



An Overview on Cystitis Diagnosis and Management Approach in PHC

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ABSTRACT

Background: Cystitis is a type of lower urinary tract infection (UTI). The most common cause is bacterial infection while the most common affected people are females. Cystitis presents with a painful micturition, urgency, and frequency. Urinary tract infections can be classified according to their complexity. As a general practitioner the differentiation between the complicated and uncomplicated urinary tract infection and to decide whether to treat or refer, is crucial. **Objectives:** We aimed to review the literature reviewing etiology of cystitis and lower urinary tract infection, its risk factors, clinical presentation, diagnosis, and management of this disease. **Methodology:** PubMed database was used for articles selection, and gathered papers underwent a thorough review. **Conclusion:** Urinary tract infections should be at the top of the differential diagnoses when assessing a patient with bothersome urinary symptoms. Moreover, ruling out other possible serious diagnosis according to patient age group is equally important. Empiric treatment with broad spectrum antibiotic is evident and effective, however, certain cause warrant further investigation and culturing to select the proper treatment.

Keywords: Cystitis, UTI, Urinary tract infection, Diagnosis, Treatment, Urinary catheter

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Received: 29 August 2020

Accepted: 11 December 2020

1. INTRODUCTION

The term cystitis refers to the inflammation of the urinary bladder. Albeit the inflammation usually is caused by bacterial infection as a part of the urinary tract infection (UTI), it can be rendered from interstitial, radiogenic, and chemotherapy cause. (Mathers *et al.*, 2010) UTI is a common presentation in practice, as it constitutes the majority of outpatient infections. (Medina and Castillo-Pino, 2019) As it can be evident in all the population, with special tendency in the female and elderly, paying attention the stem of the disease with closer look into aetiology, risk factors, diagnosis and management would be helpful for health care providers in general, and for general practitioner in particular.

2. METHODOLOGY

PubMed database was used for the selection process of relevant articles, and the following keys used in the mesh

(["Urinary tract infection"[Mesh]] OR "Cystitis"[Mesh] AND ("Diagnosis"[Mesh] OR "Management"[Mesh] OR "Risk factors"[Mesh])). For the inclusion criteria, the articles were selected based on including one of the following: Urinary tract infection, cystitis, risk factors, evaluation, management, and diagnosis. Exclusion criteria were all other articles which did not meet the criteria by not having any of the inclusion criteria results in their topic.

3. REVIEW:

Urinary tract infection, including cystitis, can be further classified upon its onset or complexity. Complicated UTIs are resulted when the infection occurs in already comprised tract anatomy or immunological defences including immunosuppression, renal failure, renal transplantation, pregnancy, urinary retention, urinary obstruction, presence of foreign bodies such as catheter or calculi. UTI is uncomplicated when the infection happens in otherwise healthy individual (Flores-Mireles *et al.*, 2015). Besides, classification according to onset divided into acute and chronic with varying underlying causes.

Etiology and Pathophysiology:

Cystitis as previously mentioned has different etiological factor, as a family physician, the most common encountered underlying cause is bacterial infection. Many organisms involved in UTIs where the vast majority is caused by *Escherichia coli* in both complicated and non-complicated cases. Other causative organisms are enlisted in Table 1. The first step in developing uncomplicated UTI is the

contamination of the urethra and periurethral area with gastrointestinal pathogen, due its close proximity. Then, migration of the pathogen to the urinary bladder as a result of urinary flow occurred. Finally, host inflammatory response got activated in order to fight the extracellular pathogens. Bacteria evade the host system by either cellular invasion, morphological changes, and/or biofilm formation. Additionally, cystitis may occur as a result of foreign objects. (Flores-Mireles et al., 2015)

Table 1. Urinary Tract Infection Causative Organisms (1 The order of the organism according to its prevalence)

Uncomplicated	<i>Escherichia coli</i>	Complicated	<i>Escherichia coli</i>
	<i>Klebsiella pneumonia</i>		<i>Enterococcus species</i>
	<i>Staphylococcus saprophyticus</i>		<i>Klebsiella pneumoniae</i>
	<i>Enterococcus faecalis</i>		<i>Candida species</i>
	Group B Streptococcus (GBS)		<i>Staphylococcus aureus</i>
	<i>Proteus mirabilis</i>		<i>Proteus mirabilis</i>
	<i>Pseudomonas aeruginosa</i>		<i>Pseudomonas aeruginosa</i>
	<i>Staphylococcus aureus</i>		Group B Streptococcus (GBS)
	<i>Candida</i>		

