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# Proportional Analytics of Test Samples Reported with Urinary Tract Infection

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## Abstract

Urinary tract infection (UTI) has been reported most often in recent days. In a clinical aspect there are various reasons for this cause. Out of 100 samples tested (Clinical samples from Rashi Diagnostic Center- Bangalore NABL laboratory), under the analytical aspect several comparative analysis was done. Urine was tested within half an hour of the collection. Physical characteristics of Urine sample were studied initially. Laura M is the device used to analyses the Uro-dip. Sugar and the presence of albumin was also found. Sediment of the centrifuged sample was subjected to gram staining and direct microscopic analysis. Pus cells, epithelial cells, yeast cells and rod shaped bacteria. It was found that epithelial cells are visualized in female samples and very less or not visualized in male samples. Bilirubin content, Bile salt content and ketone bodies were analyzed and compared in each of the samples. Sample is then subjected to culturing were the T streak is done on the Mac Conkey agar and Blood agar. This will differentiate between the lactose and Non-Lactose fermenting bacteria. Each of the colony is subjected to Gram staining. Yeast cells are also reported often. Though the yeast cells are the commensals they are considered non- pathogenic. But it was found that the yeast with pseudo-hyphae are pathogenic in nature. Both Lactose and Non-Lactose fermenting bacterial colonies from Blood agar is subjected to various biochemical methods to identify the organism. The most commonly noticed non-lactose fermenting organism was Pseudomonas spp. And Lactose fermenting organisms were Escherichia coli, Enterobacteria spp and Klebsiella spp. Each Colony from the culture plate was picked and streaked on the MHA agar and Kirby Bauer method has been performed (Disc diffusion method) under the McFerland standard. Zone of inhibition of each organism towards the antibiotic in the disc was recorded.

**Keywords:** urine sample, epithelial cells, urinary tract infection, commensal, kirby bauer method

## Introduction

Pathogen that contributes to Urinary tract infection is a serious threat to mankind that's been considered as serious illness. Most common bacterial infection is found to be UTI. UTI is the most common hospital acquires nosocomial infection (Ariathianto Y 2011). World wide around 150million people are diagnosed per year. Females are more prone to Urinary tract infection than males (Akinkugbe et al., 1973). This is due to shorter and wider urethra. The Female reproductive anatomy paves a way for more chances of procuring urinary tract infection (Brotman RM, Shardell MD, Gajer Pet al.2014) . Association between the vaginal microbiota, menopause status and signs of vulvovaginal atrophy (Arthur et al., 1975; Duerden et al., 1990). Even though UTI is not taken seriously as other diseases the severity of the disease is so dangerous may lead to death at times. Clinical presentation varies with patients. UTI could be symptomatic with typical signs and symptom, or asymptomatic (Vogel T, Verreault R, Gourdeau Met al 2014. ). Diagnostic Criteria of Nuetropenic patients who do not have pyuria are quite different. (Stamm, 2002; Weinstein, 1997). Urinary tract infection causes infection not only in urinary bladder but also to the kidney, ureter, and urethra and urinary bladder of course. Kindey is the two beaned shaped organ that filters the blood to synthesize urine. (Al-Badr A and Al-Shaikh G, 2013) Bladder is a ballon shaped organ that stores urine., Ureters are the two tubes that carry urine from kidneys to bladder and urethra carries urine from bladder to the outside of the body. (Bjerklund Johansen, T.E.; Botto, H.; Cek, M.; Grabe, M.; Tenke, P.; Wagenlehner, F.M.E.; Naber, K.G 2011).Severity of the disease depends upon the etiologic organisms, severity of the infection and the immunogenic response. Fever, urinary urgency, dysuria, cloudy/ dark colored urine. People with no neural abnormalities, strong immune response and structural issues are likely to show less symptoms and recover soon. Risk of UTI increases with cystitis, famility history, fever, female gender, sexual activity, vaginal infection, diabetes, obesity and genetic susceptibility (Bradley MS, Beigi RH, Shepherd JP 2019).Complicated UTI occurs when the individual is immunosuppressed, renal failure, cervical issue, neurological diseases due to urinary retention, pregnancy, or usage of catheters or other drainage devices. (Schappert, 1999)., (Wagenlehner, F.M.E.; Naber, K.G 2011).

