Oral Versus initial intravenous antibiotic treatment for urinary tract infection in children

Thesis submitted in partial fulfillment for
the master degree in pediatrics

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Abstract

Escherichia coli is the most commonly isolated organism from pediatric patients with UTIs. However, any organism that gains access to the urinary tract system may cause infection, including fungi (*Candida* species) and viruses. Pyelonephritis may lead to renal scarring and long-term complications, such as hypertension and chronic renal failure. (Approximately ١٠-٣٠% of children with UTI develop renal scarring).

Among the patients who are attending the general and nephrology outpatient clinic in Abu El Reesh hospital Cairo University, forty (٤٠) cases with documented UTI were included in this study during the period from March ٢٠١٠ to December ٢٠١٠, to evaluate the effect of oral antibiotics versus the intravenous antibiotics in the treatment of UTI in children .

Key word: ULT, antibiotic treatment, *pediatrics*, Epidemiology.

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List of abbreviations

- **AAP** The American Academy of Pediatrics
- **APN** Acute pyelonephritis
- **ARR** Absolute risk reduction
- **ASB** Asymptomatic bacteriuria
- **CAT** Computed axial tomography
- **CAUT** Catheter-associated UTI
- **CCT** Controlled clinical trial
- **CER** Control event rate
- **CI** Confidence interval
- **Cfu** Colony-forming unit
- **CKD** Chronic kidney disease
- **CRF** Chronic renal failure
- **CRP** C-reactive protein
- **CT** Computed tomography
- **CUS** Cystourethrosonography
- **CVU** Clean voided urine
- **DMSA** Dimercaptosuccinic acid
- **Dx/HA** Dextranomer/hyaluronic acid
- **DRC** Direct radionuclide cystography
- **eGFR** Estimated glomerular filtration rate
- **EL** Evidence level
- **EQA** External quality assurance
- **ERF** Established renal failure
- **ESR** Erythrocyte sedimentation rate
- **ESRD** End-stage renal disease

- **GFR** Glomerular filtration rate
- **Hpf** High power field
- **ICD** International classification of diseases
- **IM** Intramuscular
- **IQR** Interquartile range ().
- **IRC** Indirect radionuclide cystogram
- **IRSG** The International Reflux Study Group
- **IV** Intravenous
- **IVP** Intravenous pyelogram
- **IVU** Intravenous urogram
- **LE** Leucocyte esterase
- **LR+** Positive likelihood ratio
- **LR−** Negative likelihood ratio
- **MAG۳** Mercaptoacetyltriglycine
- **MCUG** Micturating cystourethrogram
- **MRI** Magnetic resonance imaging
- **NHS** National Health Service
- **NNIS** National Nosocomial Infection Surveillance
- **OR** Odds ratio
- **PCT** Primary care trust
- **PDU** Power Doppler ultrasonography/ultrasound
- **PCT** Procalcitonin
- **PPV** Positive predictive value
- **PROS** Pediatric Research in Office Settings
- **RCT** Randomised controlled trial
- **RN** Reflux nephropathy
- **RNC** Radionuclide cystogram

- **RRT** Renal replacement therapy
- **SD** Standard deviation
- **SPA** Suprapubic aspiration
- **STING** Subureteric transurethral injection
- **US** Ultrasound
- **UTI** Urinary tract infection
- **UVJ** Ureterovesical junction
- **VCUG** Voiding cystourethrogram
- **VUR** Vesicoureteric reflux
- **VUS** Voiding urosonography
- **WBC** White blood cell
- **WHO** World Health Organization

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Introduction

Urinary tract infections (UTI) are common and important clinical problem in childhood .Upper urinary tract infections i.e. acute pyelonephritis, may lead to renal scarring, hypertension, and end-stage renal disease .Although children with pyelonephritis tend to present with fever, it is often difficult on clinical grounds to distinguish cystitis from pyelonephritis, particularly in young children " those younger than ٢ years" ***(Hoberman et al, ٢٠٠٣).***

