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Improving the Diagnosis and Treatment of Urinary Tract Infection in family medicine, Systemic review

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Abstract: **Background: Recurrent uncomplicated urinary tract infection (UTI) is a common presentation to family doctors. Thus most improve their techniques of diagnosing and treating this condition in appropriate methods. Objective: to systematically review studies investigating the developed ways and how could be the diagnostic procedures and treatments approaches of Urinary tract infection in primary care more developed to reach the maximum effectiveness. Methodology: We conducting systematic review by searching Observational and experimental studies identified through Medline, Embase, and Cochrane published in any language between 1955 and July 2016. MeSH terms for these databases included "primary health care", "urinary tract infections", and "diagnosis and managment". Conclusion: Guidelines regarding the diagnosis, treatment, and follow-up of urinary tract infections (UTIs) in population continue to evolve. Although a somewhat less aggressive approach to evaluation is now recommended, it is important for primary care physicians to appropriately diagnose and treat UTIs in all parts of population**

Keywords: **Diagnosis and Treatment, diagnostic procedures, aggressive approach.**

1. INTRODUCTION

Acute urinary tract infection (UTI) is one of the most common acute bacterial infections in primary care especially among women. [(1,2)] The prevalence is highly dependent on age and gender (figure1). [(3)] Conventional diagnosis relies on identifying a potential urinary pathogen from culture of a midstream specimen of urine (MSU) in a symptomatic patient. The standard for reporting UTI in most previous research and clinical practice was 105 colony-forming units per ml (cfu/ml).[(4)] The gold standard for the diagnosis of a urinary tract infection is the detection of the pathogen in the presence of clinical symptoms. The pathogen is detected and identified by urine culture (using midstream urine). This also allows an estimate of the level of the bacteriuria. However, the minimum level of bacteriuria demonstrating an infection of the urinary tract has not been defined in scientific literature or standardized by microbiological laboratories. Many laboratories define 10^5 colony forming units (cfu)/mL urine as the threshold. However, this threshold misses many relevant infections. There are therefore other recommendations [(5,6)] that recommend the diagnosis of UTI from a count of 10^3 cfu/mL, depending on the types of bacteria detected.

Dipsticks are the most widely used simple near patient tests in primary care.[(7–10)]Summary data are available from studies that assessed nitrite and leucocyte esterase separately, but primary data are needed to assess the independent predictive value of all dipstick results.[(11)] A systematic review suggested that the evidence base for dipstick use in primary care is poor, due to the paucity of studies and 'spectrum bias'.[(10,12)]

Evidence from emergency settings suggests that dipsticks may be particularly helpful where clinical assessment indicates a moderate probability of infection.[(13)] Other studies from primary care have not assessed the independent value of dipstick results (hence over-complicating clinical decision rules), and/or mixed clinical and dipstick variables, and/or had low power.[(8,10,14,15)]

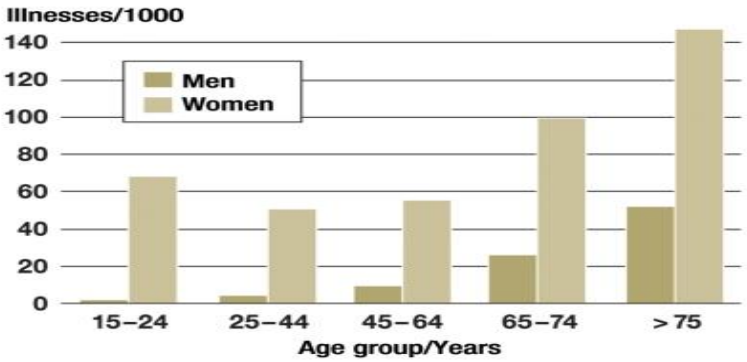

Figure 1: Prevalence of infections of the urinary tract in primary care (authors' illustration; data taken from [3]

The guideline recommendations for the antibiotic treatment of infections of the urinary tract are often not implemented in practice. National and international recommendations warn against the broad and uncritical use of fluoroquinolones for uncomplicated infections. [5] The numbers of prescriptions show how widely these recommendations are ignored in practice. These prescription practices have led to increasing resistance and endanger the use of fluoroquinolones in severe infections [16].