Asymptomatic urinary tract infected Patients UTI are more likely to be cured with simple medication such as antibiotics (Beveridge LA, Davey PG, Philips G and McMurdo MET.2011 ). Continuous medication might lead to alteration of normal flora of vagina and gastrointestinal tract and multi drug resistance paves way for rick of colonization of uropathogens( Wagenlehner, F.M.E.; Naber, K.G 2012).Infection is mild and harmless at the initial stages but if neglected would cause serious lethal clinical manifestation. (Stamm, 2002; Weinstein, 1997). Biofilm formed on the tissue is the cause of the disease. To generalize it is the gram-negative bacteria that is responsible for the infection. (Cai T, Mazzoli S, Mondaini Net al. 2014)Adverse outcome of the infection is severe. UTI can be categorized as upper and lower urinary tract infection. Kidneys are situated at the either side of the spinal column and are capable of purifying blood and water which in turn regulates the blood pressure and the water and mineral content in the body respectively. They also continuously filter and cleanse the blood where the waste been eliminated by the body via urine. When kidney receives blood and these blood are filtered by Nephrons and thus urine is been synthesized. Urine moves through the ureter and reaches the urinary bladder and flows out of the body via urethra. (Stamm, 2002; Weinstein, 1997) (Wagenlehner, F.M.E.; van Oostrum, E.; Tenke, P.; Tandogdu, Z.; Cek, M.; Grabe, M.; Wullt, B.; Pickard, R.; Naber, K.G.; Pilatz, A.; et al 2011)

## Materials and Methods

**Study population:** The study population are the patients with suffering symptomatic urinary tract infection.

Hundred (100) patients who were clinically diagnosed with UTI collected from Rashi Diagnostic Center-Bangalore NABL laboratory),were involved in the study. Sample of 50 males and 50 females and aged above 20 years were considered. (Choudhury S, Das SK, Jana D and Pal DK.2014) Few were excluded from the study who were not suffering from UTI and patients who have already stared the medication course such as antibiotics. Sample was collected any time in the day throughout, mid-stream urine was collected in a sterile screw cap topped bottle. The bottle was mentioned with the Name, age, sex and a bar code unique for each patient's sample. And the sample was examined on its physical, chemical and microscopic aspect in the next half an hour of the collection time.

### Identification of Micro Organisms By 16s RRNA Sequencing

The use of 16S rRNA gene sequencing used for the study of bacterial phylogeny and taxonomy has been by far the most common housekeeping genetic marker used for a number of reasons. These reasons include its presence in almost all bacteria, often existing as a multigene family, or operons; the function of the 16S rRNA gene over time has not changed, suggesting that random sequence changes are a more accurate measure of time(evolution); and the 16S rRNA gene(1500 bp) is large enough for informatics purposes.

