DIAGNOSIS AND MANAGEMENT OF URINARY TRACT INFECTIONS IN CHILDHOOD: A PRACTICAL GUIDE

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Urinary tract infections occur in 2% of children. Prompt diagnosis, treatment and management are essential for three main reasons:

i A urinary tract infection (UTI), particularly in the first 18 months of life, may indicate an underlying congenital abnormality of the renal tract. Early recognition and management can reduce further damage and long term problems.

ii Up to 20% of children less than six years of age with previous healthy kidneys will, following a UTI, develop renal scarring with the consequent problems of recurrent UTIs, hypertension, calculi and renal failure. There is a direct relationship between the severity of scarring and the delay in treatment of the infection, ie these consequences are, to a large extent, preventable[1].

iii Chronic pyelonephritis is responsible for up to 30% of end stage renal disease and 50% of hypertension in childhood. It is essential to have a high index of suspicion for UTI in infancy and childhood, followed by good techniques of specimen collection and transport to the laboratory, and prompt treatment with antibiotics and appropriate investigation.

WHO NEEDS TESTING?

Symptoms of UTI in infancy may be nonspecific, becoming more classical in later childhood. A specimen should be obtained from the following children:

infant <18 months of age with unexplained fever over 38.5°C
unexplained vomiting/abdominal pain
frequency of micturition, dysuria, enuresis
failure to thrive
prolonged jaundice in the newborn
nonspecific illness
suspected sexual abuse
haematuria
hypertension

METHOD OF COLLECTION OF URINE AND TRANSPORT TO THE LABORATORY

It is essential that a non-contaminated urine specimen be obtained. In boys and toilet-trained girls a midstream specimen of urine can be obtained. In younger children and infants a clean catch specimen, caught in a sterile container such as a foil tray, is appropriate. A negative bag urine specimen reliably confirms the absence of infection, but a positive one is probably a contaminant and must in all cases be followed by either a clean catch specimen or a suprapubic aspirate of urine.

The recent advent of the urine dip sticks (M8SG, Bayer, Newbury) has revolutionised urine testing in our paediatric department[2,3]. The freshly voided sample is tested immediately with the dip sticks, looking particularly at the nitrate and leucocyte esterase tests **which must be read at exactly the correct times**, ie one minute and two minutes respectively. The absence of both these markers in a urine sample confirms its sterility; the presence of one of them indicates a possible infection of the urine; and the presence of both confirms infected urine. If a possible or definite UTI is indicated on this testing,

i) in a toilet trained child, an MSSU must be obtained

ii) in a non-toilet trained child then a clean catch urine must be obtained (see diagram) or alternatively suprapubic aspiration (SPA).

The specimen must be transferred to the laboratory for examination within two hours. If this is not possible then it should be chilled immediately to 4°C in the main compartment of a domestic refrigerator. A specimen that is allowed to stand at room temperature will become contaminated. Please indicate on the request form the method of urine collection, the time of the sample and the mode of storage.

Dip sticks are a reliable means of diagnosing infection in the majority of children. In those with more complex renal problems, however, infection with non-nitrate producing organisms such as pseudomonas and group B streptococci is possible, in which case formal urine analysis must be done.

TREATMENT OF URINARY TRACT INFECTION

Antibiotic treatment should commence immediately after the urine specimen has been obtained. Appropriate antibiotics include Trimethoprim, Co-Amoxiclav or Cephradine as a five-day course with Trimethoprim being the first choice.

In children less than six years of age a low dose antibiotic should be continued prophylactically after completion of the treatment until investigation of the urinary tract has been completed. Suitable agents include Trimethoprim 2mg/kg in a single daily dose at night or Nitrofurantoin 1mg/kg in a single daily dose at night. The prophylactic antibiotic should continue even when the child is receiving treatment with other courses of antibiotics, as stopping and starting will reduce its efficacy.

RADIOLOGICAL INVESTIGATIONS

Ideally all urinary tract infection in childhood should be investigated. The protocol used in Lancaster is based on the recommendations of the Royal College of Physicians Working Group[4].

i age under two years

USS + plain abdominal X-ray
micturating cystourethrogram (MCU)
DMSA scan at three months.

If all investigations are normal, discontinue prophylaxis and check urine at 3-monthly intervals for two years. If abnormal or if there is vesico-ureteric reflux (VUR), continue prophylaxis until six years old and check urine at 3-monthly intervals.

ii age two to six years

USS + plain abdominal X-ray
DMSA at three months.