Risk Factors

As the infection requires certain circumstances to happen, some internal and external factors can participate in providing the favorable environment to organisms. Anatomical factor is one key factor in facilitating UTIs, but not necessarily anatomical abnormalities. Being a female, for instance, is an independent risk factor for developing frequent uncomplicated UTIs. The reason behind this that women has shorter urethra and underdeveloped internal-urethral sphincter, hence increases the chances of getting ascending infection. (Hickling et al., 2015; Minardi et al., 2011) The lifetime incidence of UTIs can go as high as 50–60% in adult women. (Medina and Castillo-Pino, 2019) The gender plays differently in pediatric age, as under the age of 1 year the incidence is higher in boys than in girls, that can be justified by circumcision as the foreskin harbors pathogens that may lead to UTI eventually. (Korbel et al., 2017) Anatomical abnormalities can hinder the normal flow of urine, thence stasis will arise and encourage infections. Anatomical abnormalities include cystocele, diverticulum, and fistula. (Dason et al., 2011) Pregnancy also contributes in UTIs by both physical pressure against ureters causing stasis as well as the immunological changes during the gestation. (Emiru et al., 2013) Finally, indwelling urinary catheter use is directly associated with complicated UTIs, representing 70–80% of health care acquired infections. (Nicolle, 2014)

Clinical Presentation:

The lower UTIs (urethritis and cystitis) usually shows no constitutional symptoms. Therefore, fever, chills, and others systemic symptoms are reserved to upper UTI (pyelonephritis). The fundamental symptoms of acute uncomplicated UTI are burning micturition, painful urination, increased frequency, and urgency. (Bollestad et al., 2018) In pediatric the similar symptoms are expected to be seen, moreover, foul-smelling urine in diapers maybe noticed as well. As the infants cannot convey their symptoms properly, complication and further ascension of disease is anticipated. Consequently, the American Academy of Pediatrics

recommend to suspect UTI if the patient, who aged between 2 months to 2 years, presented with fever of unidentifiable source of infection. Other suggestive symptoms in pediatric age to be consider by the general practitioner are irritability, poor feeding, vomiting and failure to thrive. Toddlers who are toilet trained develop recent urinary incontinence should be suspected as well. (Korbel et al., 2017) Elderly patients may present with atypical symptoms such as delirium, tachycardia, and hypotension. (Wojszel and Toczyńska-Silkiewicz, 2018) People with indwelling catheter presentation is similar to pediatrics, fever with no localizing findings is usual presentation of this case. (Nicolle, 2014) Urine characteristics such as malodor, or cloudiness, or turbidity, are not standalone valid indicators of UTI in adults. (Beahm et al., 2017)

Diagnosis

In contrast to value of suggestive symptoms excerpted from detailed history, physical examination and laboratory testing have limited use in the diagnosis of UTI. Suprapubic pain can be detected in some cystitis patients upon examination, more importantly to look for other sign that indicate other causes that may be masked or misinterpreted as cystitis. Those signs include abdominal or loin tenderness in case of pyelonephritis, renal mass in case of tumour, or vaginal discharge in the presence of vaginitis or vulvovaginal infections. Combining certain elements from both history and examination can have very high probability, for example the presence of dysuria and frequency while there is no evidence of vaginal discharge nor irritation has probability of having cystitis that is close to 90%. Also in women who already suffered from previous bouts of UTI symptoms alone can be highly suggestive. (Car, 2006) Urinalysis has higher chances of giving false positive results due to asymptomatic bacteriuria, reading of high pyuria. So, routine usage of urine dipstick and urine analysis is not recommended in the diagnosis of UTI. However, it provides a high negative predictive value which can be used to exclude symptomatic infection in elderly patients. Urine culture is not used in every case of UTI either, its use assigned for complicated UTI or pyelonephritis; as broader range of

