## Antenatally Detected Urinary Tract Abnormalities

<table>
<thead>
<tr>
<th>Title of Guideline</th>
<th>Guideline for the assessment and management of antenatally detected urinary tract abnormalities</th>
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| Directorate & Speciality | Family Health; Renal |
| Date of submission | May 2016 |
| Date on which guideline must be reviewed (this should be one to three years) | May 2021 |
| Explicit definition of patient group to which it applies (e.g. inclusion and exclusion criteria, diagnosis) | Inclusions criteria: Fetuses and babies with antenatally detected abnormalities of the urinary tract |
| Abstract | This guideline describes the assessment and management of babies found to have abnormalities of the urinary tract on antenatal ultrasound scan |
| Key Words | Fetus, baby, renal, child, hydronephrosis, posterior urethral valve, pelviureteric junction obstruction, vesicoureteric junction obstruction, reflux, oligohydramnios |
| Statement of the evidence base of the guideline – has the guideline been peer reviewed by colleagues? Evidence base: (1-5) | 2a |
| 1a meta analysis of randomised controlled trials | |
| 1b at least one randomised controlled trial | |
| 2a at least one well-designed controlled study without randomisation | |
| 2b at least one other type of well-designed quasi-experimental study | |
| 3 well –designed non-experimental descriptive studies (ie comparative / correlation and case studies) | |
| 4 expert committee reports or opinions and / or clinical experiences of respected authorities | |
| 5 recommended best practise based on the clinical experience of the guideline developer | |
| Consultation Process | Feto-maternal Consultants, Midwives, Neonatologists, Paediatric Nephrologists, Paediatric Radiologists, Paediatric Urologists, Feto-maternal Guidelines Group, Neonatal Guidelines Group, Paediatric Guidelines Group |
| Target audience | Clinicians and healthcare professionals caring for fetuses and babies with antenatally detected urinary tract abnormalities. |

This guideline has been registered with the trust. However, clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt contact a senior colleague or expert. Caution is advised when using guidelines after the review date.
Amendments from previous guidelines:

1. Addition of [www.infoKID.org.uk](http://www.infoKID.org.uk) in patient information section
2. Update of antibiotic for MCUG
3. Update of estimated GFR information as Appendix 3
4. Addition of referral through NIPE system.

Statement of Compliance with Child Health Guidelines SOP

This guideline has had only minor changes made and therefore this version has not been circulated to all for review. A previous version had been approved by circulation to senior team members.

Martin Hewitt  
Clinical Guideline Lead  
12 May 2016
Please note – it is unlikely you will need to print the whole of this guideline at any one time – please consider the environment and print only the pages relevant to your needs.

## Contents of Guideline

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Background</td>
<td>4</td>
</tr>
<tr>
<td>2. Antenatal/Neonatal Management</td>
<td></td>
</tr>
<tr>
<td>2.1. Antenatal Counselling</td>
<td>4</td>
</tr>
<tr>
<td>2.2. Algorithms for management of:</td>
<td></td>
</tr>
<tr>
<td>2.2.1. High risk features requiring early intervention</td>
<td>5</td>
</tr>
<tr>
<td>2.2.2. Moderate risk features</td>
<td>6</td>
</tr>
<tr>
<td>2.2.3. Mild risk features</td>
<td>7</td>
</tr>
<tr>
<td>3. Further Postnatal Management</td>
<td>8</td>
</tr>
<tr>
<td>3.1. Algorithm for management of MCDK</td>
<td>9</td>
</tr>
<tr>
<td>3.2. Algorithm for management of unilateral dysplasia or hypoplasia / single kidney</td>
<td>10</td>
</tr>
<tr>
<td>3.3. Algorithm for management of urinary tract dilatation</td>
<td>11</td>
</tr>
<tr>
<td>4. Audit points</td>
<td>12</td>
</tr>
<tr>
<td>5. References</td>
<td>12</td>
</tr>
<tr>
<td>Appendix 1 – FAX Referral form for babies with antenatally detected urinary tract abnormality</td>
<td>13</td>
</tr>
<tr>
<td>Appendix 2 – Urinary tract infection in babies (leaflet for parents)</td>
<td>14</td>
</tr>
<tr>
<td>Appendix 3 – Estimated GFR</td>
<td>15</td>
</tr>
</tbody>
</table>
1. Background

Improvements in second trimester ultrasound (USS) screening have resulted in an increased number of antenatally detected urinary tract abnormalities (AUTA).\(^1\)