If investigations are normal, discontinue prophylaxis and check urine at three-monthly intervals for two years. If abnormal, continue prophylaxis until six years old and investigate further with MCU or IVP as necessary. Continue 3-monthly urine checks.

iii age seven years and over

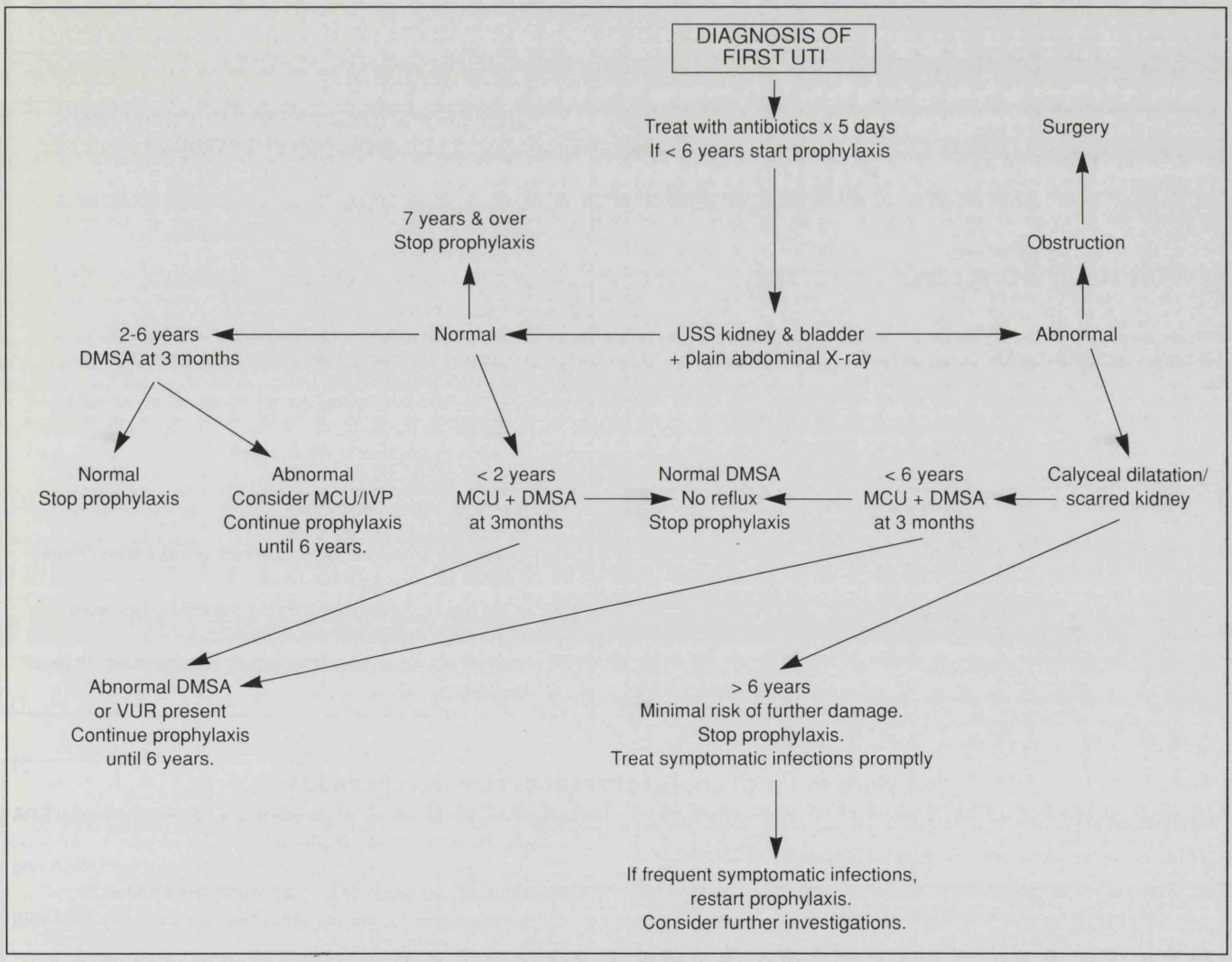
GP can organise USS
Refer only if this is abnormal
No further investigations unless infection recurs
Check urine 3-monthly for 12 months.

The costs of false positive diagnosis of UTI, particularly in the under-2s, are considerable, not only in radiological terms but also in parent time and frustration. Clean catch urines are not easy in this age group!