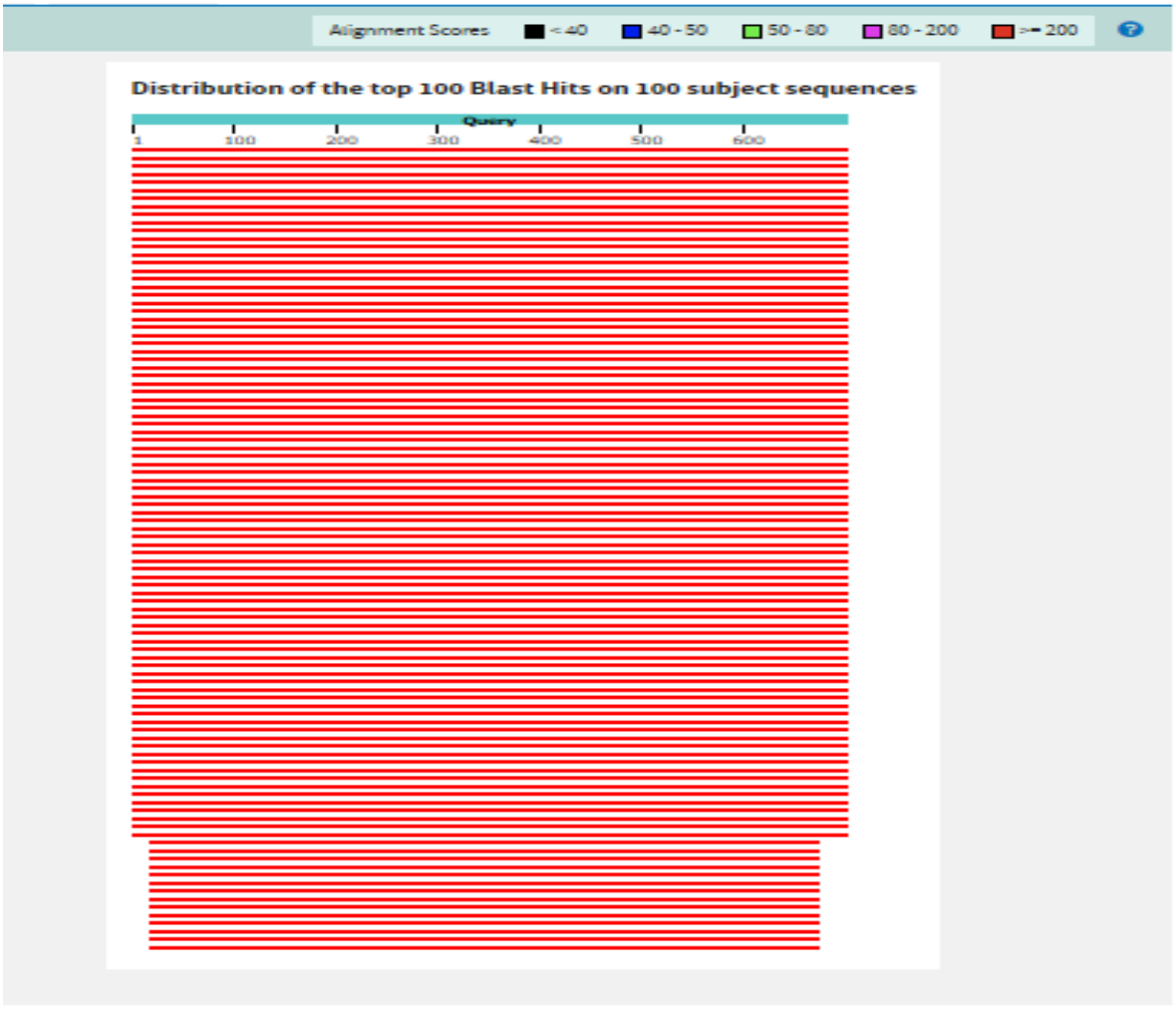


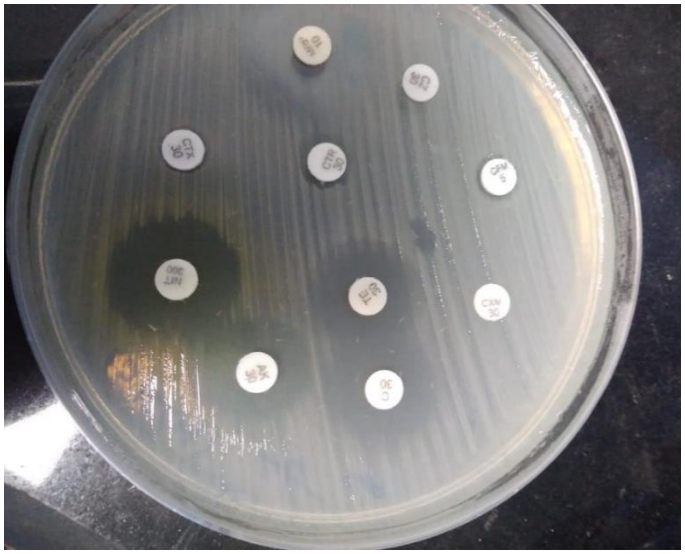

**Figure 1:** Pseudomonas aeruginosa strain AQ_BF36

(Accession number: KY857862.1)


Xanthomonas campestris pv. vesicatoria strain 8004

(Accession number-NC007508.1)