Abnormalities fall into two main categories:

- Abnormalities of **renal parenchymal texture**
- Abnormalities of **drainage system** (maximum transverse AP diameter of the renal pelvis \(\geq 7\) mm at 18 – 20\(^{+6}\) weeks gestation or later is considered significant)\(^2\)

Abnormalities may be unilateral or bilateral. The outcomes in patients with unilateral abnormalities are very good, though investigation is required postnatally.\(^1\)

The outcome from bilateral anomalies is also often good. Risk factors for a poor outcome include bilateral renal parenchymal abnormalities and/or oligohydramnios. Significant oligohydramnios may lead to pulmonary hypoplasia which can result in stillbirth or early neonatal death.

**Babies of mothers who have renal problems** such as:

- Vesico-ureteric reflux
- renal tract dilatation
- duplex kidney
- solitary kidney
- MCDK

with **entirely normal** urinary tracts on antenatal ultrasound scans **do not need further follow up**. Please give advice regarding urinary tract infection.

Please contact relevant paediatrician or paediatric nephrologist to discuss individual cases with other maternal renal disease if unsure whether follow up is required.

2. Antenatal Management

2.1 Antenatal counselling

Once a renal tract abnormality is detected on ultrasound, parents should receive **specialist counselling** by a doctor with appropriate competency in counselling and post natal management of AUTA, taking into account the severity of the condition. **Prognosis should be guarded** as post natal scans may reveal the abnormality to be either more or less severe than expected.

2.2.2 The following algorithms detail guidelines for management of:

- 2.2.1 High risk features requiring early intervention
- 2.2.2 Moderate risk features
- 2.2.3 Mild risk features
2.2.1 High risk features requiring early intervention
(measurements refer to AP diameter at 18 – 20+6 weeks gestation or later)

- Bilateral hydronephrosis AP diameter ≥10 mm
- Suspected bladder outlet obstruction (e.g. Posterior urethral valves, ureterocele)
- Unilateral hydronephrosis AP diameter ≥10 mm in a fetus with a single kidney
- Bilateral abnormality of renal parenchyma
  - Polycystic kidney (autosomal dominant or recessive inheritance. Check family history, and consider screening parents)
  - Congenital nephrotic syndrome (may be associated with polyhydramnios, raised AFP, large placenta, family history)
  - Any renal abnormality associated with oligohydramnios (e.g. echogenic kidneys)

ANTENATAL MANAGEMENT
- Refer to Nottingham Fetal Medicine team who will discuss with Paediatric Nephrologist
- Initial management plan discussed with parents and relevant neonatal team and copied to Neonatal Alert File
- Further scans will be undertaken by fetal medicine team as appropriate
- Provide parents with appropriate written information. Information is available at www.infoKID.org.uk. In addition copies of the following leaflets are available from Paediatric Nephrology (0115 970 9420 or extn. 61420):
  - Kidney and Bladder Problems Detected before birth by Ultrasound
  - Multicystic Dysplastic Kidney (MCDK) Explained
  - Posterior Urethral Valves, Urinary Tract Infection in Babies
  - Urinary Tract Infections in Babies

POSTNATAL MANAGEMENT
- Refer to individual management plan
- Document concerning clinical features:
  - Poor urinary stream (posterior urethral valve or other bladder outlet obstruction)
  - Palpable bladder or kidney
  - Systemically unwell
  - Other relevant positive clinical findings (eg. significant oligohydramnios and associated complications (eg. respiratory distress, talipes, developmental dysplasia of hips)
- Inform Paediatric Nephrology consultant on-call by pager within 24 hr
2.2.2 Moderate risk factors
(measurements refer to AP diameter at 18 – 20\(^6\) weeks gestation or later)

- Unilateral hydronephrosis AP diameter ≥20mm
- Bilateral hydronephrosis AP diameter ≥7mm but <10 mm
- Hydronephrosis AP diameter ≥7mm but <10mm in a fetus with a single kidney

ANTENATAL MANAGEMENT
- Repeat scan around 28 weeks and 34-36 weeks to assess development of dilatation
- Provide parents with written information eg. Kidney and Bladder Problems Detected before birth by Ultrasound (copies available from Paediatric Nephrology - NUH extn. 61420) or www.infoKID.org.uk

POSTNATAL MANAGEMENT – Are any of the following concerning clinical features present?
- Poor urinary stream (?posterior urethral valve or other bladder outlet obstruction)
- Palpable bladder or kidney
- Systemically unwell
- Other relevant positive clinical findings eg. significant oligohydramnios and associated complications (eg. respiratory distress, talipes, developmental dysplasia of hips)

