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SPECIFIC URINARY TRACT INFECTION SYMPTOMS IN WOMEN RELATE TO UROPATHOGENS WHILE FALSE NEGATIVES OF STANDARD URINE CULTURES MAY DELAY PATIENT TREATMENT

Hypothesis / aims of study

The purpose of this original study is to compare the abilities of two urine culture techniques to detect uropathogens at baseline. To characterize women's urinary tract infection (UTI) symptoms at two different time points using a validated questionnaire and to relate uropathogens to classic symptoms of urinary tract infection. Finally, to assess possible inefficiencies of the current standard urine culture and its effect on patient care.

Study design, materials and methods

This prospective study enrolled urogynecologic patients (2014-15) and dichotomized them based on their perception of the presence of a current UTI (Yes/No). Both groups rated the severity and bothersome nature of 7 classic UTI symptoms [frequency and urgency of urination (urination regularity); dysuria and incomplete bladder emptying (problems with urination), lower abdominal discomfort or pain and low back pain (pain associated with UTI) and hematuria (blood in urine)] on a Likert-type response scale using a validated UTI symptom assessment (UTISA) questionnaire (Bayer Pharmaceuticals Corp., Global Health Economics and Outcomes, Research Department, West Haven CT. 2005). The YES group was later contacted to complete a follow-up UTISA survey. Each participant's catheterized urine sample was processed with the standard culture (SC) method, as well an expanded quantitative urine culture (EQUC) method. Bacterial identification was performed through the use of MALDI-TOF mass spectrometry. Women were treated clinically as necessary. Wilcoxon rank sum test and independent t-tests were used to assess medians and means respectively, with a $p \leq 0.05$ considered significant. Median UTI symptom severity and bother scores, combined for each of the 7 symptoms, were analyzed between the YES and NO groups.
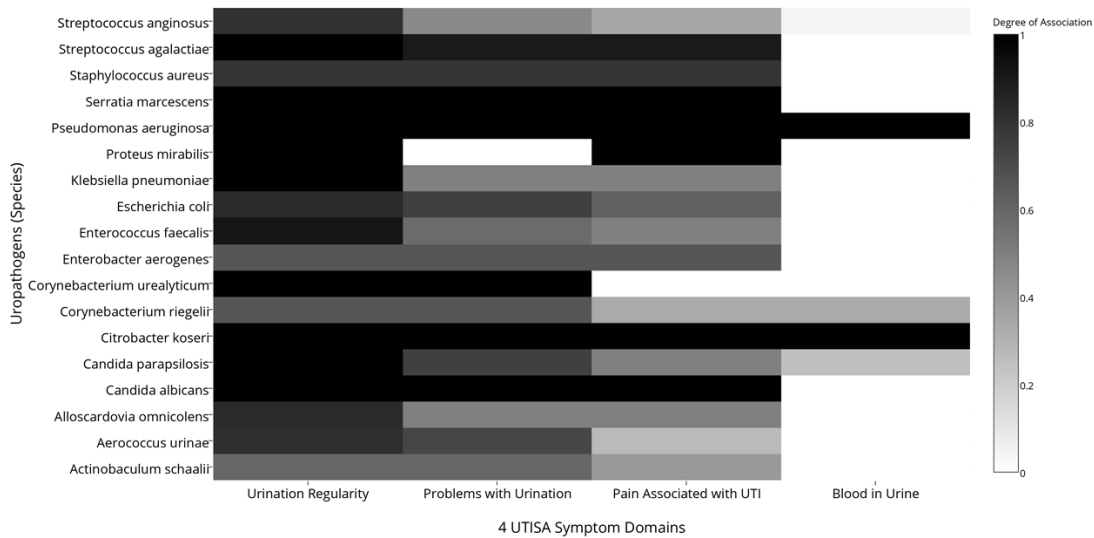
Results

Most (80.9%) of the cohort was Caucasian; the average age was 61.75 (±12.89) years and the average body mass index (BMI) was 29.5(±6.25). The YES group (N=40) was significantly older than the NO group (N=75) (p=0.042) (Table 1). Current antibiotic use (p=0.051) and sexual status (p=0.058) trended towards statistical significance.

Regarding the use of an expanded versus standard culture, EQUC was always positive when the SC grew a microbe (N=24 SC+/EQUC+). EQUC methods detected uropathogens in 87.5% (35/40), which included 27.5% (11/40) that were SC negative (SC-/EQUC+, false negative group). Out of the 11 women that were SC-/EQUC+, only one was treated with antibiotics. 54.2% (13/24) of the SC+/EQUC+ and 81.8% (9/11) of the SC-/EQUC+ women completed the post-op questionnaire. Women with a positive standard urine culture [60.0% (24/40)] were evaluated clinically and the majority [83.3% (20/24)] was treated with antibiotics. Thus, a higher proportion of the SC-/EQUC+ women [66.7% (6/9)] reported the same or worsening UTI symptoms on follow-up UTISA testing compared to the SC+/EQUC+ women [38.5% (5/13)].

Women in the YES group had significantly more frequency (5 vs. 2, p=0.008), urgency (4.5 vs. 2, p=0.001) of urination, pain or burning when passing urine (4 vs. 0, p=0.000) and pressure in the lower abdomen or pelvic area (2 vs. 0, p=0.001).

Fig. 1 shows the degree of association between the EQUC-cultured uropathogens (from all 115 patients) and the four UTI symptom domains, where a value of 1 represents a high association of culturing that uropathogen when the corresponding symptom is reported, regardless of the degree of symptom intensity. The majority of uropathogens clustered around symptoms of urinary frequency and urgency. *Corynebacterium riegelii*, *Citrobacter koseri*, *Candida parapsiliosis* and *Pseudomonas aeruginosa* were the only microbes associated with all four-symptom domains.

Figure 1: Uropathogen Associations with Urinary Symptoms

Interpretation of results
1.) Each EQUC-cultured uropathogen had a unique symptom association pattern. 2.) For most women who felt they had a UTI, EQUC more often detected a uropathogen than did SC. UTI symptom (severity and bother) improved after treatment with an antibiotic. Importantly, women who were SC-negative but EQUC-positive were not treated with antibiotics despite having a uropathogen. These women frequently had no symptom improvement or became worse.

Concluding message
The UTISA post-questionnaire in conjunction with EQUC highlights the troublesome false negative rate of SC. Clinicians can improve patient care with the additional information available from EQUC. Each EQUC-cultured uropathogen had a unique symptom association pattern. In general, most uropathogens caused symptoms relating to urination regularity, while few resulted in hematuria.

Disclosures
Funding: None **Clinical Trial:** No **Subjects:** HUMAN **Ethics Committee:** Institutional Review Board **Helsinki:** Yes **Informed Consent:** Yes **open discussion poster:** ePoster with fixed time presentation slot (5 mins presentation including questions to an audience)