# Management of uncomplicated paediatric urinary tract infections among General Practitioners in West Ireland

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## ABSTRACT

**Introduction:** Urinary tract infection (UTI) is a common infection in children. The management of UTI is usually straight forward, but in the community setting, the general practitioners (GPs) face difficult decision once UTI is suspected. The aim of this study was to examine the management of paediatric UTI among the GPs working in West Ireland. **Materials and Methods:** A postal questionnaire based on a case scenario of simple or uncomplicated paediatric UTI was sent to the 198 GPs in the rural regions in the West of Ireland who commonly refer cases to the Portiuncula Hospital, Ballinasloe. The questionnaire consisted of a standardised set of questions covering diagnosis, urine processing, result interpretation, treatment instituted, hospital referral and advice on UTI's management. A letter explaining the purpose of the questionnaire with a stamped return envelope was attached. Participating GPs were asked to return the questionnaire within one month period of receiving the questionnaire. **Results:** The response rate in this study is 38%. Majority of the GPs (52.7%) used urine bag as method of collection and a single urine sample (56.8%) was used to diagnose UTI. Half of the samples taken (50%) were sent straight to the hospital for investigations. In the case of simple UTI, 67.6% of the GPs will commence the patient on oral antibiotic, usually amoxicillin-clavulanic acid (co-amoxiclav) (59.4%) for 5-7 days (79.7%). The referral rate for tertiary care was 59.5% of the cases. **Conclusion**: UTI can be challenging diagnosis especially in primary care setting. Implementation of UTI management according to local guideline is essential to prevent development of resistant organism.

**Keywords: urinary tract infection, paediatrics, primary care, management**

## INTRODUCTION

Paediatric urinary tract infection (UTI) is commonly associated with vesicoureteric reflux (VUR) and can result with end stage renal disease and hypertension. [1] Accurate diagnosis and appropriate choice of antibiotic for early treatment of UTI reduces associated morbidity and mortality. The prevalence of antibiotic resistance has been increasing, in part due to unrestricted use of broad spectrum antibiotics in the community. [2]

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General practitioners (GPs) have been criticised for their failure to make accurate diagnosis and appropriate referral to secondary or tertiary centres. [3] Under-diagnosis of infants with UTI can lead to unfavourable outcomes, and over-diagnosis causing waste of hospital resources. UTI can be difficult to detect in the community setting especially in smaller infants. Infants less than one year of age present with non-specific symptoms such as fever, vomiting and irritability. In older children who can verbalise, history is often easy to aid diagnosis. UTI is diagnosed by the presence of a single pathogenic micro-organism with more than $10^5$ cfu/ml, in a urine sample [4] The choice of urine collection in the community setting are clean catch (mid -stream urine [MSU]) or urine bag specimen. The latter is commonly used but frequently produce contaminated samples. Early diagnosis and prompt treatment are essential to prevent renal scarring, although this can be difficult to achieve. [5]

The aim of the study was to obtain information regarding GPs' practice in the management of paediatric UTI. The study was based in the Portiuncula Hospital which is a 220 bedded busy district general hospital in Ballinasloe of County Galway, West Ireland. The estimated annual number of infant deliveries in Western Ireland is 1,600 babies. The hospital is equipped with a 20 bedded Paediatric Unit, and receive approximately 1,500 admissions annually. The paediatric (defined as patients aged between 0 and 14) catchment population is estimated at 35,000 in County Galway, Ireland alone.

## MATERIALS AND METHODS

A case scenario of uncomplicated UTI with set of questionnaire was formulated. The questions covered aspects of diagnosis, urine collection methods, result interpretation, antibiotics given, criteria for hospital referral and advice regarding UTI in children. The questions validity was initially piloted and tested among the medical doctors to obtain the relevance and applicability.

The short case scenario of simple UTI was as followed:

> *'21-month-old girl presented with 3 days history of intermittent low-grade fever, decreased appetite and mild abdominal pain. There is positive family history of UTI. She was born normally at 35 weeks with uneventful neonatal period. Her antenatal scan was unremarkable. On examination, she was well, with occasional discomfort on suprapubic palpation. No other abnormal finding of note.'*

These questionnaires were sent with covering letter explaining the study's objective to GPs within the catchment area of Portiuncula Hospital, West Ireland. There were 198 GP practices identified from the hospital referral list. GPs were asked to return the completed questionnaire within one month period. Approval to conduct the study was sought and approved by the Department of Paediatrics, Portiuncula Hospital.