causative pathogens are likely to be found with possibility of antimicrobial resistant. In case of need to obtain urine sample, the patient must be instructed to use “the midstream clean catch technique”. (Beahm *et al.*, 2017; Car, 2006) The use of radiological reserved for the cases of recurrence, especially in pediatric population, where ultrasound, pyelography, or cystoscopy, voiding cystourethrogram. A voiding cystourethrogram is the chosen screening tool for vesicoureteral reflux. Its results accurately identify the grade of vesicoureteral reflux; with the ability to recognise posterior urethral valves, ureterocele, obstructive uropathies, and bladder abnormalities such as bladder diverticula or trabeculations. (Leung *et al.*, 2019) Competent general practitioner should always keep in mind the possibility of complicated recurrent UTI which warrant referral. Box 1 shows indications for specialist referral. (Tan and Chlebicki, 2016)

Box 1. The Indications of UTI Patient’s Referral
1. All lower urinary tract symptoms in men
2. Infants aged under three months with a possible UTI
3. Infants and children aged three months or older with upper UTI
4. UTIs with the following characteristics:
a) Severe symptoms
b) Failed medical treatment
c) Evidence of retention
d) Ultrasonography abnormalities, such as calculi or bladder tumor.
5. Recurrent UTIs (≥ 3 UTIs in 1 year) with the following characteristics:
a) Risk factors for complicated UTI
b) A surgically correctable cause
c) If diagnosis of UTI is uncertain

Management

The pillar of bacterial UTI treatment is antibiotic. The pharmacological choice of the drug depends on multiple variables. Type of pathogen, age group, and the current health status of the patient are involved to set the perfect management plan. In acute uncomplicated cystitis in otherwise healthy adults, the choice of antibiotic relies on gender. Non-pregnant women first line antibiotic is Fosfomycin trometamol or Nitrofurantoin microcrystal. While in men the first choice will be amoxicillin-Clavulanate. (Tan and Chlebicki, 2016; Chu and Lowder, 2018) For children, education about toilet habits and hygiene should be discussed with the patients and their parents. Voiding every 1.5–2 hours and not to over hold the urine is recommended along with complete emptying of bladder once micturate. Thorough genital hygiene and proper fluid intake should be discussed and encouraged. The ideal pharmacological choice for children should be easy to administer, achieve a high concentration in the urine, have a low incidence of bacterial resistance, have minimal or no toxicity, and have minimal or no effect on the normal flora. The preferred route is oral, as it gave similar results as parenteral one; the latter is used in case of infants ≤ 2 months or any child who is unable to tolerate orally, looks toxic, hemodynamically unstable, immunocompromised, or failure of the oral medication. The intravenous options include combination of intravenous Ampicillin and intramuscular Gentamycin. The duration lower UTI treatment lies between 5–7, depending on the age of the child, risk factors, clinical severity, and response to treatment. Vigilance must be paid to renal function and serum creatinine level if the treatment with Gentamycin proceed for more than 48 hours. (Leung *et al.*, 2019) Details of drugs and dosages for each age group are demonstrated in Table 2.

Table 2. Drug Choices for Lower UTI

Group	Drug	Dose	Duration (day)	Remarks
Non-pregnant women	Fosfomycin Trometamol	3 g single dose	1	-
	Nitrofurantoin Macrocrystal	100 mg twice daily	5	Avoid if suspicious for Pyelonephritis
Pregnant women	Nitrofurantoin Macrocrystal	100 mg twice daily	5	Avoid if suspicious for Pyelonephritis; avoid in first trimester
	Amoxicillin	Every 8 h (500 mg) or 12 h (875 mg)	3-7	Resistance is increasing in population
Men	Amoxicillin-clavulanate	625 mg three times a day	7	-
Pediatrics	Cefixime	8 mg	-	-
	Cefdinir	14 mg	-	-
	Ampicillin	50 mg	-	-
	Amoxicillin	50 mg	-	-

4. CONCLUSION

The diagnosis of UTI can be challenging as it depends on the symptoms experienced by the patient. These symptoms differ

among the patients according to their age and other factors. Laboratory testing provides help in diagnosis and the disease but it should not be used routinely. Skilled physicians should be able to discriminate between upper and lower UTI and

complicated and uncomplicated ones. Recurrent UTI usually warrant further investigation, hence specialist opinion is preferred. Treatment should consider the patient as a whole and choosing the appropriate drug depending on the patient's current situation.

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