Patients from outside the Nottingham area
- Refer to Paediatrician with responsibility for patients with AUTA.
- **Counsel parents regarding symptoms of urinary tract infection:** Provide urine sample collection bottle. Ask parents to see GP urgently (with clean catch urine specimen if possible) if any clinical suspicion of urinary tract infection such as fever, poor feeding, vomiting, diarrhoea, prolonged jaundice. *Note that fever may be absent in neonatal urinary tract infection.*
- **Antibiotic prophylaxis** is not recommended
- **Post natal USS** at 2-4 weeks recommended (If required, postnatal scans can be reviewed at the weekly Nottingham multidisciplinary radiology meeting and a management plan recommended. Contact link Paediatric Nephrologist to arrange)
- Follow algorithm relevant to postnatal USS diagnosis (section 3)
2.2.3 Mild risk features
(measurements refer to AP diameter at 18 – 20 weeks gestation or later)

- Unilateral multicystic dysplastic kidney with normal contralateral kidney
- Unilateral renal dysplasia / hypoplasia
- Single kidney with normal parenchyma and no dilatation
- Unilateral hydronephrosis AP diameter <20 mm
- Non obstructing ureterocele
- Other renal abnormality with normal liquor volume (eg. echogenic kidney, duplex system, horseshoe kidney):
  - these conditions should be treated according to degree of dilatation if present
  - if not dilated, discuss with Paediatric Nephrologist or Paediatrician with responsibility for patients with AUTA

ANTENATAL MANAGEMENT
- Repeat scan around 28 weeks and 34-36 weeks to assess development of dilatation
- Provide parents with written information eg. Kidney and Bladder Problems Detected before birth by Ultrasound (copies available from Paediatric Nephrology (NUH extn. 61420) or www.infoKID.org.uk

POSTNATAL MANAGEMENT – Are any of the following concerning clinical features present?
- Poor urinary stream (posterior urethral valve or other bladder outlet obstruction)
- Palpable bladder or kidney
- Systemically unwell
- Other relevant positive clinical findings eg. significant oligohydramnios and associated complications (eg. respiratory distress, talipes, developmental dysplasia of hips)

Inform Paediatric Nephrology consultant on-call by pager

Patients from outside the Nottingham area
- Refer to Paediatrician with responsibility for patients with AUTA.
- Counsel parents regarding symptoms of urinary tract infection: Provide urine sample collection bottle. Ask parents to see GP urgently (with clean catch urine specimen if possible) if any clinical suspicion of urinary tract infection such as fever, poor feeding, vomiting, diarrhoea, prolonged jaundice. Note that fever may be absent in neonatal urinary tract infection.
- Antibiotic prophylaxis is not recommended
- Post natal USS at 2-6 weeks recommended (If required, postnatal scans can be reviewed at the weekly Nottingham multidisciplinary radiology meeting and a management plan recommended. Contact link Paediatric Nephrologist to arrange)
- Follow algorithm relevant to postnatal USS diagnosis (section 3)
3. Further Postnatal Management

The further investigations required depend on the results of the postnatal ultrasound. Note that, ultrasound before 48hrs age may be unreliable due to relative oliguria.

The following algorithms detail management of the following:

3.1 Multicystic dysplastic kidney - page 9
3.2 Solitary kidney/ unilateral hypoplasia or dysplasia with normal contralateral kidney – page 10
3.3 Urinary tract dilatation – page 11

If required, postnatal scans can be reviewed at the weekly Nottingham multidisciplinary radiology meeting and a management plan recommended. Contact Paediatric Nephrology department extn. 61420 or 0115 970 9420 to arrange import of scans.

Note that although the majority of patients will not be on prophylactic antibiotics from birth, patients having a micturating cystourethrogram (MCUG) need antibiotic cover. In view of current bacterial sensitivities cephalaxin at a treatment dose is recommended for 3 days starting the day before the test\(^3\). It is helpful to obtain a catheter specimen of urine at the time of MCUG should the need for treatment of an intercurrent urinary tract infection arise.

From the age of 2, estimated GFR should always be calculated from the creatinine. This is automatically reported for in-patients in Nottingham Children’s Hospital. For patients in whom this is not available see Appendix 3.
Audit data in Nottingham has shown that DMSA is not required for diagnosis of MCDK. If similar data are available locally, DMSA can be omitted. From the age of 2, estimated GFR should always be calculated from the creatinine. See Appendix 3.