It is hoped that these guidelines and also the instruction sheets on the following pages will help GPs and parents in the diagnosis and management of UTIs in childhood. It is only by conscientious identification and management in general practice that later complications can be avoided.

		£
ultrasound scan + plain X-ray		110.00
MCU		250.00
DMSA scan		120.00
	TOTAL	480.00
prophylactic antibiotics for 2 years		30.00
3-monthly urine checks for 2 years:		
by multistick		1.20
by bacteriology		40.00

Costs of investigations in UTI



Suggested Management for Urinary Tract Infection in Childhood

GUIDELINES AND INSTRUCTIONS

INSTRUCTIONS FOR COLLECTION OF NON-CONTAMINATED URINE SPECIMEN

Requirements: sterile urine bottle or sterile container

If the initial labstix is positive, then either an SPA or clean catch urine must be done. Ideally the child should soak in the bath before the collection; failing this wash the genital area with cotton wool soaked in warm water.

Boys – a midstream specimen of urine (MSSU): start to urinate, then place urine bottle in direct line with urine stream. Remove when one third to one half full. Allow child to complete urination in toilet or nappy.

Girls – a midstream specimen of urine (MSSU):

a) **girls who are toilet trained.** Have the child sit on the toilet seat with her legs widely spread apart so that the labia (vaginal skin folds) do not touch. Start to urinate, collect the middle stream of urine in a sterile container, then remove the container and allow her to finish urination in the toilet. Pour the sterile urine directly into the urine collection bottle.

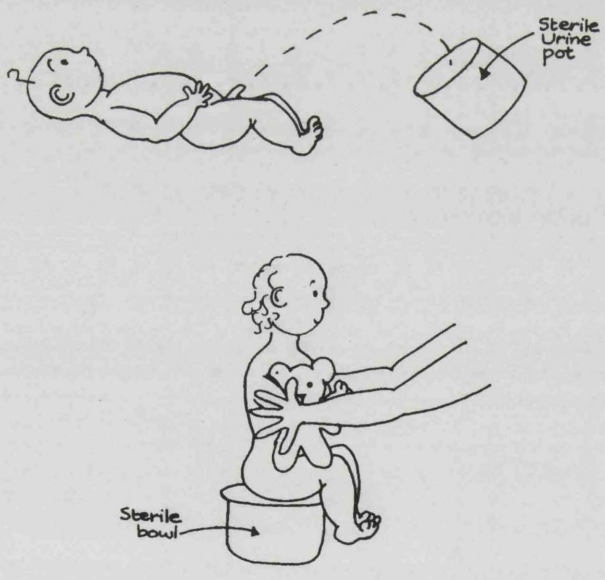
b) **girls who are not toilet trained.** This is the most difficult group. The gold standard is the suprapubic aspirate but the clean catch urine is second best.

i) **clean catch urine:** bath the child or wash her down with warm water. After or during a feed hold her over a sterile pot until she passes urine. Pour the urine into a urine collection bottle.
NB: if bowels are opened at the same time, abandon and start again.

ii) **bag urine:** bath the child or wash down with warm water. After or during a feed stick the urine bag over the perineum. Hold the child upright so that urine does not come into contact with the perineal area. Remove the bag and pour urine into the collection bottle.
NB: (a) If the bag has been in place for two hours and no specimen obtained, then abandon and start again because by this time the bag will have been contaminated by skin flora.
(b) A UTI cannot be confidently diagnosed on the basis of a bag urine because of the very high risk of contamination. However, if the bag urine is negative then you can be confident that a UTI is not present.

iii) **suprapubic aspirate of urine:** refer to hospital for this to be done unless the GP is happy to do it at home.

What to do with the urine specimen – urine is an excellent culture medium and any organism will therefore grow rapidly. Ideally the urine should be delivered immediately to the laboratory and examined within two hours of collection. If this is not possible, then it should be chilled immediately to 4°C in the main compartment of a domestic refrigerator until it can be examined in the laboratory. It must not be allowed to stand at room temperature as contamination will result.