**Antibiotic sensitivity of Xan*thomonas campestris* organism.**

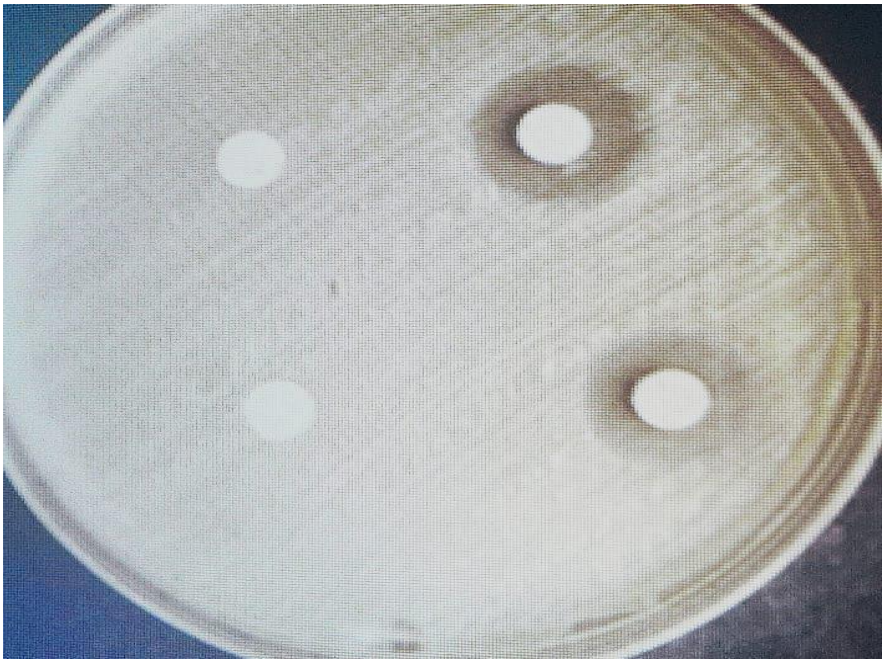


The organism is grown against common anti-microbial agents (antibiotics) to find out the antibiotic sensitivity pattern. Results indicated that Oflaoxacin, Chloramphenicol, Amakacin, Azithromycin, 30, Gatiflaxacin were the most potent of all the antibiotics. Cloxacellin, Ampicillin, Vancomycin and Cotrimoxazole were poorly effective.

**Antibiotic sensitivity of *Pseudomonas aeruginosa* strain AQ_BF36**

The organism is grown against common anti-microbial agents (antibiotics) to find out the antibiotic sensitivity pattern. Results indicated that Ciprofloxcin, Augmentin, Gentamicin and Tetracycline were the most potent of all the antibiotics. Linomycin, Vancomycin, Streptomycin, trimethoprim and Penicillin were poorly effective.

**Antibiotic sensitivity of *Klebsiella spp.***

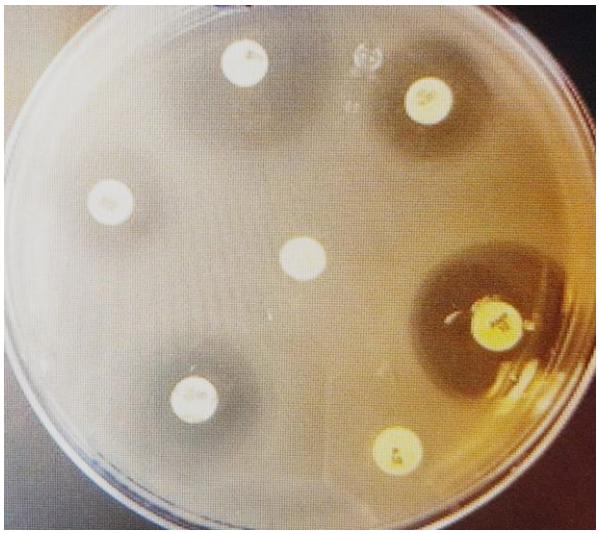


The organism is grown against common anti-microbial agents (antibiotics) to find out the antibiotic sensitivity pattern. Results indicated that Ciprofloxacin, Imipenem were the most potent of all the antibiotics. Amoxicillin and amikacin were poorly effective.