3.1 Algorithm for management of MCDK

**USS at 4 – 6 weeks post delivery**

- Febrile UTI
- Contralateral pelvic AP diameter >10 mm
- Ureteric dilatation

**no**

3 months age:
- DMSA
- Creatinine (abnormal if above 35 μmol/l)
- blood pressure (see bp guideline)
- urinalysis

**yes**

- Consider MCUG² (with antibiotic cover cephalexin treatment dose for 3 days starting the day before the test³) +/- MAG3
- Consider prophylaxis

Annual follow up:
- Blood pressure
- Urinalysis

Additionally at 2 yr follow up:
- USS

Additionally at 5 and 10 yr follow up:
- USS
- Creatinine (calculate eGFR³)

After 10 years, if normal parameters, consider discharge to GP for lifelong annual:
- Blood pressure
- Urinalysis

**Indications for referral to Paediatric Nephrologist at any stage:**

- Hypertension
- Proteinuria >20 mg/mmol creatinine on early morning specimen (EMU)
- Lack of compensatory hypertrophy on USS
- GFR < 90 ml/min/1.73m²

**With indications for referral to Paediatric Nephrology clearly communicated in writing**

*Audit data in Nottingham has shown that DMSA is not required for diagnosis of MCDK. If similar data are available locally, DMSA can be omitted.

² From the age of 2, estimated GFR should always be calculated from the creatinine. See Appendix 3.
3.2 Algorithm for management of single kidney / unilateral dysplasia or hypoplasia with normal contralateral kidney

USS at 2 – 6 weeks post delivery

Ectopic kidney identified

no

yes

Discuss with relevant paediatrician

- Febrile UTI
- Contralateral pelvic AP diameter >10 mm
- Ureteric dilatation

3 months age:
- DMSA*
- Creatinine (abnormal if above 35 mmol/l)
- blood pressure (see bp guideline)
- urinalysis

Annual follow up:
- Blood pressure
- urinalysis

Additionally at 2 yr follow up:
- USS

Additionally at 5 and 10 yr follow up:
- USS
- Creatinine (calculate eGFR³)

After 10 years, if normal parameters, consider discharge to GP for lifelong annual:
- Blood pressure
- Urinalysis

* may be omitted if presence of ectopic renal tissue has been confidently excluded by other means

³ From the age of 2, estimated GFR should always be calculated from the creatinine. See Appendix 3.
3.3 Algorithm for management of urinary tract dilatation following postnatal ultrasound.

Postnatal scan AP pelvic diameter ≥20mm
Or AP diameter >10mm and clinical history of:
- oligohydramnios
- palpable kidney or bladder
- or poor urinary stream
- or solitary kidney

- Discuss promptly with consultant experienced in management of severe renal abnormality
- Refer to individual management plan

### Severe reflux (≥ grade 3)
- Consider trimethoprim prophylaxis 2mg/kg once a day
- Consider creatinine check if bilateral involvement (abnormal if >35 µm/l)

- Consider DMSA
- Continue follow up with vigilance for UTI

- Repeat USS 2 years age
- Consider stopping antibiotics if normal and no UTIs for previous year (alternatively continue prophylaxis until out of nappies – discuss preference of parents)

- Repeat USS 5 years age

### Non specific mild dilatation
- No reflux or
- Degree of reflux not sufficient to account for degree of dilatation

MAG 3 with furosemide

- Abnormal
- Normal

Repeat USS at 1yr

Discharge if dilatation resolved

Discuss with relevant Paediatrician. Cases may be discussed at the Nottingham Multidisciplinary Meeting if required (see p8)

### Postnatal scan AP pelvic diameter ≥10mm and <20mm and no clinical history of:
- oligohydramnios
- palpable kidney or bladder
- or poor urinary stream
- or no other renal abnormality

Routine MCU with antibiotic cover:
cephalexin treatment dose for 3 days starting the day before the test

- No antibiotic prophylaxis
- No routine follow up
- Review if UTI diagnosed

Mild reflux (≤ grade 2)
- No antibiotic prophylaxis
- Regular follow up with vigilance for UTI
- Consider prophylaxis if UTI diagnosed

- Repeat USS 2 years age

Assess:
- Scarring
- Renal size
- Ongoing UTIs

### Postnatal scan AP pelvic diameter <10mm and
- no calyceal or ureteric dilatation
- normal renal size
- no other renal abnormality