Collection of sterile urine from non-toilet-trained child

OBJECTIVES IN MANAGEMENT OF URINARY TRACT INFECTION IN CHILDHOOD

1 early diagnosis
- within five days of acute symptoms
- within four weeks of ill-defined symptoms
- test if daytime enuresis at five years
- test if night time enuresis at seven years

2 early and adequate treatment
- treatment should commence immediately after the multisticks are suggestive of infection in a symptomatic patient
- give prophylaxis to under–sixes between treatment and investigation
- continue prophylaxis if reflux present

3 appropriate investigation
- investigate as outlined above
- investigate after first infection
- investigate with USS and MCU where positive family history of reflux in a first degree relative

4 avoid false positive diagnosis. For the child < two years radiological costs alone are £480

5 avoid missed diagnosis. This occurs in 2% of the 0–10 year population

THE ROLE OF THE GP IN URINARY TRACT INFECTION IN CHILDHOOD

1 Diagnose UTI.

2 Start treatment and, where indicated, continue prophylaxis.

3 Check urine is sterile after course of treatment. Supervise 3-monthly urine checks where indicated.

4 All children less than seven years of age with UTI should be referred to the paediatric department. If a GP feels an urgent SPA is appropriate this can be organised.

5 GP may organise USS and plain abdominal X-ray, but DMSA and MCU can only be requested via a hospital department.

6 GP is responsible for lifelong annual BP check in any child with scarred or damaged kidneys.

Following are examples of two handouts used in the Paediatric Department.

URINARY TRACT INFECTION: GENERAL MEASURES TO REDUCE THE RISK OF RECURRENT INFECTION AND PERINEAL SORENESS

1 Encourage regular bladder emptying four-hourly or before each meal and before going to bed.
2 To make sure the bladder is completely empty, ask the child to try again after five to ten minutes. This is particularly important before going to bed.
3 Treat constipation effectively with diet and laxatives.
4 Wear cotton underwear, avoiding nylon pants, tights and tight trousers. At night leave with no knickers.
5 Avoid biological washing powders and detergents for underwear. Ensure that underwear is rinsed properly after washing.
6 Bath regularly, drying carefully afterwards.
7 Avoid scented soaps. Do not use bubble bath.
8 Treat thrush and threadworms.
9 After defaecation wipe bottom clean from front to back. Use soft absorbent toilet paper.
10 Ensure free access to satisfactory toilets at school.
11 Discourage masturbation.
12 Encourage regular eating of live yoghourt.

WHAT IS A MICTURATING CYSTOGRAM EXAMINATION?

Please read this leaflet if you would like to know more about your child's X-ray examination.

BEFORE

A micturating cystogram is an X-ray examination of the lower part of the urinary system, in particular the bladder. These organs are not seen clearly on normal X-ray films so fluid called X-ray contrast agent, which is visible on X-ray films, is used to outline the lower urinary system.

When you arrive at the hospital please go to the children's medical ward and report to the nurses' desk. An allocated nurse will take you and your child into a preparation room.

A doctor or nurse will pass the end of a fine, sterile tube through your child's urethra (the passage through which they pass water) into the bladder. The other end of the tube will be secured to the child's leg using sticky tape. Your child can be given a mild sedative for this procedure if necessary.

You will then be taken to the X-ray department where the examination will take place.

DURING

This part of the examination may take up to 30 minutes. A parent or relative may come into the X-ray room.

Contrast agent will be passed through the tube into your child's bladder whilst the child lies on an X-ray couch. The radiologist (X-ray doctor) will watch and take X-ray films using an X-ray television and camera.

When the bladder is full the tube is removed. Your child will then be asked to empty their bladder either onto absorbent pads or into a receiver if preferred. The radiologist will take further films at this time.

AFTER

After the examination you will be asked to return to the childrens medical ward. If your child was not sedated you should be able to leave immediately. If your child was sedated you may be asked to wait until its effect has worn off.

LATER

The contrast agent is clear so it will have no effect on the colour of your child's urine.

Your child may experience a slight soreness where the tube was inserted.

Some children also find a little difficulty in passing water after the examination. This can be relieved by allowing the child to pass water in a bath of warm water.

RESULTS

The results of your child's examination will not be given to you on the same day.

After the examination you need an appointment at the childrens outpatient clinic to see the doctor who referred you. Details of this will be checked with you by the ward nurse.

Grateful thanks for the artwork to Di Wood, Paediatric Department, RLI

REFERENCES

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2 Shaw KN, Hexter MD, McGowan KL, Schwartz JS Clinical evaluation of a rapid screening test for urinary tract infections in children J Paediatr 1991; 118: 733-6

3 Woodward MN, Griffiths DM Use of dipsticks for routine analysis of urine from children with acute abdominal pain Br Med J 1993; 306: 1512

4 Report of working group of research unit of Royal College of Physicians Guidelines for the management of acute UTI in childhood J Roy Coll Phys London 1991; 5: 36-42