) between antibiotic administration and another UTI episode were reviewed.

Electrofulguration Database (n = 477)

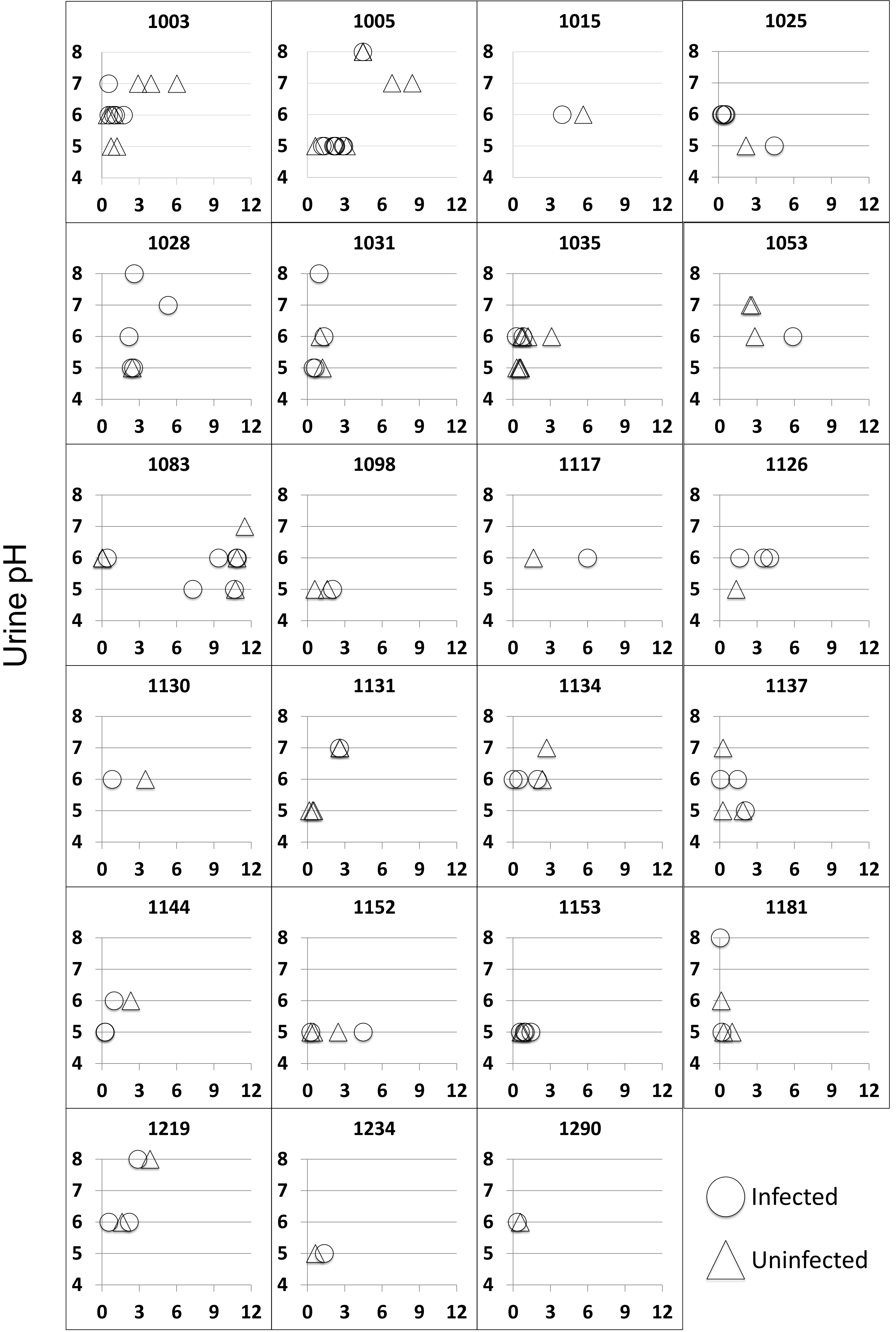
Excluded (n = 454)

- Duration of follow-up < 6 months (n = 84)
- Urine pH from urinalysis in addition to urine culture data not present (n = 110)
- One clear urine culture in addition to infected urine culture not present (n = 93)
 - At least one *E. coli* culture not present (n = 164)
 - Deceased (n = 3)

Final number included in analysis (n = 23)

Data

Urine pH Over Time



Years After Electrofulguration

Results

- 2006-2016 n = 23 women
- Mean follow-up of 2 (1-9) years and mean age of 66 (28-92) years.
- Total number of urine cultures: 181, including 93 positive, 88 negative, and 54 with *E. coli*.
- Average number of urine cultures per patient was 7 ± 3.8 (2-16).
- Median urine pH observed was 6, with no difference between infected, uninfected, or *E. coli* urine cultures.
- No change in urine pH with aging.
- Six individuals were prescribed antibiotics for which pH has not been shown to change efficacy, 10 in whom urine pH aligned with the reported best efficacy range for their prescribed antibiotic, and 7 whom urine pH was not in the ideal antibiotic pH range.
- Mean interval time between first and second positive urine culture was longer for those with the appropriate urine pH for the prescribed antibiotic (26 months, 2-63) compared to those with a mismatch between urine pH and optimal pH range for their antibiotic (18 months, 1-33).

Conclusion

- This observational study explores the possible link between the urine pH of a woman with RUTIs and her response to antibiotic treatment administered without taking her urine pH into account.
- Future studies are needed to determine if an individual's urine pH needs to match the optimal pH range of a prescribed antibiotic to result in maximum therapeutic efficacy.

References

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