## RESULTS

198 questionnaires were distributed to most of the practice in the west of Ireland covering large western counties such as Galway, Roscommon, South Tipperary, Longford, Offaly and Westmeath. Seventeen replied questionnaires were considered as incomplete (GPs deceased, retired or moved) due to various

**Table 1: Demographic of the general Practitioners.**

| Variables | n (%) |
|---|---|
| Gender of GP | |
| Male | 47 (63.5) |
| Female | 27 (36.5) |
| Experience in GP setting (years) | |
| 1-5 | 3 (4.1) |
| 5-10 | 5 (6.8) |
| >10 | 56 (75.7) |
| Specialist certification (MRCGP, MICGP) | |
| Yes | 59 (79.7) |
| No | 5 (6.8) |
| Incomplete data entrance | 10 (13.5) |

reasons and 74 completed the questionnaire were processed, giving a response rate of 38%.

For suspected UTI, 82% (n=61/74) of GPs would routinely collect urine specimen. Twelve (16.2%) would base the diagnosis on urine dipstick and one (1.4%) would diagnose UTI based on clinical assessment alone. Thirty -nine (52.7%) of the GPs used urine bag for specimen collection, 12 (16.2%) used the clean catch method and seven (9.5%) used the mid stream urine specimen. Sixteen (21.6%) GPs did not provide any response. Out this number, 60 (81%) of the GP sent collected urine to the hospital for culture; 43.2% one sample and 32.1% two urine samples collection.

We also found 56 (75.7%) GPs would treat asymptomatic bacteriuria (ABU). Oral antibiotic was commenced in 65.7% of the cases prior to the culture result availability; and 17.6% would wait for completion of urine culture and sensitivities prior to commencement of oral antibiotic.

## DISCUSSION

UTI is the second commonest infection among all paediatrics admission to the hospital. Concern about UTI in smaller children is mainly because of the association with VUR, congenital anomalies and potential long-term complication such as hypertension. In the community context, it is not well known of its prevalence. No major study to capture the disease burden especially in relation to GP

**Table 2: Data on the management of simple UTI in the community (N=75).**

| | n (%) |
|---|---|
| **Method of urine collection** | |
| Urine bag | 39 (52.7) |
| Clean catch | 12 (16.2) |
| Mid stream urine | 7 (9.5) |
| Multiple techniques | 16 |
| **Action following urine collection*** | |
| Send specimen to hospital | 50 (67.6) |
| Storing in fridge | 2 (2.7) |
| Strict lab transfer | 8 (10.8) |
| Dipstick test | 2 (2.7) |
| **Number of samples** | |
| 1 | 32 (43.2) |
| 2 | 26 (35.1) |
| 3 | 9 (12.2) |
| **Treating asymptomatic bacteriuria*** | |
| Yes | 56 (75.7) |
| No | 8 (10.8) |
| Not sure | 8 (10.8) |
| **Action when result showed mixed growth*** | |
| Repeat urine | 63 (85.1) |
| Start antibiotic | 3 (4.1) |
| Observe | 2 (2.7) |
| **Management for simple Paediatric UTI*** | |
| Start oral antibiotic | 50 (67.6) |
| Wait for the culture result | 13 (17.6) |
| Refer to Paediatric Team | 2 (2.7) |
| **Antibiotics used** | |
| Co-amoxiclav | 38 (51.4) |
| Trimetoprim | 18 (24.3) |
| Cephradine | 4 (5.4) |
| Amoxicillin | 3 (4.1) |
| Other antibiotics | 9 |
| **Length of antibiotic therapy*** | |
| <5 days | 10 (13.5) |
| 5-7 days | 59 (79.7) |
| >7 days | 4 (5.4) |
| **Criteria for referral to hospital*** | |
| All patients after first infection | 44 (59.5) |
| Selected patients after first infection | 3 (4.1) |
| None after first infection | 1 (1.3) |
| After repeated episode of infection | 11 (14.9) |
| **Post treatment urine investigation*** | |
| Yes | 63 (85.1) |
| No | 10 (13.5) |
| **Advice for the family*** | |
| Improve hygiene | 13 (17.6) |
| Avoid constipation | 7 (9.5) |
| Check urine if suspected UTI | 7 (9.5) |

setting.