2. OBJECTIVES

Prevalence of resistance to commonly prescribed antibiotics in primary care for patients with urinary tract infections is high, particularly in some developing countries. This could render some antibiotics ineffective as first line treatments for urinary tract infection. Routine use of antibiotics in primary care contributes to antimicrobial resistance, which can persist for up to six months after treatment and due to the lack of diagnostic guidelines in some countries. therefore this study aimed to systematically review studies investigating the developed ways and how could be the diagnostic procedures and treatments approaches of Urinary tract infection in primary care more developed to reach the maximum effectiveness.

3. METHODOLOGY

Design:

Systematic review study

Data Sources:

We conducting systematic review by searching Observational and experimental studies identified through Medline, Embase, and Cochrane published in any language between 1955 and July 2016. MeSH terms for these databases included "primary health care", "urinary tract infections", and "diagnosis and managment". MeSH terms were combined with text word searches that included "antibiotic(s)", "primary care", "family practice", "ambulatory care", "community", "UTI", and "urinary bacteria". We screened reference lists of selected key papers and contacted authors who appeared multiple times to request details of further published and unpublished work.

4. RESULTS

Diagnosis UTI in General primary care:

It is of concern that GPs diagnose UTIs in children without checking a urine sample at all, and alarming that almost two thirds do so at weekends; a trend reported previously.[17] It needs to be remembered that, in terms of routine laboratory services, a 'weekend' constitutes nearly 40% of the week. Symptoms are often not diagnostic of UTI in children; febrile children may have a false-positive diagnosis because of dysuria from a concentrated urine and have unnecessary imaging investigations, while children with a UTI may have no dysuria, a false-negative diagnosis and develop avoidable scarring, hypertension or renal failure. a sin study by Vernon et al, 1997 [18], stated that Despite requiring more effort and more help from community and local paediatric staff, more GPs collect satisfactory urine samples from infants than from older children. This probably reflects their awareness of their greater risk of reflux nephropathy. It must be remembered that, even with 'satisfactory' methods, there is a chance of contamination, which could appear as a false-positive result, except

perhaps from suprapubic puncture, which is impractical in general practice. approximately three quarters of GPs always use urine culture as their primary diagnostic test, and up to nearly 90% sometimes do; this figure falls by about half at weekends (Table 1). [18] as in the same study by Vernon et al, A small number of GPs examine urine under a microscope for bacteria to test for UTI and do so equally on weekdays and weekends; only infected samples were cultured. During the week, up to one third of GPs test urine samples with dipsticks, and 3.3–4.8% use this as their sole diagnostic test. At weekends, when fewer GPs culture urine routinely, between 9.2% and 19.1% use dipsticks as their sole diagnostic test.

Table 1: Primary methods of urine analysis used by GPs to diagnose UTIs, from Vernon et al.1997 (18)

Method	Percentage of GPs using each method (range)	
	On a weekday	At weekends
Microscopy in surgery	6.6–10.5	5.4–11.0
Dipstick alone	3.3–4.8	9.2–19.1
Culture in laboratory	76.2–87.2	34.5–58.6

For each range, the lower value is the percentage of GPs who always use the method, and the upper value also includes those who sometimes do.

Clinical variables:

According to study by Little et al, 2006, [34] four variables independently predicted UTI (Table 2): cloudy urine, offensive smell, and dysuria and/or nocturia of moderate severity. Severity was an important aspect of prediction: symptoms rated as slight problems were much less predictive. A cut off of 2 or more of a score based on the sum of the rounded logistic coefficients (a clinical decision rule based on 2 out of 4 features) had sensitivity 65% and specificity 69% (see Tables 3). Each end of the score could be used to improve performance by varying the cut-off point. Thus the NPV was 71% for none of the four clinical features, and the PPV 84% for three or more features. [34]

Table 2: Clinical predictors of laboratory diagnosis of urinary tract infection according to European guidelines.