### Postnatal scan AP pelvic diameter
AP pelvic diameter <10mm and
- no calyceal or ureteric dilatation
- normal renal size
- no other renal abnormality

- Repeat USS 5 years age

### Discharge if:
- No scarring
- Normal renal size
- No dilatation
- No UTI off prophylaxis for at least one year

### Unilateral scarring and/or ongoing UTIs
- refer to paediatrician with appropriate expertise to monitor for and manage hypertension / recurrent UTIs

### Bilateral scarring and/or bilateral small kidneys
- refer to Paediatric Nephrologist

### Assess:
- Scarring
- Renal size
- Ongoing UTIs
4. **Audit Points**
   1. Are investigations undertaken as per guidelines?
   2. Are referrals made to paediatric nephrology appropriate and at the correct time?
   3. Has the patient been offered written information about the condition?
   4. What proportion of fetuses with dilated systems at 20 weeks were subsequently found to have systems within normal range on subsequent antenatal scans? Of these, what proportion were found to have abnormalities on the postnatal scan?

5. **References**
   3. NICE guidelines UTI in children August 2007
Appendix 1

REFERRAL FOR ANTENATALLY DETECTED URINARY TRACT ABNORMALITY

Please fill in the details as requested and FAX to number below – this form acts as the referral letter to the Paediatric Nephrologists. Ensure Trust front sheet is sent first for reasons of confidentiality.

**Mother**

(affix hospital identity label)

**Infant**

Name ………………..

Sex M/F

K number……………..

Date of Birth……………..

NNU Consultant……………..

Phone No: ……………………………………..

**Problem:** (describe findings on antenatal scans)

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

Was oligohydramnios diagnosed / suspected? Yes/No

Were parents counselled by renal team member before birth? Yes/No

**Physical findings after birth:**

Urinary stream: Good / Poor / Not documented (Parents to observe at home)

Palpable kidney(s)? Yes / No

Palpable bladder? Yes / No

Other findings: eg. (dysmorphism / respiratory status / general wellbeing)

Information sheet given re UTI Yes / No

…………………………………………………………………………………………………

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…………………………………………………………………………………………………

Please do NOT book investigations. Paediatric Nephrologist will do this.

**Referring Doctor:**

Name: ……………….. Designation: ………….. Date: ………………..

Hospital: City/ Queen’s Campus* (*delete)

Please send form together with maternal notes and baby notes (if created) to Judith Hayes, Medical PA to Paediatric Renal Team, E17 Children's Renal & Urology Unit, QMC Campus. (Phone ext 64120, fax internal 61419)

Tracking for notes: PRUSEC
Appendix 2 – UTI Information leaflet for parents

Urinary Tract Infections in Babies

In all children it is important to be aware of the possibility of a urinary tract infection (infection in your child’s urine or wee).

It is important that your baby is seen by a doctor and a urine sample collected to test for infection, if your baby, for example,

- has a fever
- is unwell
- has persistent vomiting
- has diarrhoea
- is not feeding well

If you have been given a sterile collection container, you can collect a urine sample at home before seeing the GP, but if your baby is very unwell, do not let this delay you seeing the doctor.

Here’s how to collect the sample:

- This is best done after a feed, with your baby lying on a clean nappy.
- Clean your baby’s bottom with cotton wool, using warm water only (not soaps, cleansers or baby wipes). Wipe from front to back.
- Open the sterile container and put the top facing downwards in a clean place nearby.
- Hold the container ready to catch the wee. Take care not to touch your baby’s skin (this can make the sample inaccurate).
- When your baby wees, catch some of the urine in the container, again taking care not to touch your baby’s skin. It doesn’t matter if you only get a small amount of wee.
- Put the top back onto the container, touching only the outside.
- Take this to the GP surgery as soon as possible. If it is after hours and your baby is not so ill as to need to see an emergency doctor, store the specimen in your fridge and drop it in to the GP first thing the next day.

Your GP can then test the urine with a dipstick and if it tests positive, give your baby antibiotic treatment. They will send the sample to the lab to confirm the diagnosis.
Appendix 3 - Estimated GFR

Estimated GFR is automatically reported in all in-patients in Nottingham Children’s Hospital over 2 years of age.

Where automated GFR is unavailable use the formula;

\[ \text{GFR} = \frac{k \times \text{ht (cm)}}{\text{creatinine (μmol/l)}} \]

Ideally k should be validated locally eg in Nottingham;

- \( k = 36 \) for males older than 13
- \( k = 30 \) for all others

If a locally validated k value has not been established then \( k=40 \) should be used.