**Antibiotic sensitivity of *Staphylococcus spp.***

The organism is grown against common anti-microbial agents (antibiotics) to find out the antibiotic sensitivity pattern. Results indicated that Penicillin, Oxacillin, Cephalothin, Trimethoprim, Tlosin were the most potent of all the antibiotics. Ampicillin was poorly effective.

**Antibiotic sensitivity of *Escherichia coli.***



The organism is grown against common anti-microbial agents (antibiotics) to find out the antibiotic sensitivity pattern. Results indicated that Amikacin, Norfloxacin, Gentamicin, tobramycin were the most potent of all the antibiotics. Ceftriaxone, Cefepime, and Cefepime were poorly effective.

## Reference


1. Abrutyn E, Mossey J, Berlin JAet al. Does asymptomatic bacteriuria predict mortality and does antimicrobial treatment reduce mortality in elderly ambulatory women. Ann Intern Med 1994; 120(10):827-33
2. Al-Badr A and Al-Shaikh G. Recurrent urinary tract infections management in women: A review. SQU Medical Journal 2013; 13(3): 359-367
3. Ariathianto Y. Asymptomatic bacteriuria- Prevalence in the elderly population. Australian Family Physician 2011;40(10): 805-808
4. Beveridge LA, Davey PG, Philips G and McMurdo MET. Optimal management of urinary tract infection in older people. Clin Interv Aging 2011;6:173-180
5. Bjerklund Johansen, T.E.; Botto, H.; Cek, M.; Grabe, M.; Tenke, P.; Wagenlehner, F.M.E.; Naber, K.G. Critical review of current definitions of urinary tract infections and proposal of an EAU/ESIU classification system. Int. J. Antimicr. Agents 2011, 38S, 64–70.
6. Bleidorn, J.; Gagyor, I.; Kochen, M.M.; Wegscheider, K.; Hummers-Pradier, E. Symptomatic treatment (ibuprofen) or antibiotics (ciprofloxacin) for uncomplicated urinary tract infection?— Results of a randomized controlled pilot trial. BMC Med. 2010, 8, e30. Antibiotics 2014, 3 377
7. Bradley MS, Beigi RH, Shepherd JP. A cost-minimization analysis of treatment options for postmenopausal women with dysuria. Am J Obstet Gynecol 2019;221(5):P505.e1-505.e7
8. Brotman RM, Shardell MD, Gajer Pet al. Association between the vaginal microbiota, menopause status and signs of vulvovaginal atrophy. Menopause 2014;21(5):450-458.
9. Burnham P, Dadhania D, Heyang M et al. Urinary cell-free DNA is a versatile analyte for monitoring infections of the urinary tract. Nature Communications Open article. DOI:10/1038/s41467-018-04745-0. Urinary Tract Infection in Postmenopausal Women - A Review
10. Cai T, Mazzoli S, Mondaini Net al. The role of asymptomatic bacteriuria in young women with recurrent urinary tract infections: to treat or not to treat? Clin Infect Dis 2012;55:771-7