	UTI (*n* = 254) *n*(%)	No UTI (*n* = 154) *n*(%)	Crude odds ratio (95% CI)	Adjusted odds ratio[b] (95% CI)	*P*-value
Urine cloudy on examination	117 (46)	32 (21)	3.26 (2.05 to 5.16)	2.32 (1.40 to 3.85)	0.001
Urine has offensive smell on examination	62 (24)	16 (10)	2.79 (1.54 to 5.03)	2.02 (1.05 to 3.90)	0.034
Patient reports moderately-severe dysuria	179 (70)	66 (43)	3.18 (2.10 to 4.83)	2.76 (1.78 to 4.28)	<0.001
Patient reports moderately-severe nocturia	137 (54)	56 (36)	2.05 (1.36 to 3.09)	1.81 (1.16 to 2.80)	0.008
Patient reports moderately-severe daytime	185 (72)	94 (61)	1.71 (1.12 to 2.62)	1.37 (0.85 to 2.22)	0.20
Patient reports moderately-severe urgency	158 (62)	77 (50)	1.65 (1.10 to 2.47)	1.01 (0.63 to 1.61)	0.97
Patient reports moderately-severe haematuria	59 (23)	18 (12)	2.29 (1.29 to 4.05)	1.71 (0.93 to 3.16)	0.085

[a]10^3 colony-forming units per ml.

[b]Mutually adjusted for all significant predictors. Other variables tested but not significant in either univariate or multivariate analysis: history of backache, fever, feeling unwell, abdominal pain, prior duration, daytime or night-time frequency (number of times), renal angle tenderness, lower abdominal tenderness, previous history of UTI. UTI = urinary tract infection.

Table3: Clinical rule performance in predicting laboratory diagnosis of urinary tract infection [34]

	Test		
Standard	Clinical rule − [a]	Clinical rule + [b]	Total
UTI−	106	48	154
UTI+	90	164	254
Total	196	212	

[a] One or less of the following: moderately severe dysuria, moderately severe nocturia, urine smell offensive, urine cloudy or nitrite, or leucocyte and blood.

[b] Two or more of the following: moderately severe dysuria, moderately severe nocturia, urine smell offensive, urine cloudy or nitrite, or leucocyte and blood.

Treatment of UTI in primary care and some improving strategies:

The decision to prescribe antibiotics is one of the most common treatment decisions faced by frontline primary care clinicians daily, and urinary tract infection (UTI) is one of the most common bacterial infections encountered.[19] Although antimicrobial treatment for UTI is accepted in clinical practice, antibiotic resistance in urinary bacteria is increasing, [20] with rates cited in the literature of between 20% and 40% to trimethoprim and amoxicillin respectively. [21] Bacteria are adept at side-stepping human intervention (for example, antibiotics and vaccines) and are developing resistance to antibiotics faster than the pharmaceutical industry is developing new ones: only two new classes of antibiotics have been developed in the last 30 years. [22]

These problems highlight the need for high quality evidence to help primary care clinicians optimise the diagnosis and management of UTI. Fortunately, a plethora of high quality, clinically valuable, primary care research papers have been published in 2010, including four in the *BMJ* journal [23–26] and two in British Journal of General Practice (BJGP).[27,28]

study by Vellinga and colleagues they found that a previous measure of resistance to co-amoxiclav, ampicillin, ciprofloxacin, and trimethoprim remains predictive of further resistance at 3 and 12 months. The long duration of effects, although not as strong as at 3 months, may surprise many clinicians, but is not an isolated finding. A recently published systematic review [29] reports a similar trend of effects in three studies [21,30,31] that, when pooled, show that the relationship between antibiotics prescribed over a 12-month period and bacterial resistance cannot be explained by chance (odds ratio = 1.33, 95% CI = 1.15 to 1.53).

Two Cochrane systematic reviews, published in 2003 and 2004, summarised the evidence from randomised controlled trials for the efficacy and safety of different antibiotic regimens for the treatment of acute UTI in children. [32,33]

The first [32] reviewed RCTs comparing 2–4 days of antibiotic treatment with 7–14 day courses in children without acute pyelonephritis (diagnosed on the basis of absence of fever of 38°C or above). The authors concluded that a 2–4 day course of oral antibiotics appears to be as effective as 7–14 days in eradicating acute lower UTI.

The second review [33] identified 18 randomised controlled trials involving over 2600 children with pyelonephritis, treated either in inpatient or outpatient settings. Outcomes studied included clearance of bacteriuria, resolution of symptoms, abnormalities on DMSA scan, and adverse effects.

5. CONCLUSION

Guidelines regarding the diagnosis, treatment, and follow-up of urinary tract infections (UTIs) in population continue to evolve. Although a somewhat less aggressive approach to evaluation is now recommended, it is important for primary care physicians to appropriately diagnose and treat UTIs in all parts of population. Some underlying etiologies, including renal scarring and renal disease, can lead to considerable morbidity later in life.

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