There are many challenges in diagnosing UTI in the community settings. First, diagnostic tools are not easily accessible, thus many specimens must be sent to secondary to tertiary centre for processing. This takes time for the results to become available. Delay in diagnosis especially in smaller children with VUR can accelerate the serious scarring effect in the developing kidneys. Second, there are practical issues on how to collect the urine and storing. Urine can be easily collected by bag specimen but the rate of contamination is reported to be as high as 37-63%. Urine dipstick is a reliable method of screening but it can lead to false positive or even false negative result. There are costs involved when urine was sent for processing. This includes transportation of sample to the hospital; the use of urinalysis and specialised boric acid containers; refrigeration of the sample and laboratory workforce during the out-of-hour processing. Time, infrastructure and diagnostic ability are limited in especially in the community. Third, labelling the diagnosis based on the current definition can be labourious. Mixed result may indicate contamination or even improper urine collection method. Repeat urine can be done but it is also time consuming. In our study, urine dipstick was used as the diagnostic tool in some practices. Dipstick has its own flaws; however negative leukocyte esterase and nitrite screening may be reasonable to rule out UTI. [6] Diagnosis of UTI depends heavily on urine collection method and clinical history. Clean catch was considered appropriate in the pre-toilet trained age group but time consuming in the community setting. Urine bags were the most popular collection method however precautionary steps need to be taken to reduce contamination during the collection.

It has been estimated that GPs see only 1-2 cases of proven childhood UTI per year. [3] Diagnosis of UTI can be reliably made if three carefully collected bag samples show consistent growth of $>10^5$ cfu/ml of a single uropathogen. However, this is rarely practiced in the community as shown in our study.

Interpretation and distinguishing between ABU, urethral syndrome and UTI can be confusing. ABU is defined as finding of significant bacteriuria in an asymptomatic patient when investigation or screening was done in a well-child. There is a higher degree of antibiotic commencement among the GPs (73.6%) despite asymptomatic symptoms. A study by a Canadian Taskforce suggested that ABU contributed to only minor complication but re-infection is very common. [8] Our findings showed that most GP (71%) initiated antibiotic early if they have a strong suspicion of UTIs in children. Delayed antibiotics until the culture and sensitivity become available is an option in uncomplicated cases but socio-cultural context should be considered seriously. Family who are complaint with medications and are educated perhaps can be considered in this group. In uncomplicated UTIs, follow up may not be an issue especially in lower UTI, typical organism (*E. coli*), absence of structural abnormalities, children older >3 years and responded well to oral antibiotic. [9]

We noted that 57.8% of the GPs referred uncomplicated cases to a paediatric outpatient clinic, which may reflect the moderate level of confidence among the GP when

managing UTI in the community.

There is no standard antibiotic guideline in the community. Cephradine is the drug of choice and is the first line antibiotic in Portiuncula Hospital. Co-amoxiclav is a preferred choice in the community due to palatability, good coverage and good compliance. Care however should be taken when organisms are partially sensitive to an antibiotic, where its use may lead to subsequent antibiotic resistance. The resistance pattern shows a large inter-regional variation. This is seen in different usage of antibiotics treatment that has led to changing pattern of common uropathogens to treatment given. [11] A long course antibiotic therapy is associated with fewer treatment failures. [10] Monitoring the pattern of resistance regionally by continuous surveillance of resistance pattern and development of local policy for the choice of antibiotics are essential parts of management.

Information needs to be communicated between hospital and community setting. Cephalosporin resistance is documented at 8% in patients less than 16 year old. [11] Peterson *et al.* reported that 66.6% patients with UTI were started with trimethoprim, followed by 31.4% with cephalexin and further 6.9% with co amoxiclav (amoxicillin-clavulanic acid). [12] Resistance to trimethoprim and ampicillin has been reported to be between 7% and 18% in the last decade. [2] In this study, we found that 77.6% of GPs preferred a 5-7 days course for the treatment. It has been shown in a study that 7-10 days of appropriate antibiotic is adequate for the treatment of UTIs. [13]

Among the limitation of the study that we did not inquire about the personal educational profile of each GP. The profile should include years of experience, update activities on UTI, experience in management of UTI in children and number of patients treated in the practice per year. This will give a better picture on the depth and experience of each GP. The second limitation was related to poor response from the GPs with incomplete questionnaire response. Active participation would require time for each GP to answer the questionnaire correctly. With a busy daily schedule and house-calls, this could deter GPs from participating in the study. Reminder letters could be ensure higher response rate of participation. The third limitation is related to the set up. In rural Western Ireland, the infrastructure is less developed compared to the urban areas. GPs may have access to hospital referral system. However, infrastructure challenges include correct method of collection in children, storage of samples, usage of appropriate container and prevention of contaminated urine specimen, may delay the diagnosis accuracy. Practicalities and awareness of such investigations remained the yardstick for decision making in the community. This should be supported by parental cooperation, understanding and motivation, to help the GPs by ensuring adequate steps taken to reach a correct diagnosis of UTI in children.

In conclusion, diagnosing UTIs in the community can be challenging. Standardised local policy in agreement with the hospital setting in the management of paediatric UTI is am essential component of management. Knowledge update based on recent evidence is important part of education to appropriate treatment is instituted for these patients.

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