Because the signs and symptoms of UTI in children are rather non specific, the diagnosis of UTI requires laboratory confirmation. The decision to obtain a urine specimen is not easy in young children, as bladder catheterization is frequently required. However, empiric therapy without confirmatory testing generally should be discouraged in young children ***(Hoberman et al, ١٩٩٣)***

Important aspects of the physical examination in the child with suspected UTI include documentation of blood pressure and temperature, growth parameters (poor weight gain and/or failure to thrive may be an indication of chronic or recurrent UTI) .Abdominal examination for tenderness or masses (eg, enlarged bladder or enlarged kidney secondary to urinary obstruction)***(Hoberman et al, ١٩٩٧).*** Assessment of suprapubic and costovertebral tenderness , examination of the external genitalia for anatomic abnormalities (eg, phimosis or labial adhesions) and signs of vulvovaginitis and evaluation of the lower back for signs of occult myelodysplasia (eg, midline pigmentation, lipoma, vascular lesion, sinus, tuft of hair), which may be associated with a neurogenic bladder ***(Shaikh et al, ٢٠٠٧) .***

Current recommendations for imaging of the urinary tract are not

based on prospective studies of outcomes (development of renal scars). A recent publication suggests that renal ultrasonography and DMSA scanning at the time of acute illness are of limited value and recommends the routine use of voiding cystouretherography to identify children with reflux ***(Struthers et al, ٢٠٠٣).***

Most infants older than two months with UTI can be safely managed as outpatients as long as close follow-up is possible (***Hodson et al, ٢٠٠٧).*** Usual indications for hospitalization include :Age < ٢ months, potential bacteremia, immunocompromised patient, vomiting or inability to tolerate oral medication, lack of adequate outpatient follow-up eg, no telephone, live far from hospital and failure to respond to outpatient therapy ***(Chang et al, ٢٠٠٦).***

Antimicrobial therapy for children with presumed UTI depends upon a number of factors, including the age of the child, severity of illness, presence of vomiting, duration of fever before presentation, underlying medical and/or urologic problems, and the antimicrobial resistance patterns in the community ***(Roberts et al, ١٩٩٠).***

Aim of the work

The main objective of the study is to compare the efficacy of oral Vs initial IV antibiotic treatment in children with an episode of UTI.

REVIEW

OF

LITERATURE

Definition of Urinary Tract Infection:

Urinary tract infection (UTI) is defined as the presence of a pure growth of more than $١٠^{٥}$ colony forming units of bacteria per milliliter of urine. Lower counts of bacteria may be clinically important, especially in boys, and in specimens obtained by urinary catheter. Any growth of typical urinary pathogens is considered clinically important if obtained by suprapubic aspiration. In practice, three age ranges are usually considered on the basis of differential risk and different approaches to management: children under ١ year; young children (١-٤ years); and older children (up to ١٢-١٦ years). *Recurrent UTI* is defined as a further infection by a new organism. *Relapsing UTI* is defined as a further infection with the same organism ***(Coulthard et al, ٢٠١٠)***.

Epidemiology :

❖ In young children with fever :

The prevalence of UTI in children < ٢ years presenting with fever has been the subject of several large prospective studies and a meta-analysis. Important points that emerged from these studies include: the overall prevalence of UTI is approximately ٧ percent in febrile infants and young children but varies by age, race/ethnicity, sex, and circumcision status .White children have a two -to four-fold higher prevalence of UTI than do black children .Girls have a two -to four-fold higher prevalence of UTI than do circumcised boys .White girls with a temperature of ≥ ٣٩ºC have a UTI prevalence of ١٦ percent (***Shaikh et al, ٢٠٠٨).***

❖ In older children:

The prevalence of UTI in older children is probably underestimated .Most studies report the proportion of urine cultures that are positive among all children who present to the emergency department rather than among those in whom UTI is suspected ***(Musa-Aisien et al,***