11. Choudhury S, Das SK, Jana D and Pal DK. Is urodynamic study a necessity for evaluation of lower urinary tract symptoms in postmenopausal female patients? Results of a prospective observational study. Urol Ann 2017;9:239-243
12. Chu CM and Lowder JL. Diagnosis and treatment of urinary tract infections across age groups. Am J Obstet Gynecol 2018;219(1):40-51
13. Colgan R, Williams M. Diagnosis and treatment of acute uncomplicated cystitis. Am Fam Physicians 2011;84(7):771-76
14. Cortes-Penfield NW, Trautner BW and Jump RLP. Urinary tract infection and asymptomatic bacteriuria in older adults. Infect Dis Clin N Am 2017;31:673-688
15. De Nisco NJ, Neugent M, Mull Jet al. Direct detection of tissue-resident bacteria and chronic inflammation in bladder wall of post menopausal women with recurrent urinary tract infection. J of Molecular biology 2019:431:4368-4379
16. Ejrnæs K. Bacterial characteristics of importance for recurrent urinary tract infections caused by Escherichia coli. Dan Med Bull. 2011;58(4):B4187.
17. Gandhi J, Chen A, Dagur Get al. Genitourinary syndrome of menopause: an overview of clinical manifestations, pathophysiology, etiology, evaluation and management. Am J Obstet Gynecol 2016;704-711
18. Garimella PS, Bartz TM, Ix JH et al. Urinary uromodulin and risk of urinary tract infections : The cardiovascular health study. Am J Kidney Dis 2017;69(6):744-751.
19. Gliniewicz K, Schneider GM, RidenhourBJ et al. Comparison of the vaginal microbiomes of premenopausal and postmenopausal women. Front. Microbiol. 2019; 10.193.
20. Grabe M, Bartoletti R, Johansen TEB et al. European Association of Urology. EAU guidelines on urological infections 2015
21. Grabe, M.; Bjerklund-Johansen, T.E.; Bartoletti, R.; Çek, M.; Naber, K.G.; Pickard, R.S.; Tenke, P.; Wagenlehner, F.; Wullt, P. Guidelines on urological infections. European Association of Urology 2014. Available online: http://www.uroweb.org/gls/pdf/19%20Urological%20infections_LR.pdf (accessed on 13 July 2014).
22. Gupta, K.; Hooton, T.M.; Naber, K.G.; Wullt, B.; Colgan, R.; Miller, L.G.; Moran, G.J.; Nicolle, L.E.; Raz, R.; Schaeffer, A.J.; et al. International clinical practice guidelines for the treatment of acute uncomplicated cystitis and pyelonephritis in women: A 2010 update by the Infectious Diseases Society of America and the European Society for Microbiology and Infectious Diseases. Clin. Infect. Dis. 2011, 52, e103–e120.
23. Haghighi M, Shoaee S, Moghaddam MAet al. The association between serum level of Vitamin D and asymptomatic bacteriuria in pre and post menopausal women evaluated between 2011-2016. Arch clin Infect Dis 2017;12(3):e62134.
24. Hamid R and Losco G. Pelvic organ prolapse-associated cystitis. Curr Bladder Dysfunct Rep (2014); 9:175-180.
25. Henn EW. Menopause and its effect on the female lower urinary tract. SA Fam Pract 2010;52(5):405-408
26. Ishitoya S, Yamamoto S, Mitsumori K, Ogawa O and Terai A. Non-secretor status is associated with female uncomplicated pyelonephritis. BJU International 2012;89:851-854
27. Jhang J-F, Kuo H-C. Recent advances in recurrent urinary tract Infection from pathogenesis and biomarkers to prevention. Tzu Chi Medical Journal 2017;29(3): 131-137
28. Jung C and Brubaker L. The etiology and management of recurrent urinary tract infections in postmenopausal women. Climacteric 2019;22(3):242-49.
29. Kallen AJ, Welch HG, Sirovich BE. Current antibiotic therapy for isolated urinary tract infections in women. Arch Intern Med 2006;166(6):635-39
30. Kang Cheol-In, Kim J, Park DW et al. Clinical Practice guidelines for antibiotic treatment of community acquired urinary tract infections. Infect Chemother 2018;50(1):67-100
31. Kodner CM and Gupton EKT. Recurrent urinary tract infection in women: diagnosis and management Am Fam Physician 2010;82(6):638-643
32. Lutters M, Vogt-Ferrier NB. Antibiotic duration for treating uncomplicated, symptomatic lower urinary tract infections in elderly women. Cochrane Database Syst Rev 2008;(3):CD001535. Published 2008 Jul 16.
33. Magiorakos, A.P.; Srinivasan, A.; Carey, B.; Carmeli, Y.; Falagas, M.E.; Giske, C.G.; Harbarth, S.; Hindler, J.F.; Kahlmeter, G.; Olsson-Liljequist, B.; et al. Multidrug-resistant, extensively drug-resistant and pandrug-resistant bacteria: an international expert proposal for interim standard definitions for acquired resistance. Clin. Microbiol. Infect. 2012, 18, 268–281.
34. Masajitas-Zagajewska A and Nowicki M. New markers of urinary infection. Clinica Chimica Acta 471 2017;286-291.
35. Minardi D, d'Anzeo G, Cantoro Det al. Urinary tract infections in women: etiology and treatment options. Int J Gen Med 2011;4:333-343
36. Mody L and Juthani-Mehta M. Urinary tract infections in older women: A clinical review. JAMA. 2014;311(8):844-854.
37. Naber, K.G.; Schito, G.; Botto, H.; Palou, J.; Mazzei, T. Surveillance study in Europe and Brazil on clinical aspects and antimicrobial resistance epidemiology in females with cystitis (ARESC): implications for empiric therapy. Eur. Urol. 2008, 54, 1164–1178.
38. Nicolle LE, Gupta K, Bradley SF et al. IDSA 2019 Clinical Practice Guideline for the management of asymptomatic bacteriuria. Clin Infect Dis 2019 May 2:68(10):e83-e110 doi:10.1093/cid/ciy1121
39. Owens DK, Davidson KW, Krist AH et al. Screening for asymptomatic bacteriuria in adults. US Preventive services task force recommendations statement. JAMA 2019;322(12):1188-94
40. Paduch DA. Viral lower urinary tract infections. Curr Urol Rep. 2007;8(4):324-335.
41. Raz, Raul. Urinary Tract Infection in postmenopausal women. Korean J Urol 2011;52:801-808
42. Recent Advances on Physiology, Pathogenesis and Biotechnological Applications, Amidou Samie, IntechOpen,
43. Sarada Satyamoorthy Garg & S Ramalakshmi Impact Factor (JCC): 6.3089
    NAAS Rating 3.99
44. Siroky MB. The aging bladder. Reviews in Urology 2004; Vol6 Suppl 1, S3- S7
45. Sobel JD, Vazquez JA. Fungal infections of the urinary tract. World J Urol. 1999;17(6):410□414.
46. Stalenhoef JE, van Nieuwkoop C, Wilson DCet al. Biomarker guided triage can reduce hospitalization rate in community acquired febrile urinary tract infection. Open access article, 2018 may, Elsevier Ltd, on behalf of The British Infection Association.

47. Sunden F. Asymptomatic bacteriuria protection against, and differential diagnosis towards symptomatic urinary tract infection. Lund University publication ( thesis published)
48. Tandogdu, Z.; Cek, M.; Wagenlehner, F.; Naber, K.; Tenke, P.; van Ostrum, E.; Bjerklund Johansen, T. Resistance patterns of nosocomial urinary tract infections in urology departments: 8-Year results of the global prevalence of infections in urology study. World J. Urol. 2014, 32, 791–801.
49. Timothy Kudinha (July 12th 2017). The Pathogenesis of Escherichia coli Urinary Tract Infection. 2107, Jul.
50. Toz E, Kurt S, Sahin C and Canda MT. Frequency of recurrent urinary tract infection in patients with pelvic organ prolapse. Research and reports in Urology 2015;7:9-12
51. Treatment of urinary tract infections in nonpregnant women. Clinical management guideline for obstetrician-gynecologist. ACOG practice bulletin 2008; 91
52. Varella LRD, DaSilva RB, deOliveira MCE et al. Assessment of lower urinary tract symptoms in different stages of menopause. J. Phys. Ther. Sci. 2016; 28:3116-3121
53. Vogel T, Verreault R, Gourdeau Met al. Optimal duration of antibiotic therapy for uncomplicated urinary tract infection in older women: A double blind randomized control trial. CMAJ 2004;170(4):469-73
54. Wagenlehner, F.M.E.; Hoyme, U.; Kaase, M.; Fünfstück, R.; Naber, K.G.; Schmiemann, G. Clinical practice guidelines: Uncomplicated urinary tract infections. Dtsch. Arztebl. Int. 2011, 108, 415–423.
55. Wagenlehner, F.M.E.; Naber, K.G. Asymptomatic bacteriuria—Shift of paradigm. Clin. Infect. Dis. 2012, 55, 778–780.
56. Wagenlehner, F.M.E.; van Oostrum, E.; Tenke, P.; Tandogdu, Z.; Cek, M.; Grabe, M.; Wullt, B.; Pickard, R.; Naber, K.G.; Pilatz, A.; et al. Infective complications after prostate biopsy: Outcome of the Global Prevalence Study of Infections in Urology (GPIU) 2010 and 2011. A prospective multinational multicentre prostate biopsy study. Eur. Urol. 2013, 63, 521–527.